JAPAN INTERNATIONAL COOPERATION AGENCY

DEPARTMENT OF THE INTERIOR AND LOCAL GOVERNMENT
THE REPUBLIC OF THE PHILIPPINES

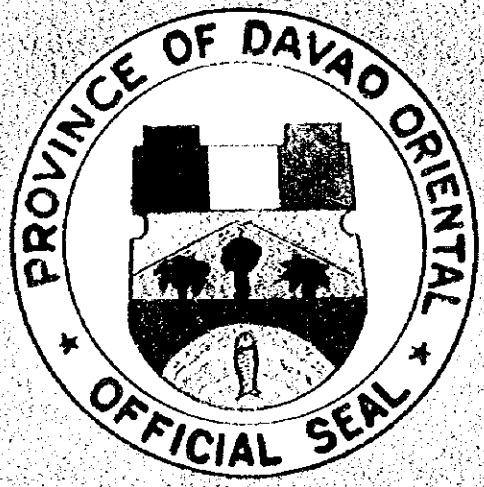
THE STUDY ON THE PROVINCIAL WATER SUPPLY, SEWERAGE AND SANITATION SECTOR PLAN IN THE REPUBLIC OF THE PHILIPPINES

VOLUME I - [1]

MAIN REPORT

PROVINCIAL WATER SUPPLY, SEWERAGE AND SANITATION SECTOR PLAN FOR THE PROVINCE OF

DAVAO ORIENTAL



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Republic of the Philippines
Province of Davao Oriental
OFFICE OF THE PROVINCIAL GOVERNOR
Mati

MESSAGE

The preparation of the Provincial Water Supply, Sewerage and Sanitation Sector Plan (PW4SP) is timely in the light of decentralization and devolution. For so long a time, water and sanitation had always been recognized as a prevailing concern but as to what extent it was not made known until the preparation of this PW4SP.

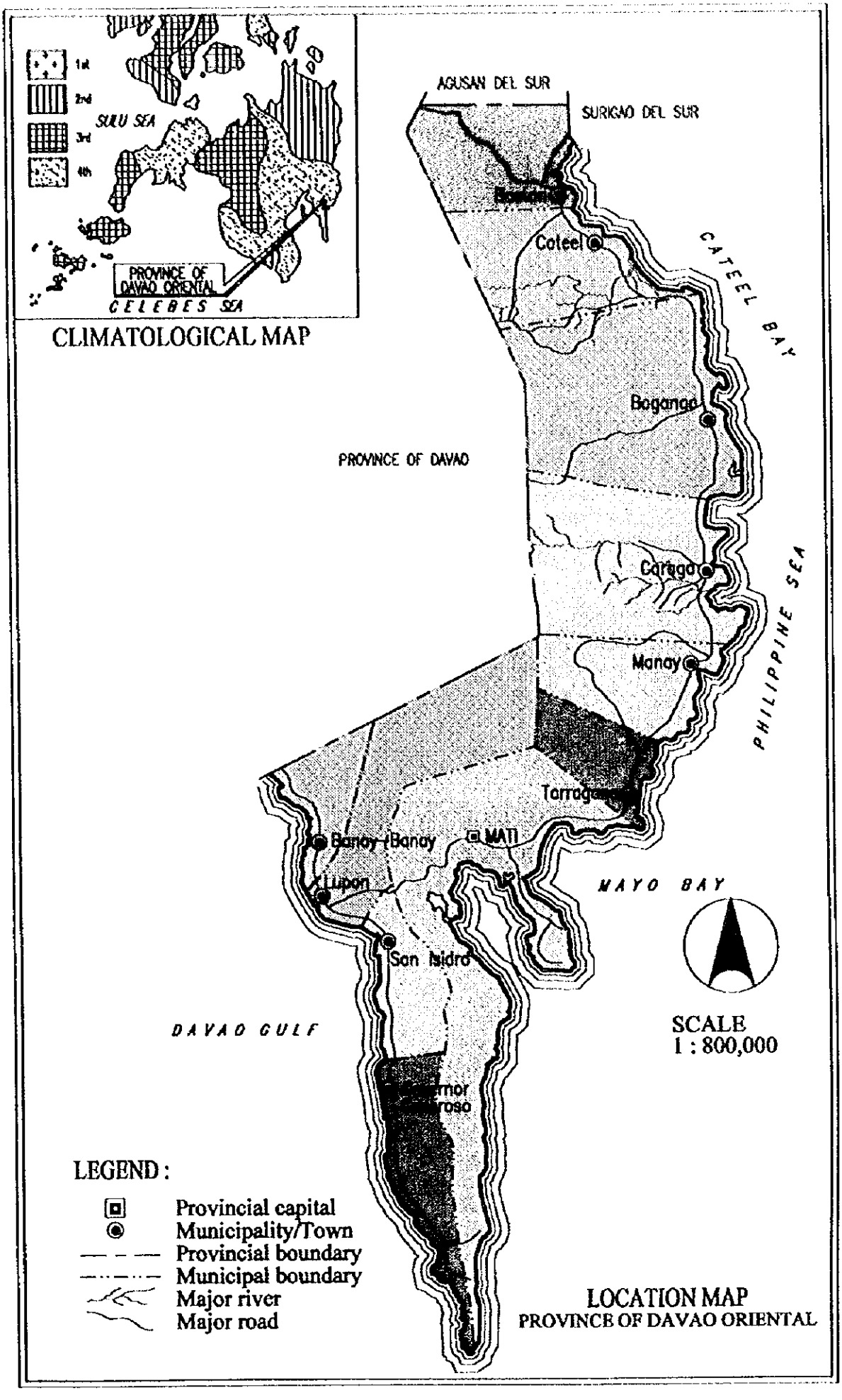
The unwavering support of the Japan International Cooperation Agency (JICA) in terms of extending technical assistance to the LGUs opened up avenues towards looking at the WATSAN sector in terms of service delivery with utmost efficiency, effectiveness and adequacy. Normally we content ourselves with implementing WATSAN projects in a fragmented and palliative manner. We failed to take a look at the economic dimension of the WATSAN Sector where investment costs are directly proportional to the number of the population that would benefit from the project.

With the formulation of the PW4SP, we hope to come-up a comprehensive sector development plan through the future and provide a basis in our budgeting allocation for local and outside funding assistance. Also, we envision the PW4SP to provide us with the framework of institutionalizing bottom-ups planning as a mechanism of ensuring sustainability.

It is therefore with profound gratitude that we acknowledge the assistance of the Department of the Interior and Local Government (DILG) and other agencies in building the capabilities of the LGUs to rise to the challenges brought about by the New Local Government Code. It is with great expectation that the plan we successfully formulated will find its way towards getting the much needed resources to ensure that the identified projects get implemented thus, the goal of improving the quality life of our people will be achieved.

To the Provincial Sector Planning Team (PSPT) members, congratulations for a job well done!

ROSALIND Y. LOPEZ
Governor



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PROVINCIAL WATER SUPPLY, SEWERAGE AND SANITATION SECTOR PLAN

VOLUME I MAIN REPORT

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PROVINCIAL WATER SUPPLY, SEWERAGE AND SANITATION SECTOR PLAN

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LIST OF ABBREVIATIONS

AC-PO	-	Area Coordinator-Project Officer
ADB	-	Asian Development Bank
AIDAB	-	Australian International Development Assistance Bureau
AIM	-	Asian Institute of Management
AIP	-	Annual Investment Plans
BC	-	Barangay Council
BDC	-	Barangay Development Council
BLGF	-	Bureau of Local Government Finance
BMGS	-	Bureau of Mines and Geo-Sciences (defunct), the now Mines and Geo-Sciences Bureau
BOD	-	Biochemical Oxygen Demand
BOD/Officers	-	Board of Director/Officers
BWP	-	Barangay Water Program
BWSA	-	Barangay Waterworks and Sanitation Association
CBO	-	Community-Based Organizations
CD	-	Community Development
CDA	-	Cooperative Development Authority
CDF	-	Countryside Development Fund
CDTS	-	Community Development and Training Specialist
CEP	-	Capacity Enhancement Program
CIDA	-	Canadian International Development Agency
CLGOO	-	City Local Government Operations Officer
CO-CD	-	Community Organization-Community Development
CPC	-	Country Program for Children
CPH	-	Census on Population and Housing
CPSO	-	Central Project Support Office
CSC	-	Civil Service Commission
D/D	-	Detailed Design
DA	-	Department of Agriculture
DAP	-	Development Academy of the Philippines
DBM	-	Department of Budget and Management
DECS	-	Department of Education, Culture and Sports
DENR	-	Department of Environment and Natural Resources
DEO	-	District Engineering Office
DF	-	Development Fund
DILG	-	Department of the Interior and Local Government
DOF	-	Department of Finance
DOH	-	Department of Health
DPWH	-	Department of Public Works and Highways
DSWD	-	Department of Social Welfare and Development
DTI	-	Department of Trade and Industry
EVS	-	Environmental Sanitation
F/S	-	Feasibility Study
FHSIS	-	Field Health Service Information System
FW4SP	-	First Water Supply, Sewerage and Sanitation Sector Project
GAD	-	Gender and Development
GFI	-	Government Financial Institution
GO	-	Government Office
GOP	-	Government of the Philippines

GOJ	-	Goverment of Japan
HH	-	Household
IBRD	-	International Bank for Reconstruction and Development
IEC	-	Information, Education and Communication
IRA	-	Internal Revenue Allotment
IRR	-	Implementing Rules and Regulations
ITN	-	International Training Network
JICA	-	Japan International Cooperation Agency
LBP	-	Land Bank of the Philippines
LGC	-	Local Government Code
LGU	-	Local Government Unit
LWUA	-	Local Water Utilities Administration
MDC	-	Municipal Development Council
MDF	-	Municipal Development Fund
MEO	-	Municipal Engineer's Office
MHO	-	Municipal Health Office
MLGOO	-	Municipal Local Government Operations Officer
MOA	-	Memorandum of Agreement
MOOE	-	Maintenance Operating and Overhead Expenses
M/P	-	Master Plan
MPDO	-	Municipal Planning and Development Office
MS	-	Monitoring Specialist
MSL	-	Municipal Sector Liaison
MSLT	-	Municipal Sector Liaison Team
MTPDP	-	Medium-Term Philippine Development Plan
MWSS	-	Metropolitan Waterworks and Sewerage System
MWSTF	-	Municicipal Water and Sanitation Task Force
NAMRIA	-	National Mapping and Resource Information Authority
NCRFW	-	National Commission on the Role of Filipino Women
NDCC	-	National Disaster Coordinating Council
NEDA	-	National Economic and Development Authority
NGOs	-	Non-Governmental Organizations
NIA	-	National Irrigation Administration
NMP	-	National Master Plan
NMYC	-	National Manpower Youth Council
NSDW	-	National Standard for Drinking Water
NSO	-	National Statistics Office
NSMP	-	National Sector Master Plan
NWRB	-	National Water Resources Board
O&M	-	Operation and Maintenance
ODA	-	Overseas Development Assistance
OECF	-	Overseas Economic Cooperation Fund
PA	-	Provincial Administrator
PAIASO	-	Provincial Accounting and Internal Audit Service Office
PBO	-	Provincila Budget Office
PD	-	Presidential Decree
PDC	-	Provincial Development Council
PEO	-	Provincial Engineer's Office
PHO	-	Provincial Health Office
PIO	-	Public Information Office
PGSO	-	Provincial General Services Office
PLGOO	-	Provincial Local Government Operations Officer
PMC	-	Project Monitoring Committee
PMO	-	Project Management Office
PMU	-	Provincial Monitoring Unit

POPCOM	-	Population Commission
PoW	-	Program of Work
PPAC	-	Philippine Plan of Action for Children
PPDC	-	Provincial Planning and Development Coordinator
PPDO	-	Provincial Planning and Development Office
PSPT	-	Provincial Sector Planning Team
PST	-	Provincial Sector Team
PTA	-	Parent Teacher Association
PTO	-	Provincial Treasury Office
PW4SP	-	Provincial Water Supply, Sewerage and Sanitation Sector Plan
PWSC	-	Provincial Water Supply and Sanitation Coordinator
PWSO	-	Provincial Water and Sanitation Office
RA	-	Republic Act
RDC	-	Regional Development Council
RDCC	-	Regional Disaster Coordinating Council
RHO	-	Regional Health Of
RHUs	-	Rural Health Units
RPMC	-	Regional Project Monitoring Committee
RSI	-	Rural Sanitary Inspector
RWSA	-	Rural Waterworks and Sanitation Association
SB	-	Sanggunian Bayan
SP	-	Sanggunian Panlalawigan
SSI	-	Supervicing Sanitary Inspector
SWL	-	Static Water Level
TESDA	-	Technical Education and Skills Development Authority
TCP	-	Teacher-Child-Parent
UNDP	-	United Nations Development Programme
UNICEF	-	United Nations International Children's Emergency Fund
VIP	-	Ventilated Inproved Pit Latrine
WASAMS	-	Water and Sanitation Monitoring System
WATSAN	-	Water and Sanitation
WC	-	WATSAN Center
WD	-	Water District
WHO	-	World Health Organization
WID	-	Women in Development
WSSE	-	Water Supply and Sanitation Engineer
WSS-PMO	-	Water Supply and Sanitation-Project Management Office

EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

1. Introduction

Background and Objectives

The Provincial Water Supply, Sewerage and Sanitation Sector Plan (PW4SP) for the province of Davao Oriental was prepared by the Provincial Sector Planning Team with technical assistance from Japan International Cooperation Agency (JICA). The PW4SP will be the basis for execution of sector development from proceeds of sector loan by foreign donors, LGU's budget including internal revenue allotment from the National Government and private sector investments.

The PW4SP covers a Long-Term Development Plan (2004-2010) and a Medium-Term Investment Plan (1999-2003) to achieve the provincial targets of water supply, sewerage and sanitation sector. The plan includes arrangements and logistics for implementation and measures to strengthen operational frameworks and institutional capabilities that embody community development and gender responsiveness. As an initial step towards capability building, the Study was designed with the end view of strengthening the LGUs capability in sector plan preparation through conduct of series of workshop and hands-on training.

Planning Approach for Future Sector Development

The primary bases of the PW4SP are national sector policies and strategies, as well as major legislation and regulations relevant to the sector. The guidelines for setting the provincial sector targets are the three national level plans: the Philippine National Development Plan (1999-2024), the Water Supply, Sewerage and Sanitation Master Plan of the Philippines (1988-2000) and the Updated Medium Term Philippine Development Plan (1996-1998). The GOP recently approved the IRR providing detailed arrangements on the devolution of WATSAN responsibilities and resources. Parallel to this are the current sector policies and strategies, to wit: i) self-reliance and local community management of services; ii) an integrated approach to water, sanitation and hygiene education; iii) cost sharing arrangement; iv) cost recovery of capital and O&M; v) private sector participation; and vi) an integrated water resources strategy.

The PW4SP will help ensure that sector investments are optimized in consideration of fund and water source availability constraints as well as planning capacity. It is envisaged that the Plan

will be progressively updated as its implementation proceeds. Furthermore, future detailed studies and plans for project implementation shall be conducted in the context of the PW4SP.

A data management system was established as a tool to come up with the outputs commensurate to the objectives of the provincial plan and at the same time reflect the planning approach. It will provide a map of relative needs in the province allowing for adjustment and updating when further information becomes available. Different scenarios maybe worked out by planners using the program by changing key parameters based on planning assumptions and conditions.

Report Composition

Three (3) study reports were prepared as follows: i) Main Report (Volume I) which presents the results of the whole study consisting of 12 chapters; ii) Supporting Report (Volume II); and iii) Data Report (Volume III). Supporting materials including alternative studies and detailed calculations, and data/information constitute the last 2 reports.

2. Provincial Profile

Davao Oriental is one of the 6 provinces in Region XI, the Southern Mindanao Region. The capital town of Mati is about 165km from Davao City, the regional center. It is composed of 11 municipalities with 183 barangays, of which 23 are urban and 160 rural. The province is classified as 2nd class. At the municipal level, the municipalities are either 1st to 4th class. There are no 5th and 6th class municipalities. The population of the province was 413,472 in 1995 with an annual growth rate of 0.87% between 1990 to 1995.

Physical Features

There are 2 types of climate being experienced in the province: Type II in the northern part, which is characterized by an absence of dry season with very pronounced maximum rain period and Type IV, in the southern part, characterized by an evenly distributed rainfall throughout the year. The province is considered as less visited by typhoons. The topography of the province is mostly mountainous with high elevations and steep slopes. Comparatively wide alluvial areas are in Lupon and in Mati. Principal river systems are Cateel, Manurigao, Caraga, Casauman, Bitanagan and Sumlog. Gold mining activities if left uncontrolled are potential sources of surface water pollution. About 63% of the total land area of the province constitute forestland, while 29% are agricultural and built-up areas. The remaining forest cover must be conserved to serve as watershed rather than as source of timber.

Socio-economic Aspects

Agriculture is the major economic activity in the province. The mean annual family income in 1994 was P41,796 which was well below the national average of P83,161. Moreover, about 62% of the total number of families lived within and below the established poverty threshold income of P41,579 in Region XI.

All municipalities have electric supply services with 68% household coverage. Telecommunication is also available to all municipalities. Transportation can be obtained by means of jeepneys and buses on land and on sea, by motorboats. There are only 17 banking institutions, 428 industrial/commercial establishments and 63 tourism-related facilities. With regard to social services, there are 361 schools, 10 hospitals, and 161 health units and barangay health stations.

Provincial population growth rates had been declining for the last 6 censal years. The 1997 population was estimated to provide the planning base for this provincial plan. Urban-rural classification of barangays was modified to reflect actual conditions of the area and using this classification, rural population accounts for 69%, while the remaining 31% are urban.

An indicator of health problem related to water supply and sanitation is the high incidence of water-related diseases. The reported cases in the province were typhoid, skin disease, diarrhea, dysentery, filariasis, malaria and dengue fever.

Environmental problems related to wastewater discharge and unsanitary solid waste disposals are occurring in parts of the province. Major pollution sources in urban areas are domestic wastewater and dumped garbage. Only 20% of the total households in the province relied on the municipal refuse collection services.

3. Existing Facilities and Service Coverage

The service coverage of each sub-sector is estimated as percentages of served population/ households/utilities against the total number. In water supply, safe classification of Level I facilities is introduced and further categorized into public or private. Aside from household toilets, school toilets and public toilets are included in the sanitation components in view of public hygiene improvement. Preliminary discussions on solid waste management are also considered.

Water Supply

The province has 20 Level III systems in 8 municipalities. These systems are operated under different kinds of ownership: WDs (4 systems); provincial waterworks (1), municipal waterworks (2) and barangay waterworks (13). A total of 11 systems utilize springs and the remaining 9 are deep wells. Common issues encountered are inadequate capacity of distribution pipes due to inappropriate planning and designing, high unaccounted-for-water, no regular disinfection, poor water quality (high turbidity and possible contamination of heavy metals due to mining activities). Collection efficiency of water charges is quite high at bigger waterworks, but at small waterworks, even the analysis on charge collection is not practiced due to weak management practice.

Seventy two (72) Level II systems, mostly using springs, are operating in all municipalities covering 8 urban and 64 rural barangays. However, in some of these systems, expansion of distribution line and installation of additional 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 and supply interruption. These Level II systems impose flat rate water charge or supply water free of charge. This practice has negative implications on the financial savings to cope with future repair and depreciation. Cost recovery is a prerequisite in sector management.

The 6,404 operational Level I facilities in the province consist of shallow, deep and dug wells, springs, and rainwater collectors. Of these facilities, 4,256 are considered as safe sources. Among the unsafe sources are 1,430 shallow wells and 632 open dug wells. Most of these unsafe sources are located in nearby potential pollution sources, hence, for new construction of shallow wells, proper site selection and appropriate construction method shall be applied together with periodic water quality monitoring. Percentage shares between public and private Level I facilities for rural water supplies are 38% and 62%, respectively. Nonetheless, non-functioning public Level I facilities account for 41% and 29% of the total number of deep and shallow wells, respectively. The share of developed springs in public facilities is 26%. The BWSA or users are responsible on O&M, however it is almost negligible.

About 52% or 223,300 of the present population (427,200 comprising 31% in urban area and 69% in rural area) are adequately served. Under area classification, 63% of urban population and 47% of rural population have access to safe water sources/facilities. Of the served population, only 15% or 33,300 persons are served by Level III systems. About 59% or 129,700 persons depend on Level I facilities, while the rest relies on Level II systems.

Sanitation

The service coverage with sanitary toilets in the province is 68% or 55,000 of the total households, which is a little bit higher than the national coverage of 66%. These toilets consist of 8% flush type and 92% pour-flush type (the province has just recently introduced the construction of VIP-type). In municipalities that have higher water service coverage, higher sanitation coverage occurs and adversely, in lower water supply coverage, lower sanitation coverage also occurs. Service coverage in urban area is 51%, while in rural area, the coverage is 75%. Although high percentage of sanitary toilets is disclosed in urban areas, problems arise from the unsatisfactory disposal of the effluent from the septic tanks or the direct discharge of wastewater to the local drains. Sullage management is unheard of.

The province has a total of 2,058 toilets installed at 347 schools. Only 66% of the students is adequately served by sanitary toilets. The present average ratio of 66 students per sanitary toilet is well below the service level standard of 40 students per sanitary facility. Some of these facilities are not being used due to lack of water supply, destroyed plumbing fixtures and water tank seepage. There are 42 public utilities; public markets, bus/jeepney terminals, and parks or plazas. About 55% of these are served with sanitary toilets. However, the manner of usage and maintenance are improper rendering the facilities unsanitary.

4. Existing Sector Arrangements and Institutional Capacity

Institutional Framework

The Local Government Code has essentially re-defined the role, relationship and linkages of central, provincial, municipal and barangay institutions in the provision of social basic services, including water and sanitation. The new direction mandates the LGUs to play a larger role in planning and implementing water supply and sanitation projects, however, this has raised serious institutional capacity and resource reallocation issues.

Drastic changes took place among the DPWH, DILG, DOH and LGUs after the government's decentralization and issuance of the NEDA Board Resolution No.4 (1994). With the purpose of ensuring common interpretation of the Resolution, the Implementing Rules and Regulations (IRR) for the relevant sector was prepared. Those of implementing water supply projects, DPWH used to undertake, are now transferred to the LGUs. The functions of the then IPHO under the DOH have been devolved to the LGUs. Thus, DILG now undertakes the overall coordination function for the implementation of the WATSAN projects of LGUs. The Water Supply and Sanitation-Project Management Office (WSS-PMO), a unit within DILG, is primarily responsible for water and sanitation activities.

At the provincial and municipal levels, there are central agency field offices (DPWH and DILG) and LGU offices working on the sector. Water districts, RWSAs and BWSAs have been organized to deal with the actual delivery of services. Some LGUs implement and operate municipal or provincial water and sanitation systems. Project management offices (PMOs at the central level), ad hoc inter-agency committees and task forces have been organized to address co-ordination issues.

The current major institutional issues are those of management of the transition process and of re-establishing the leadership for the sector. Major resource realignments and capacity building initiatives are needed. At the local level, LGUs' capacity for the sector project is insufficient and will require substantial input and support.

There is wide dissatisfaction among implementers themselves over the existing monitoring system. This leads to the problem of reliability of information coming from the field. There is a need to establish a system, which is perceived as having a direct link to performance, similar to project-based monitoring.

Community Development

There has been very limited experience in the province in planning or implementing community development processes for the WATSAN sector projects. CD/CO work was implemented using the process employed by past sector projects, particularly the Barangay Water Program. As such, there is an apparent lack of a permanent structure and of the identified major responsible players on CD in the LGUs, which create a serious gap to the critical linkage and support of sector projects, from the provincial to the municipal and as far down as the barangay levels. Also, training programs that should update the knowledge and skills of LGUs on this important activity has been very few and far between.

Gender Consideration

The Philippine Government recognizes gender responsiveness as a catalyst of growth and development and adopts the "Philippine Plan for Gender Responsive Development (1995-2025). The Plan aims to pave the way for full participation of women and men in planning and implementation of technology for infrastructure projects, including the WATSAN sector. All government agencies were directed to revise and review regulations and procedures to remove any gender bias and to incorporate gender concepts in their projects. The DILG implements gender responsive WATSAN projects. Sector projects in the past, especially for rural water supply and sanitation that were funded by ADB, UNDP and World Bank had emphasized women's participation in the association or O&M activities.

In the province, the concept of gender and development is still relatively new and government policies have not yet trickled down the LGU officials and beneficiaries. As such, gender disaggregated information/data that will give a clearer perspective to guide sector planners in designing gender-sensitive projects are lacking, among others, type of participation, practices, and health. In this regard, a province-wide survey and group interviews were undertaken to assess gender sensitivity of barangay officials and constituents in the roles of both men and women as well as their modes of participation in sector projects.

The findings are enumerated below. In general, there is no gender bias in the manner by which WATSAN activities are being practiced:

- water fetching responsibility - There is no designated gender as to who is responsible for fetching water. The responsibility lies on whoever is available.
- operation and maintenance activities - Most community members could not determine who is responsible for the O&M of water supply facilities. But they expressed willingness to contribute for the O&M of future projects.
- barangay organizations - These are still male-dominated. Most chairpersons/heads are males, while women occupy the traditional roles, such as secretary or treasurer.
- consultation and project participation - Most of the men and women were not consulted during project planning and implementation.
- training - Both men and women have access to training and are interested to learn new skills. Health education training programs, however, are usually attended by females.

5. Past Financial Performance in Water Supply and Sanitation

Since the devolution of the water supply and sanitation project to the LGU in 1992, the LGUs have been dependent on the Internal Revenue Allotment (IRA) for their financial requirements. For the period 1994-1998, IRA of the province represented 95% of the total income. It has no economic enterprises to derive additional local income. On the other hand, actual expenditures during the said period mainly comprised personnel (59%), operation and maintenance expenses (38%), and capital outlay (3%). In 1997, the province had a net loss of ₱2.22 million from receipts of P206.36 million after deducting expenditures of ₱190.5 million and capital outlays of ₱18,079 million. In the year of 1998, a net loss of only ₱5,000 is projected after deducting capital outlay of ₱9.8 million. Its debt servicing capacity is computed to be ₱43.82 million for the year 1998, which is maximum loanable amount through the MDF.

Funds for the capital outlay is mainly derived from the 20% DF of the IRA. During the period 1995-1998, the total funds available for the capital outlay were relatively sufficient to cover planned capital outlay requirements. However, the allocation to the relevant sector was minimal at 5.8% of the DF or about 1% of IRA.

Sector investments during the period 1995-1998 amounted to about ₱81.2 million, 9% of which was funded by the province. The investment for Level I water supply was the largest with ₱40 million or about 50% of the total investment, while those for Level II and III shared 25% and 21%, respectively.

The sector projects in previous years were implemented by the DPWH and the DILG. In the past, the province received assistance through the Barangay Water Supply Projects funded under UNICEF and ODA (part of General Appropriations Act-national budget). Level I water supply facilities were also provided through OECF loan.

With regard to the capital cost recovery for Level I water supply, it was free to the community in the past. For Level II systems, the cost is shouldered by the RWSA through a loan or grant, while for Level III, the WDs or RWSAs bear the entire cost. The capital cost for Level III is usually financed by the LWUA for a period of up to 30 years with interests ranging from 8.5-12.5 %. For less capable WDs, soft loans without interest for the first 5 years of operations are available.

In 1998, a cost sharing scheme was authorized, which prescribed that for any central government grants that are provided for the development of Level I water supply systems and sanitation facilities to the limited municipalities, the LGUs and beneficiaries concerned shall share the capital cost required. No subsidies from the central government will be provided for the construction of Level II and Level III water supply systems.

The O&M cost for Level I and II water supply systems is the responsibility of the users. It is mandatory that the community shall organize themselves into an association that handles collection of water charges as well as O&M of the facility. The monthly fees for Level I in the active association range from ₱20 to ₱30 per household, while those for Level II are ₱80 in average. For Level III systems, O&M cost is basically covered by user's fees. LWUA's policy is to make WDs financially viable, self-sufficient and be able to repay their loans obtained to improve water supply services. Four (4) WDs are currently operational and have current loan arrears with LWUA. In addition, there are sixteen (16) waterworks in operation.

The percentage of water fee to median monthly household income is about 2-3% for Level III, 2.3% for Level II, and less than 1% for Level I. Thus, the current water rates in all service levels are within an affordable range. On the other hand, construction cost of household toilet seems to be expensive comparing with the family income.

6. Water Source Development

The study on water source development covers all the municipalities in the province. It gives an emphasis on ground water sources rather than surface water considering its economic advantages and current practices in potable water use.

The geologic rock units observed in the province are classified into three (3) main groups based on the ages of the rock formations: Miocene and Older rocks, Pliocene to Pleistocene Rocks and Recent Deposits. The Miocene and Older Rock units cover about 79% of the total provincial area and are largely distributed in the mountainous area on the west and southwest sides of the province. Rocks classified as Pliocene to Pleistocene, which underlie about 11% of the total land area of Davao Oriental, are partly distributed in the marginal areas between the Older rock units and Recent deposits. The sediments cover the largest peninsula extending to south of Lupon, east of Mati, and the west of Baganga. The Recent Deposits make up about 10% of the province and are distributed in a limited area along the seashore.

For planning purposes in the development of groundwater sources, the provincial area is divided into shallow well, deep well and difficult areas. The shallow well area is located in the southern part of Lupon and the southern rim of the peninsula in the town of Mati. Deep well area covers about 13% of the province, while 83% of the provincial domain is classified as difficult areas. The groundwater in the province is generally potable except in some areas with high iron content and salt-water intrusion. High iron concentration was reported in the coastal areas of Baganga, Dapnan and Cateel. Salt water intrusion occurs in many areas such as: i) a large peninsula located south of Lupon; ii) the western area along the coastal line of Mati; iii) a peninsula extending south of Mati; and iv) the eastern coastal areas from Boston to Baculin, of San Luis area, and from San Antonio to Jovellar. Difficult areas covered by Miocene and Older Rocks generally have alluvial sediments in the narrow areas along the streams. In such places, groundwater development by means of shallow and deep wells may be often possible, though the development potential is very limited. In addition, the mountainous areas mostly occupy difficult areas and springs in these areas are the most possible water sources for development.

Based on the inventory of water sources prepared through the study, the province has 480 developed springs currently serving the province, which issue from high mountain areas. Most areas in the province are mountainous with slopes directly rising from the seashore. A total of 49 untapped springs are reported in the municipalities of Lupon, San Isidro, Gov. Generoso, Mati, Cateel and Boston.

According to existing well inventory, the depth of potential aquifers occurs between 23 to 100 mbgl in the Recent alluviums and the Pliocene-Pleistocene rocks. The development of deep wells is more advantageous than shallow wells considering the safe quality and invariable yields of deeper aquifers.

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

For the furtherance in collecting accurate information to design the concrete specifications of the planned wells, the following recommendations are made. Prior to the detailed design or pre-construction stages, additional detailed groundwater investigation shall be conducted entailing electric resistivity survey and/or the construction of test wells in the municipalities of Banaybanay, Lupon, San Isidro, Tarragona, and Boston. Of these municipalities, Boston area is planned to carry out electric resistivity survey in the urban and rural areas and the construction of a test well in the urban area. While, other areas are proposed to conduct the survey and test wells in the urban areas.

The untapped springs shall also be surveyed to confirm the development possibility in the detailed groundwater investigation in the following items: 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. Development priority in water supply sector during Phase I period is given to upgrade service cover-

age in rural area, while the urban area is considered to moderately improve the present service level 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*	*63*	*70*	*95*
	Rural Area	*47*	*60*	*93*
Sanitation	*Urban HH Toilet*	*60*	*70*	*93*
	Rural HH Toilet	*75*	*85*	*93*
	School Toilet	*53*	*75*	*95*
	Public Toilet	*55*	*70*	*100*
Sewerage	*Urban Area*	*0*	*Not applicable*	*50*
Solid Waste	*Urban Area*	*64*	*75*	*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*	*20,200*	*106,000*
	Rural Area	*Persons*	*69,900*	*133,600*
Sanitation	*Urban IHT Toilet*	*No. of Households*	*5,300*	*17,900*
	Rural IHT Toilet	*No. of Households*	*12,500*	*31,200*
	School Toilet	*No. of Students*	*33,000*	*39,700*
	Public Toilet	*No. of Utilities*	*26*	*75*
Sewerage	*Urban Area*	*Persons*	*Not applicable*	*64,300*
Solid Waste	*Urban Area*	*No. of Households*	*4,800*	*Not applicable*

The necessary water supply facilities for Phase I include 9 deep wells/spring sources for 3,800 house connections in urban area, and 49 Level II systems with spring sources and 561 Level I wells/springs for rural area. For Phase II, 20 deep wells/spring sources for additional 26,500 connections and 2,200 Level I wells/springs are required for urban and rural water supplies, respectively. It is assumed that 70% of Level I facilities will be implemented by the LGUs and 30% of these public facilities will be allocated to spring development. Rehabilitation requirements are considered to be 10% of the total number of deep wells to be constructed under PW4SP. A new laboratory building will be constructed to augment the existing provincial laboratory. Two (2) sets of water quality test instruments/equipment will be necessary; one set to upgrade the existing laboratory, and the other set, for the new laboratory.

For urban water supply, 1 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 systems of the municipalities.

Currently, 4 of the 11 municipalities do not have Level III system, namely; Banaybanay, Boston, Cateel and Tarragona. At present, there is no particular plan/on-going project for the development of Level III/WD.

Possibility and necessity to merge service area of some neighboring municipalities to one urban water supply system were also studied from the view points of water source constraints, economical development, etc. Since the municipalities taken up in this PW4SP are generally scattered throughout the province, an individual system was recommended by municipality. However, merging of municipalities in water supply development shall be further studied for some coastal municipalities.

Preference is made to utilize spring sources owing to less O&M activities and cost compared to deep well with electric motor pump. Application of deep wells for water source is regarded as the second priority in principle. Surface water is, on the other hand, not adopted at this moment, in view of large capital investment needs and complexity of surface water treatment.

Moreover, Phase I sanitation will require 5,300 household toilets, 138 public school toilets and 26 public toilets for urban area. In rural area, 12,500 household toilets and 307 public school toilets are necessary. Solid waste disposal will need 10 refuse collection trucks. For Phase II, urban area will require 17,900 household toilets, 199 public school toilets and 75 public toilets. In rural area a total of 31,000 household toilets and 446 public school toilets are necessary.

8. Sector Management for Medium-Term Development Plan

Institutional Framework

To effectively manage the water and sanitation sector, the provincial and municipal governments will have to make some 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 shares 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 the priority on sustainability.
- Project selection and prioritization on commitment of the beneficiaries, willingness to pay, the current water and sanitation and health conditions, potential for growth and costs
- Appropriate technology to local conditions and resources. Economical facilities, not 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 concerns for the 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, in the medium-term, national and external funds will, although diminishing, continue to be channeled through local offices of central agencies.

In the medium-term, a full-time Provincial Water Supply and Sanitation Office (PWSO) shall be set up possibly under the PPDO. The LGU should ensure that adequate logistics and incentives are provided for the Office. In the long term, the Office may be promoted to the same level as PPDO. The PWSO 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 PWSO.

For institutional arrangement, the formation of BWSA for Level I and RWSA for Level II and III is a prerequisite. The community, especially the women sector, shall be involved in all phases of project management (planning, construction and O&M) and in undertaking health and hygiene education program. To provide the members with the necessary skills, training programs are to 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 LGUs shall 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 PWSO and a permanent CD Specialist be appointed to take charge of promoting, developing and coordinating CD and IEC programs of the province. The Unit should look 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 prospective Municipal Liaison Task Force (some municipalities have project-based TF) 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) shall 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 on a long term basis and implemented on the national, provincial and municipal levels. This will help promote a better awareness and understanding of the responsibilities of sector planners as well as the benefits that will be derived by the project users.

The DILG shall retain central role as the national government agency that will promote and develop the capacities of the LGUs 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. Another national agency, the LWUA, shall continue to promote community participation in the formation of LGU-WS into water districts and to provide regular CD assistance.

On the manner of participation in sector development, it is important for the LGUs to make the decision together with the users on the appropriate service level (Level I/II/III water supply) it can afford to implement. To achieve this, the LGU must encourage active community participation and involvement through the following: i) sharing relevant information on the project with the users; ii) consulting with users on all phases of project development; iii) giving ample room to the beneficiaries to make project-related decisions; and iv) providing opportunities to the community to initiate actions for their own benefit.

On the other hand, users shall participate in the following (some communities in the province have been tried): i) the participation through a firm involvement and commitment of the community at different implementation stages; expressed participation of all parties through

MOAs is a requisite; ii) the sharing of capital costs between project proponent and the users entailing the provision of land, right-of-way, free labor and/or materials by community members; and iii) O&M practices as required by service level.

For Levels I and II water supply, PWSO should play a major role in promoting and utilizing the modified "Community Development Process" developed by the UNDP-assisted project.

Gender Consideration

The sustainability of WATSAN services depends on responding to the demands of men and women in the community. The LGUs must recognize the requirements and give vital emphasis on the role of gender sensitive participation, especially with reference to maintenance and financing of WATSAN systems. 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 Trainer'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 ₱494 million. A total of ₱277 million is required as the construction/rehabilitation cost in Phase I, of which urban water supply and rural water supply share 31% and 30%, respectively. While, remaining 39% is required for urban and rural sanitation.

Required equipment and vehicle for construction/rehabilitation of Level I facilities and solid waste management are roughly estimated: each 1 set/unit of well drilling equipment, service truck with crane, well rehabilitation equipment and support vehicle; and 11 units of refuse

collection truck. The total procurement cost is estimated at approximately ₱50 million. Out of requirements, however, only each one set/unit of well rehabilitation equipment, support

Table 9.1 Investment Cost Required by Phase

Unit: 1,000 Pesos

Item	Component	Phase I	Phase II
Construction/ Rehabilitation	Water Supply	168,649	464,040
	Urban Area	85,100	353,952
	Rural Area	83,549	110,088
	Sanitation	108,359	642,457
	Household Toilet	1,081	5,618
	School Toilet	97,917	141,595
	Public Toilet	8,944	25,809
	Disinfection of Well	417	175
	Urban Sewerage	-	469,260
	Sub-Total	277,008	1,106,497
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	110	0
	Water Quality Testing Kits	15	0
	Sub-Total	995	26,782
Water Quality Laboratory		2,032	0
Sector Management	Engineering Studies	35,848	82,234
	Community Development and Training	25,402	56,931
	Sub-Total	61,250	139,165
Total Direct Cost		341,285	1,272,444
Contingencies	Physical Contingency	34,125	127,244
	Price Contingency	87,248	N.A
	Value-Added Tax (VAT)	31,585	N.A
Total Investment Cost		494,243	1,399,689
Total Investment Cost (excluding Price Contingency)		406,964	1,399,689

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.

Likewise, annual recurrent cost in 1997 price level is estimated at ₱13 to ₱20 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 4% of total IRA (20% 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 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 ₱134.7 million (provincial IRA is 42.6% of the total IRA). In the overall IRA allocation to the sub-sectors, urban water supply, rural water supply, and rural sanitation are on the same level with about 30% each of the total IRA, while urban sanitation is about half of the amount allotted to the other sub-sector.

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 33% of the requirements as a provincial average. Hence, there is a big shortfall of ₱272.3 million in funding. It will become ₱333.7 million in consideration of price escalation with annual rate of 7%. In the municipal achievement percentage in finance, Banaybanay (67%) is the highest among municipalities, followed by Lupon (57%). Others are in the range between 20% and 40% to the requirements.

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. The service coverage for urban water supply 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.

In the synthetic investment need ranking of municipalities covering four sub-sectors, the top ranking municipalities are Tarragona and Baganga, while Banaybanay 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.

There is no eligible municipality for Level I water supply in the province in terms of 5th and 6th class municipality, while there are 8 municipalities to meet the condition in sanitation sub-sector. Project components including public/school toilet facilities and distribution of toilet bowls were identified to meet the conditions in provision of GOP-assisted project. The required services will cover technical and institutional/community development aspects of the project. The overall project cost was estimated at ₱38.8 million in 1997 year 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, the GOP shall share 50% of the overall project cost in combination of the foreign assisted loan and government counter-part fund. The remaining 50% shall be shared by the LGUs (47%) and beneficiaries (3%). As a result of cost comparison between the estimated project cost to be shared by the LGUs (₱18.2 million in the current price level) and available IRA of LGUs (₱25.6 million), the projected IRA available meets the cost to be shared by the LGUs. Under this case, the IRA to be used by the LGU is 70% of available IRA.

For Case 2, the utilization of the MDF is considered in case the LGUs will fail to furnish IRA for the project, even if estimated IRA available meets the required cost to be shared by the LGU. The foreign loan may be availed of at the maximum financing limit of 75% of the overall project cost. Under this case, the IRA to be used by the LGU is about 20% of available IRA. GOP will possibly finance up to ₱29.1 million or 75% of the total project cost in the portion of loan. Out of GOP finance through the loan, ₱16.1 million or 41.5% of the total project cost shall be granted to the LGUs, aside from 8.5% GOP counterpart fund. The remaining ₱13.0 million or 33.5% of the total project cost shall be utilized for financing the LGUs to secure their budgetary capacity through MDF.

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 capital cost. While users need to pay water charge up to 2% of their monthly income to sustain the system (₱70/HH/month in 2003). For Level II water supply systems, full cost recovery is required for all capital and recurrent cost (₱66.50/HH/month in 2003, less than 2% of monthly in-

come). For Level III water supply systems, a full recovery of capital and O&M cost is required (₱251/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), only households with median monthly income will be able to pay the amount (low income households will afford to pay for less than 10 m^3/HH/month).

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 for Medium-Term Development Plan

The sector monitoring system must support a well-defined and accepted sector development process-model. It includes information collection, tracing the flow of raw data from the field to the central level information analysis and data feedback. With the sector monitoring, planners should be able to take fresh objective view of the way it implements current strategies. A sector monitoring system should reinforce the linkage between water, sanitation and health; be reliable and involve the beneficiaries; be accepted by all sectors; be practical; and 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 purpose 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 up 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 from national and local governments. At the provincial level, monitoring will include projects 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 consisting of NGOs and representatives from 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 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 of 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 area fall on the category of underserved/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. It implies that around 60% of the total population enjoy water supply service at the present time.

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 in some cases 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 this year the targets to suit current sector status.

Development in the sector had previously to a high degree been directed 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 frameworks 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 DataBase: 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 them was Davao 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 Davao 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 consisting 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). Preparation of the plan was also 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), and other national line agencies as well as Non-Government Organizations (NGOs) active in the sector. The PSPT was assisted in the preparation of the plan 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 and 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, and a planning tool that would rely heavily on local participation and gender responsiveness and is flexible enough to improve planning and implementation.

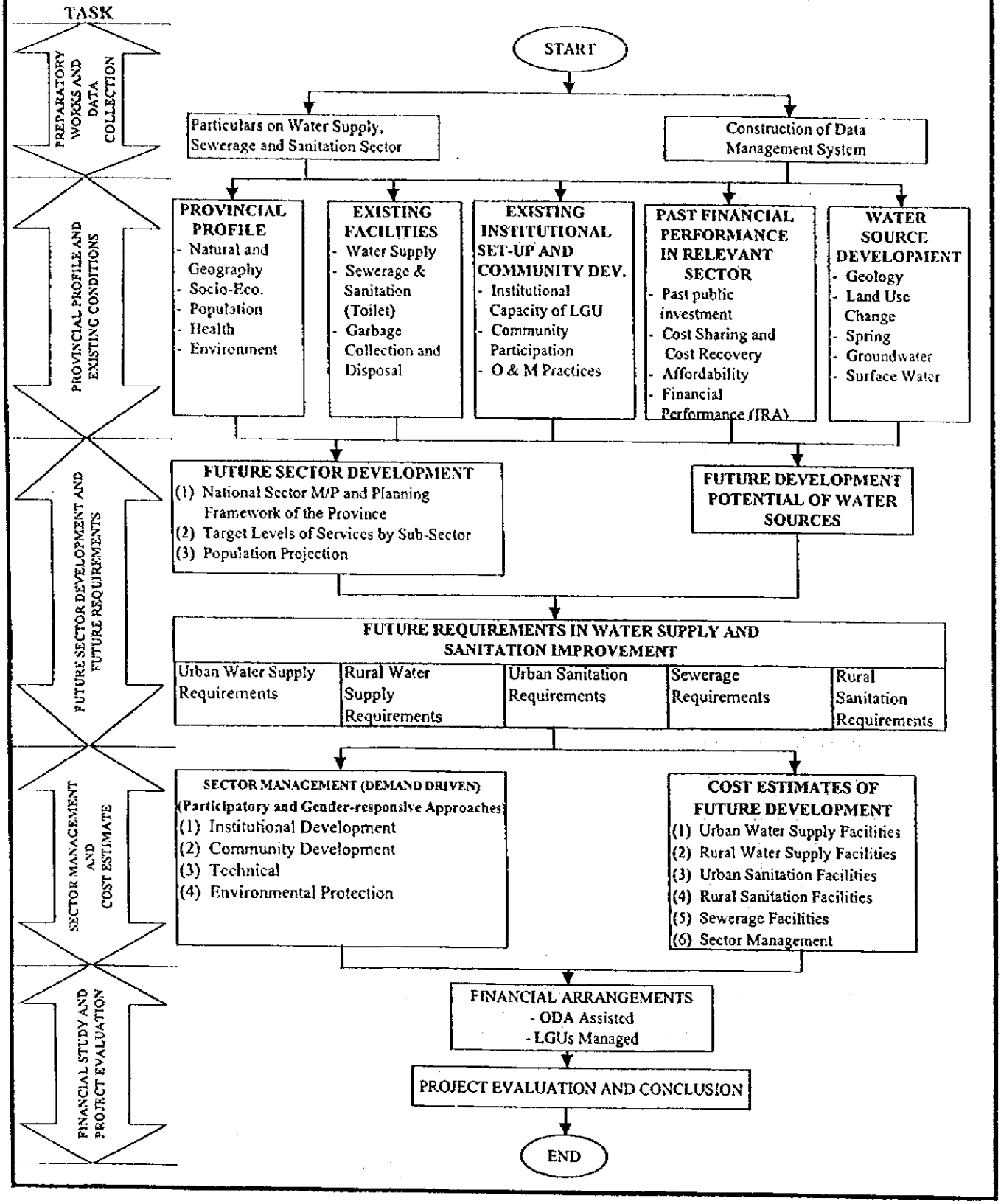
Chapter 3 provides provincial profile with reference to current sector conditions: natural conditions and geographical features, socio-economic conditions, demographic trends, health status and environmental conditions as the planning environment.

Chapter 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, which 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.

Chapter 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 frameworks, 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 financial arrangements based on identified sources of fund. The financial shortfall is shown to meet provincial targets established for the Medium-Term Investment Plan. Manner of national budget (IRA) allocation to municipalities by sub-sector is illustrated and trial calculation was made for the target year in consideration of the new cost sharing policy among central government, LGUs and beneficiaries. Investment need ranking of municipalities as a factor of financial allotment is considered based on synthetic evaluation of sector components. The study of the financial viability on Level I water supply and sanitation projects was highlighted with reference to ODA assisted projects for eligible municipalities. Cost recovery by both beneficiaries and LGUs is finally 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 Acknowledgments

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 and/or 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 Acknowledgments, Data Report). The Japanese Government through JICA had 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%	93%
Rural Water Supply	70% [4]	79%	95%
Sanitation	66% [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.

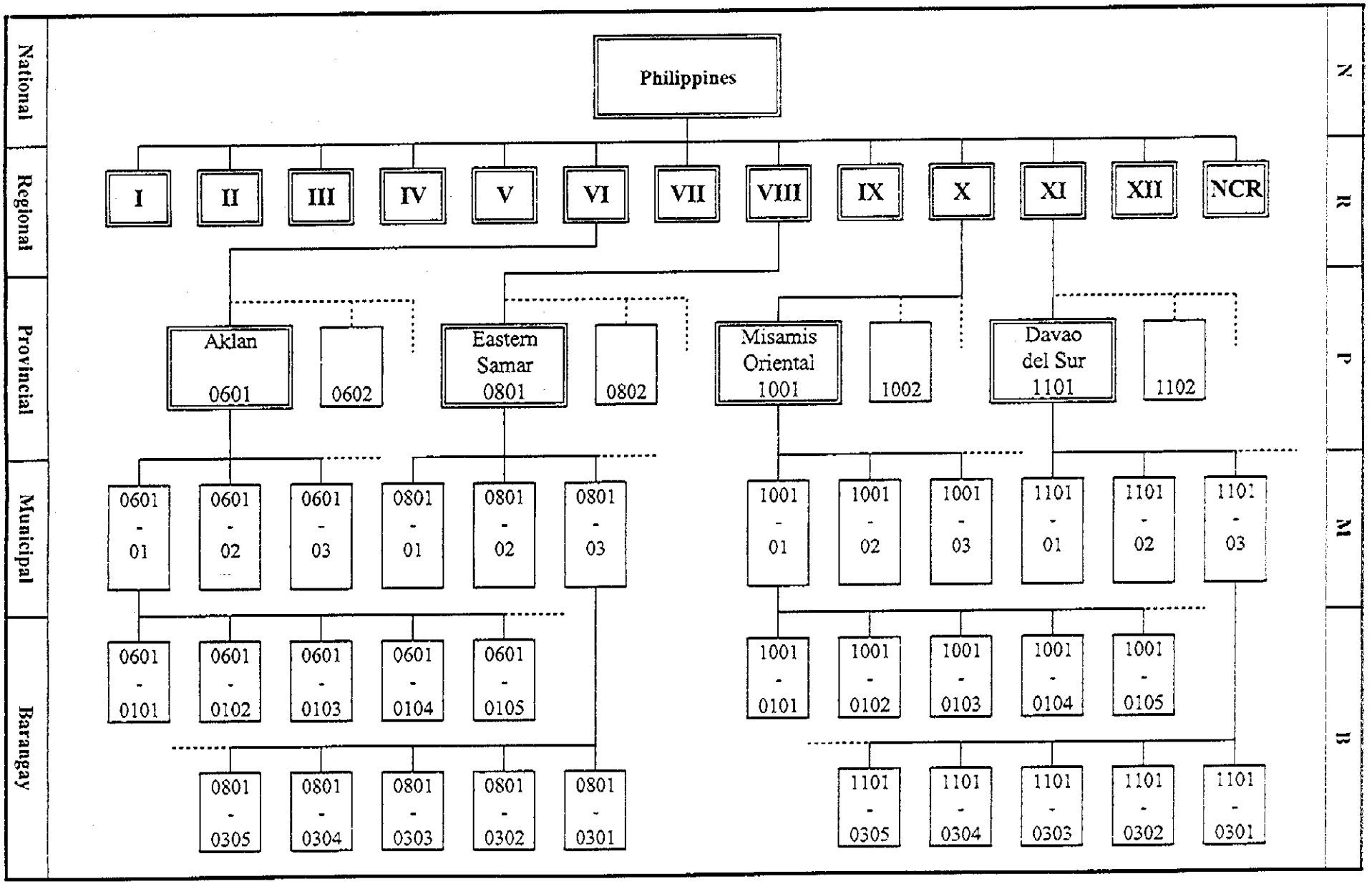


Figure 2.6.1 Institutional Hierarchical System by the NEDA Coding

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			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			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

Davao Oriental is one of the 6 provinces/city comprising the Southern Mindanao Region (Region XI). Mati, the provincial capital, is about 165km from Davao City, the regional center. The province is bounded on the north by Surigao del Sur, on the northwest by Davao Province, on the southwest by Davao Gulf, on the east by Pacific Ocean, and on the south by Philippine Sea/Mindanao Sea as shown in the Location Map.

The province is classified as 2nd class and has a total land area of about 5,164sq.km, which is 1.72% of the Philippine total land area of about 300,000sq.km. It is composed of 11 municipalities. There are 183 barangays, of which 23 are urban and 160 rural. Provincial total population was 413,472 in 1995. About 29% of the population resided in rural areas while the remaining 71% in urban areas. At present, there are 4 water districts and 2 LGU managed Level III systems operating in the province. Table 3.1.1 presents the breakdown per municipality of the land area, population and its 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
Baganga	1st	1,177.10	39,750	33.77	4	14	18
Banaybanay	3rd	419.30	33,082	78.90	2	12	14
Boston	4th	337.50	10,424	30.89	1	7	8
Caraga	3rd	553.69	31,617	57.10	2	15	17
Cateel	4th	467.18	27,211	58.25	1	15	16
Gov. Generoso	3rd	302.95	41,433	136.77	2	18	20
Lupon	2nd	227.22	50,668	222.99	2	19	21
Manay	3rd	479.64	35,428	73.86	2	15	17
Mati (Capital)	1st	681.80	93,801	137.58	5	21	26
San Isidro	4th	205.20	30,279	147.56	1	15	16
Tarragona	4th	312.88	19,779	63.22	1	9	10
Provincial Total	2nd	5,164.46	413,472	80.06	23	160	183

3.2 Natural Conditions and Geographical Features

3.2.1 Meteorology

The province has 2 types of climate under the Coronas classification: Type II, which is experience in the northern part and Type IV, in the southern part. Type II is characterized by no dry season with a very pronounced maximum rain period, while Type IV has a rainfall that is more or less evenly distributed throughout the year as reflected in the Location Map.

The mean annual air temperature is 27.7°C. The hottest months are May and October (34°C), while the coolest is March (21.5°C). The province is located between 125° 51' - 126° 35' and 6° 15' - 8° 00' north latitudes, which is considered as less visited area by typhoon.

3.2.2 Land Use

Forest area constitutes about 63% of the total area of the province located mostly in the eastern and southeastern part. Agricultural land and fishpond comprise approximately 28%, while Built-up area is limited to less than 1%. Grassland and Mangrove/Inland water areas represent a mere 3%. Declared mining area is about 5% of the total. The existing land use pattern as presented in Table 3.2.1 depicts a sustainable growth deserving and enhancing its present trend. The remaining forest cover must be conserved to 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 forestlands 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 for agricultural use.

Table 3.2.1 Current Land Use

Land Use	Area (km^2)	Percentage over Total Land Area
Forest Land	3,263.84	63.20
Grassland	119.35	2.31
Built-up	37.56	0.73
Agricultural / Fishponds	1,454.12	28.16
Mangrove, Inland Water Area	31.89	0.62
Mining Area	257.70	4.99
Provincial Total	5,164.46	100.0

3.2.3 Topography and Drainage

The province is mostly mountainous with high elevation and steep slopes. The mountain ranges often have elevation of more than 1,000m and drop close to the seashore especially in the eastern and southeastern sides. Stiff cliffs often border between the mountains and

seashore areas. The large peninsula with a length of 68km that extends from north to south divides Davao Gulf and Pacific Ocean. This peninsula is covered by high mountains with elevations ranging from 600m to 1,600m and is also surrounded by steep cliff rising from the sea. Small alluvial areas are limited. These are located near the seashore in the northeast side of Cateel, Baganga and Caraga. Comparatively wide areas are in Lupon on the western side of the province and in Mati.

Principal rivers in the province are Cateel, Manurigao, Caraga, Casauman, Bitanagan and Sunlog. Cateel and Caraga rivers have drainage areas of 264 km^2 and 468km^2, respectively. A number of secondary rivers originating from the mountain ranges drain the province. Two gold mines are located in the mountainous area in the northwest side of Boston and in the western side of Brgy. Panombon. Contamination with mercury of the rivers near the gold mine is foreseen. Surface water has a great development potential as water source in the province, considering that majority of the area is categorized as difficult area for groundwater development. Figure 3.2.1 shows the drainage systems of Davao Oriental. Table 3.2.2 is a list of the main rivers and their corresponding drainage areas with recorded flow rates. Three (3) typical rivers in the province were selected for water quality analysis, namely: Cateel, Bitanagan and Sunlog. The results of the analysis showed that all river waters were turbid with very high levels of iron and manganese, exceeding the maximum limits for Class "A" fresh surface water classification (details are referred to 7.5, Data Report).

Table 3.2.2 Drainage Areas and Flow Rates of Major River

River Name	Drainage Area (km^2)	Flow Rate (m^3/sec)			Water District (using river water)
		Peak	Maximum	Minimum	
Cateel	264	406.14	401.52	19.90	None
Manurigao	No gauging station in the watershed.				None
Caraga	468	Record is lacking.			None
Casauman	No gauging station in the watershed.				None
Bitanagan	No gauging station in the watershed.				None
Sumlog	No gauging station in the watershed.				None

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

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

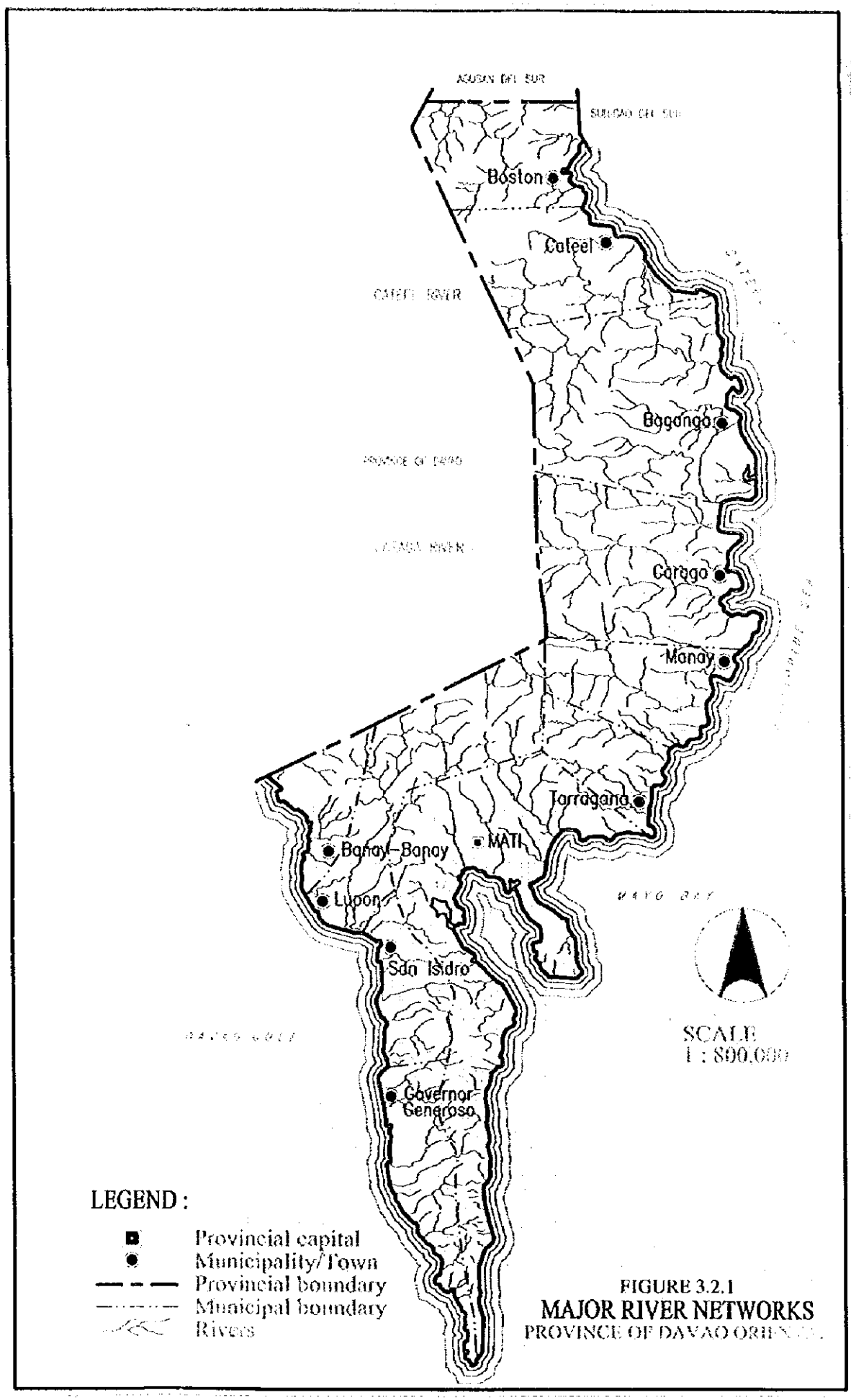


FIGURE 3.2.1
MAJOR RIVER NETWORKS
PROVINCE OF DAVAO ORIENTAL

3.3 Socio-economic Conditions

3.3.1 Economic Activities and Household Income

Agriculture is the major economic activity in the province. Major crops cultivated are coconut, rice, corn, and commercial fruits such as banana and citrus. With most of the municipalities located along the coast, fishing is also an important economic activity. The greater bulk of commercial activities are seen in Mati. Agro-based industries such as coconut oil milling and food processing are also promising economic activities.

The National Statistics Office (NSO) Family Income and Expenditures Survey (FIES) in 1994 indicated that among the provinces and cities in the region, Davao Oriental recorded the highest poverty incidence of 62.1%, about 9% higher than the 1991 figure of 53.1%. The FIES showed that the mean annual family income of the province was ₱ 41,796, while the median was at ₱ 35,416. 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).

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 Figure 3.3.2 and Table 3.3.2, Supporting Report). By class of worker, self-employed without any paid employee had the highest share of 32%, followed by those who worked for private business/enterprise or farm as indicated in Table 3.3.2, Supporting Report.

3.3.2 Basic Infrastructure

Electric supply and telecommunication services cover 65% and 100% of the municipalities, respectively. There are 12 post offices or stations in the province. Land transportation is available by means of bus, jeepneys, cars and motorcycles. There are 428 business establishments and 63 tourism-oriented facilities. Table 3.3.1 shows the provincial outline of 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 364 schools consisting of 310 elementary schools, 44 high schools and 10 colleges/vocational institutions. The 1990 N5SO census indicated that the province had 95% literacy of household population 10 years old and over. A large part of 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).

Table 3.3.1 Provincial Outline on Public Services

Items	Unit	Qty.	Items	Unit	Qty.
(1) Roads			**(8) Tourism-oriented facilities**	Number	63
a) Total Length	Km	2,096.76	(Hotel resort, lodges, recreational		
b) Barangay roads	Percent	51	facilities, etc.)		
(2) Electricity service coverage			**(9) Schools**		
a) Municipality	Percent	100	a) Elementary level	Number	310
b) Barangay	Percent	68.3	b) Secondary level	Number	44
c) Household			c) Tertiary level & technical schools	Number	7
Potential	Number	46,355			
Actual	Number	35,164			
(3) Telecommunication Services			**(10) Health Facilities**		
a) Availability in municipality	Percent	100	a) Hospital/clinics	Number	10
b) Telegraph station	Number	12	b) Main health centers, rural health	Number	161
c) Telephone station	Number	3	units, barangay health center, etc		
(4) Post Office	Number	12	**(11) Labor (as of October 1996)**		
			a) Labor force participation ratio	Percent	70.5
(5) Transportation services	Mode	Bus,	b) Employment rate	Percent	90.9
	(ex. Bus,	Jeepney			
	jeep, taxi,)	Taxi	**(12) Average family income**		
			a) Monthly income	Pesos/Month	₱3,483
(6) Banking Facilities	Number	17	b) Monthly expenditure	Pesos/Month	₱ 2,904
a) Private bank	(by Private	14			
b) Public bank	and public)	3			
(7)Industrial/business/commercial					
Establishment	Number	428			

Table 3.3.2 Public Facilities and Services by Municipality

Municipality	High School			Vocational School	College	Hospital	Public Market	Bank and Financing Institutions
	Public	Private	Total					
	nos.	nos.	nos.	nos.	nos.	nos.	nos.	nos.
Baganga	4	1	5		1		2	1
Banaybanay	1		1				1	2
Boston	1		1				1	
Caraga	1	1	2				1	
Cateel	3	1	4	1		1	1	1
Governor Generoso	5	1	6			2	2	1
Lupon	5	1	6	1		2	1	4
Manay	2	1	3	1		1	1	
Mati (Capital)	8	3	11	8	1	3	2	7
San Isidro	3	1	4		1	1	2	1
Tarragona	1		1				1	
Provincial Total	34	10	44	11	3	10	15	17

Figure 3.3.1 Distribution of Families by Income Class

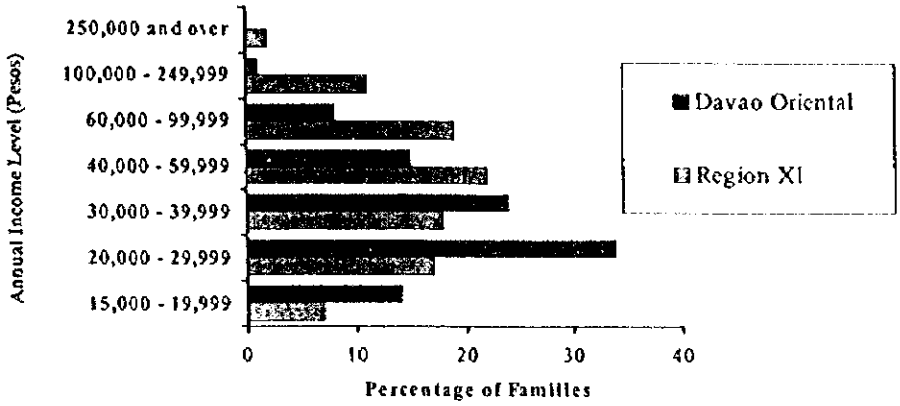


Figure 3.3.2 Employment Distribution by Major Industry Group

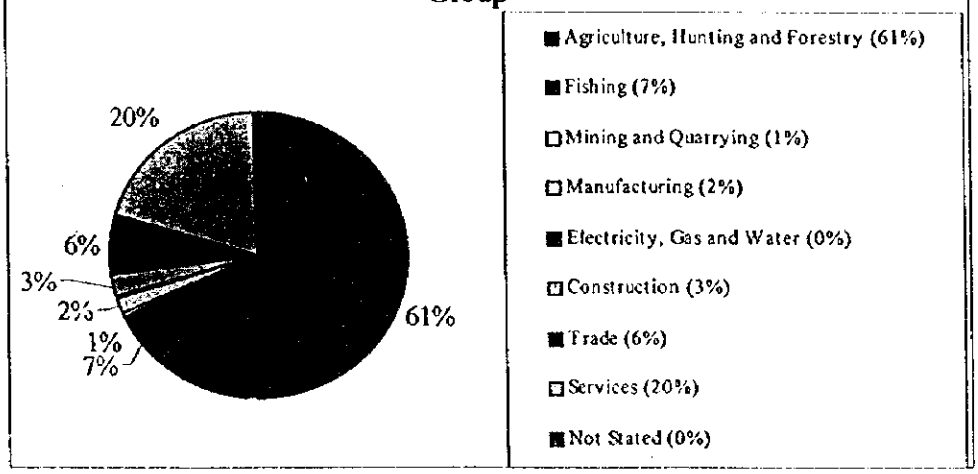
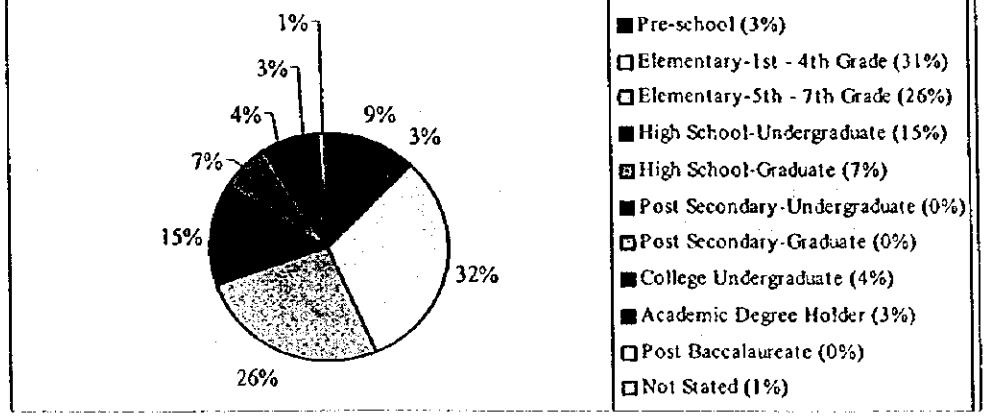


Figure 3.3.3 Population Distribution by Highest Attainment of Education



3.4 Population

3.4.1 Previous Population Development

A declining provincial population growth rate had been experienced since the last six (6) censal years (1960 - 1970) as indicated in Figure 3.4.1. From a high average annual growth rate of 6.07% during the period 1960 to 1970, it gradually decreased to a low 0.87% (1990-1995). A summary of the average annual growth rates is as follows:

Year	Population	Ave. Annual Growth Rate (%)	Period
1970	247,995	6.07	1960 - 1970
1975	299,426	3.84	1970 - 1975
1980	339,931	2.57	1975 - 1980
1990	394,697	1.50	1980 -- 1990
1995	413,472	0.87	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 the 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 including the 1995 population.

Figure 3.4.1 Previous Population Development of the Province

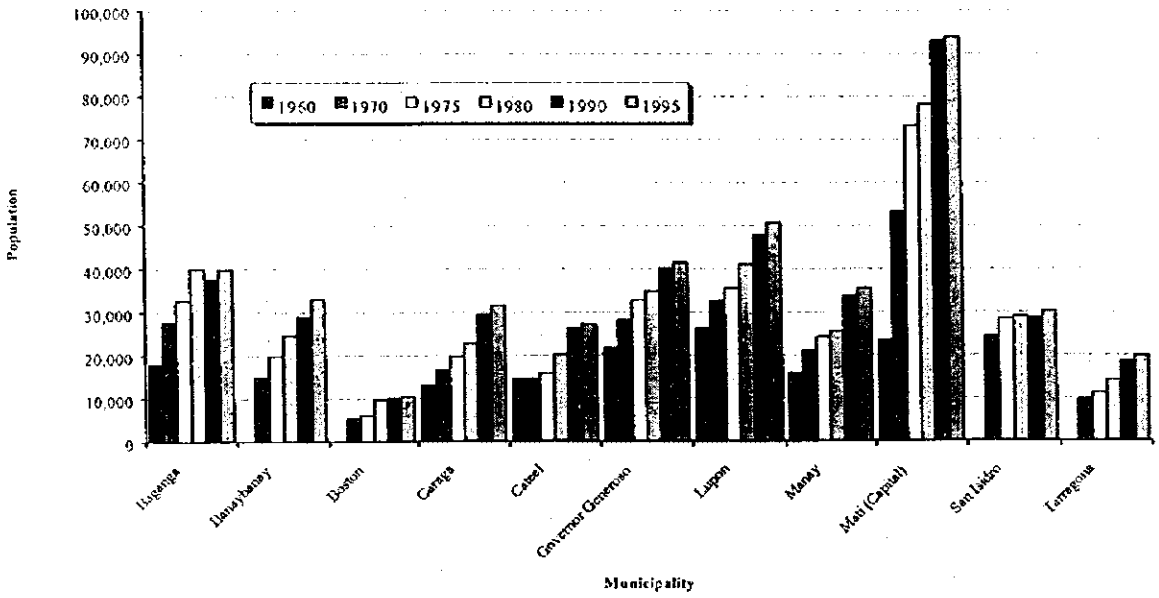


Table 3.4.1 Previous Population Development by Municipality

Municipality	Previous Population						
	1948	1960	1970	1975	1980	1990	1995
Baganga	10,002	17,993	27,678	32,670	40,039	37,719	39,750
Banaybanay			14,866	19,894	24,644	29,000	33,082
Boston			5,321	6,111	9,660	9,917	10,424
Caraga	10,838	12,992	16,618	19,672	22,831	29,368	31,617
Cateel	10,671	14,586	14,633	15,849	20,084	26,144	27,211
Governor Generoso	6,449	21,651	28,329	32,795	34,803	39,857	41,433
Lupon	7,746	26,149	32,456	35,497	41,081	47,946	50,668
Manay	11,097	15,813	21,114	24,304	25,534	33,686	35,428
Mati (Capital)	11,562	23,479	53,242	73,125	78,178	93,023	93,801
San Isidro			24,270	28,360	28,955	28,936	30,279
Tarragona			9,468	11,149	14,122	18,495	19,779
Provincial Total	68,365	132,663	247,995	299,426	339,931	394,697	413,472

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 municipalities 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/fishing.

All areas not falling under the urban classification are defined as rural area. Distribution of the classified area is shown in Figure 3.4.1, Supporting Report.

For this Master Plan, however, the 1995 NSO classification of urban and rural barangays was modified by the PPDO to reflect the actual conditions prevailing in the area. Three (3) rural barangays were re-classified as urban. With the re-classification, there are 26 urban barangays and 157 rural barangays for a total of 183 barangays in 1997. Distribution of the classified area is shown in Figure 3.4.1, Supporting Report.

3.4.3 Present Population Distribution

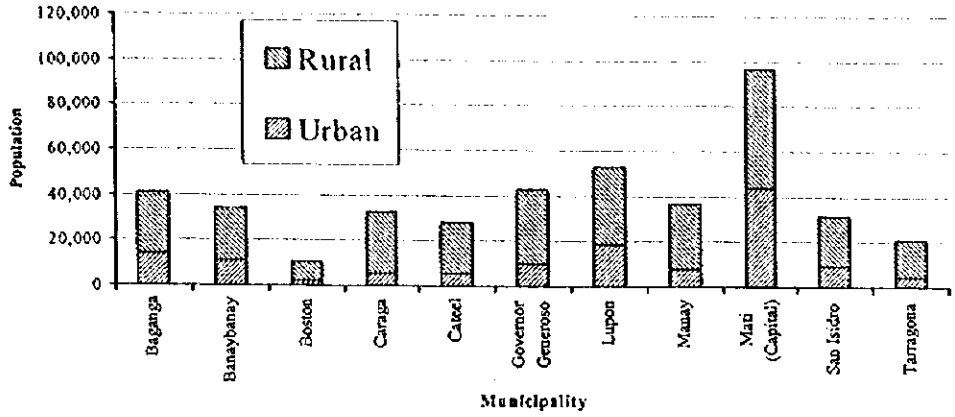
Utilizing the modified classification of the barangays, the urban-rural population was estimated. Rural population accounts for 69% of the provincial total, while 31% is urban as reflected in Figure 3.4.2. Table 3.4.2 presents the breakdown of the number of urban and rural barangays by municipality and its corresponding present population distribution.

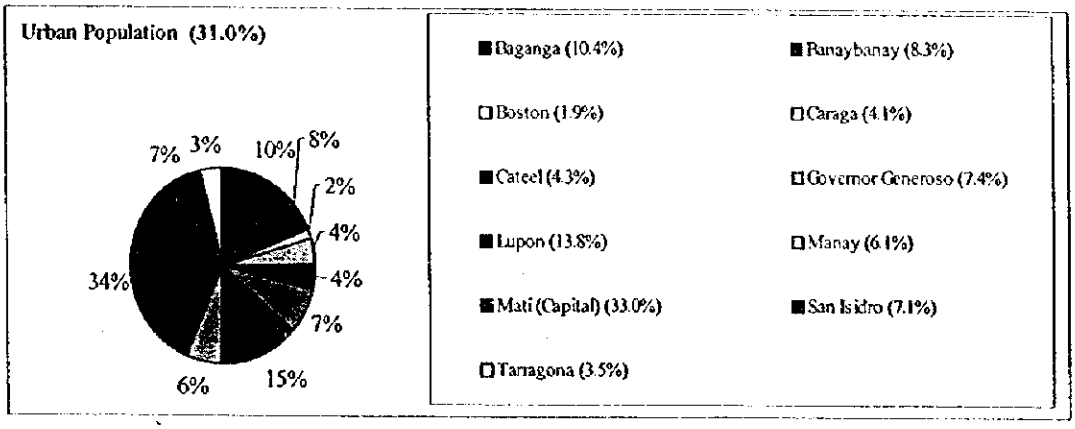
Table 3.4.2 Outline of Urban and Rural Areas in the Province

Municipality	Land Area (km^2)	Number of Barangay			Population (1997)		
		Urban	Rural	Total	Urban	Rural	Total
Baganga	1,177	4	14	18	13,781	27,365	41,146
Banaybanay	419	2	12	14	11,045	23,388	34,433
Boston	338	1	7	8	2,450	8,335	10,785
Caraga	554	2	15	17	5,410	27,296	32,706
Cateel	467	1	15	16	5,730	22,373	28,103
Governor Generoso	303	2	18	20	9,846	32,876	42,722
Lupon	227	3	18	21	18,285	34,158	52,443
Manay	480	2	15	17	8,082	28,603	36,685
Mati (Capital)	682	5	21	26	43,698	52,620	96,318
San Isidro	205	2	14	16	9,458	21,838	31,296
Tarragona	313	2	8	10	4,608	15,997	20,605
Provincial Total	5,165	26	157	183	132,393	294,849	427,242

There are an estimated 81,183 households with 69% residing in rural area and 31% households in urban area. The average provincial household size is 5.26 persons/household. Table 3.4.3 presents the breakdown per municipality the number of households in 1995 and the estimated number in 1997 as well as the household size by urban and rural area.

Figure 3.4.2 Present Population Distribution





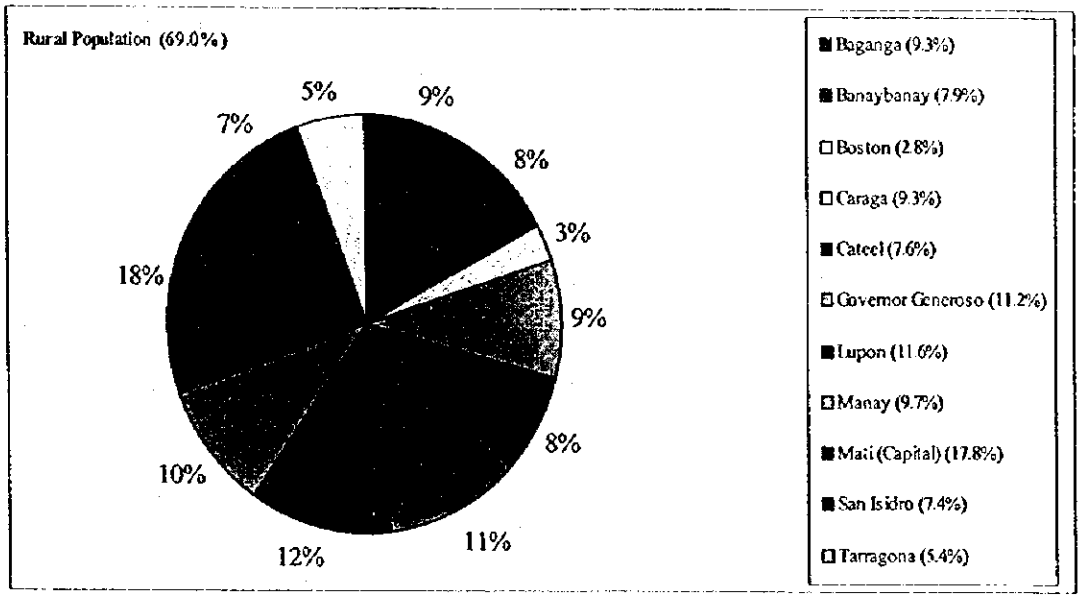


Table 3.4.3 Household Numbers and Household Size

Municipality	Number of Households (1995)			Number of Households (1997) Estimated			1995 Household Size (person/household)		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Baganga	2,447	5,063	7,510	2,533	5,242	7,775	5.44	5.22	5.29
Banaybanay	1,980	4,122	6,102	2,061	4,291	6,352	5.36	5.45	5.42
Boston	442	1,391	1,833	457	1,440	1,897	5.36	5.79	5.69
Caraga	1,009	4,993	6,002	1,044	5,170	6,214	5.18	5.28	5.27
Cateel	1,037	4,064	5,101	1,071	4,198	5,269	5.35	5.33	5.33
Governor Generoso	1,813	6,056	7,869	1,868	6,250	8,118	5.27	5.26	5.27
Lupon	3,311	6,329	9,640	3,424	6,556	9,980	5.34	5.21	5.26
Manay	1,461	5,338	6,799	1,513	5,532	7,045	5.34	5.17	5.21
Mati (Capital)	8,332	9,896	18,228	8,551	10,158	18,709	5.11	5.18	5.15
San Isidro	1,747	3,931	5,678	1,805	4,067	5,872	5.24	5.37	5.33
Tarragona	857	2,934	3,791	893	3,059	3,952	5.16	5.23	5.22
Provincial Total	24,436	54,117	78,553	25,220	55,963	81,183	5.25	5.27	5.26

3.5 Health Status

3.5.1 Morbidity, Mortality and Infant Mortality

The number one cause of morbidity was influenza followed by ARI and pneumonia. Diarrhea and bronchitis ranked fourth and fifth, respectively. Other causes of morbidity in descending order were:urinary tract infection, tuberculosis, measles, malaria and varicella. Regarding mortality, the number one cause was heart disease followed by pneumonia. Accidents and malignant neoplasms ranked third and fourth, respectively. Other causes include tuberculosis, septicemia, chronic liver disease, nephritis, diabetes and anemias. Septicemia, prematurity, diarrhea and typhoid/parathyphoid were the 4 leading causes of infant mortality in the province.

The general health status of the populace of the province was relatively inferior compared with the national condition. The incidence of diseases was higher in Davao Oriental than the Philippines as a whole. Table 3.5.1 presents a comparative statistics on the 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 4th) and malaria (9th). Also, diarrhea ranked 3rd as the leading cause of infant mortality.

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

Rate: 1/100,000

	Causes	Davao Oriental 1995		Philippines, 1993		
		Number	Rate	Number	Rate	Ranking
Morbidity	1. Influenza	6,100	1,475	609,471	910	3
	2. ARI	4,164	1,007			
	3. Pneumonia	3,865	941	470,574	702	4
	4. Diarrhea	3,737	935	1,337,449	1,997	1
	5. Bronchitis	1,366	330	903,508	1,349	2
	6. Urinary Infections	556	134			
	7. Tuberculosis	424	103	159,049	238	6
	8. Measles	350	85	85,345	127	8
	9. Malaria	323	78	49,506	74	10
	10. Varicella, Chickenpox	306	74	71,317	106	9
Mortality	1. Heart Diseases	227	55	48,582	69	1
	2. Pneumonia	141	34	35,582	53	3
	3. Other Accidents	82	20	13,477	20	6
	4. Malignant Neoplasms	77	19	5,759	9	9
	5. Tuberculosis	69	17	24,580	37	5
	6. Septicemia	47	11			
	7. Chronic Liver Disease	36	9			
	8. Kidney/ Nephritis	27	7			
	9. Diabetes Mellitus	14	3			
	10. Anemias	11	3			
Infant Mortalit	1. Septicemia	16	4	1,252	0.7	5
	2. Prematurity	8	2			
	3. Diarrhea	1	0	1,661	1.0	4

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.

Water-related diseases reported in the province were diarrhea, dysentery, typhoid, skin diseases, dengue fever, malaria and filariasis. 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 1995

Rate: 1/100,000

Diseases	Morbidity		Mortality		Infant Mortality	
	Number	Rate	Number	Rate	Number	Rate
Water-borne						
1. Diarrhea	3,824	941	7	2	6	2
2. Dysentery	7	2				
3. Typhoid/Parathyphoid	4	1	7	2		
Water-based						
1. Schistosomiasis	1					
Water-washed						
1. Skin disease	126	30				
Water vector						
1. Malaria	323	78	5	1		
2. Dengue/H-fever	24	6	5	1		
3. Filariasis	285	69				

3.5.3 Health Facilities and Practitioners

Present facilities servicing the health care of the population are 10 hospitals, 11 rural health units, and 150 barangay health stations. The ratio of the population to these health facilities is above the national average figures (refer to Table 3.5.1, Supporting Report and 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. Most of the drainage facilities in all municipalities are open canals or ditches. The rivers and streams function as the drainage system. These rivers receive the domestic wastewater and storm water collected by the segmented drainage facilities in urban centers or poblacions (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. Greywater 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. In rural areas, natural assimilation may be expected to purify organic substances. However, pollution or contamination is anticipated caused by agricultural and mining activities especially with reference to fertilizers, pesticides and mercury.

Small-scale mining companies that operate on the northern part of the province are identified as potential pollution sources 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 beneficial 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

All the 11 municipalities have a municipal refuse collection and disposal service with 14 units of open dump trucks and 1 unit of closed type. In the province, about 20% of the households is served, while the remaining 80% 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 and burying.

Table 3.6.1 Municipal Solid Waste Collection and Disposal, and Service Coverage, 1997

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		
Baganga	7,775	2		2	1,851		1,851	5,535		389	5,924	24	76
Banaybanay	6,352	1		1	832		832	4,656		864	5,520	13	87
Boston	1,897	1		1	244		244	1,507		146	1,653	13	87
Caraga	6,214	1		1	809		809	5,312		93	5,405	13	87
Cateel	5,269	1		1	791		791	4,327		151	4,478	15	85
Governor Generoso	8,118	1		1	1,107		1,107	6,825		186	7,011	14	86
Lupon	9,980	2		2	2,521		2,521	7,216		243	7,459	25	75
Manay	7,045	1		1	996		996	5,877		172	6,049	14	86
Mati (Capital)	18,709	2	1	3	5,376		5,376	12,268		1,065	13,333	29	71
San Isidro	5,872	1		1	897		897	4,760		215	4,975	15	85
Tarragona	3,952	1		1	618		618	3,209		125	3,334	16	84
Provincial Total	**81,183**	**14**	**1**	**15**	**16,042**		**16,042**	**61,492**		**3,649**	**65,141**	**20**	**80**