There are many water and sanitation activities outside the government realm. The private sector, NGOs and community-based organizations (CBOs), out of necessity, are rehabilitating publicly-installed, non-operating facilities or constructing new ones.

The current major institutional issues are those of management of the transition process and of re-establishing leadership in the sector. Major resource realignments and capacity building initiatives are needed. The formulation of a new set of implementing rules and regulations will be started shortly.

(2) Sector finance

The water sector reform study reports that in order to increase nationwide water supply coverage to about 87% by 1998, new investments of about P39.3 B will be needed. Of this, only P12.8 B has been secured, i.e., carried over from existing projects. In addition, the level of public investment in water supply has declined in real terms in recent years. During the period 1988 through 1992, P17.268 B was allocated of which only P10.453 B was disbursed. Despite the declining trend in investments, the water sector fund utilization rate is only 60.5% - indicating serious institutional planning and implementation capacity issues. The delay in the institutional response to the policy shifts has invariably contributed to this decline in activity level.

If the new arrangements are to flourish, the issue of LGU access to external sources of capital development funds (backed by GOP guarantees) needs to be addressed.

5.4 Sector Agencies at the National Level

(1) Department of the Interior and Local Government (DILG)

Responsibility: The Department has the mandate of strengthening local capacity for delivery of basic services, including water and sanitation. It is responsible for providing general administration and institution-building support to LGUs including assistance in the formation and training of BWSAs; coordination of master plan preparation; sourcing of external funds; formulation and installation of sector management systems, including O&M and BWSA financial management systems. Ultimately, DILG is geared to provide a range of support activities to develop the capability of LGUs to provide, manage,

operate and maintain water supply projects either directly or through community-based organizations, like BWSAs.

Current Activities: On a transitory basis, interagency provincial and municipal water task forces have been established in some provinces. These task forces (TFs) are the current sector entry point of DILG. Through the TFs, barangays needing improved water supply and households needing sanitation improvements are identified and organizations are formed. Training activities are also done with the TFs. Conferences are held regularly to assess performance and review sector experiences. Training generally follows the cascade approach from the national up to the barangay level.

Resources: The PMO for Rural Water Supply and Sanitation is established under the Assistant Secretary for Plans and Programs. About sixty (60) staff members comprise the PMO. It has four (4) operating divisions (Administration; Finance and Procurement; Project Planning; and Field Operations). Its Work Program is integrated with the DILG Annual Plan of Implementation. Like other line Departments, DILG's annual budget allocation goes through the general appropriations review and approval process in Congress which usually requires a one-year lead time. Action officers are assigned for every active province. Monitoring and evaluation of project implementation are done by the provincial (and municipal) local government operations officers (PLGOOs/ MLGOOs). Funds for sector training and BWSA formation are channeled through the regional and provincial DILG offices.

(2) Local Water Utilities Administration (LWUA)

Responsibility: LWUA is a specialized lending institution mandated to promote and oversee the development of provincial water utilities based on financial viability of projects. Most water utilities were under the LGUs until 1973, when some LGUs opted to waive their control over the utility and organize water districts (WDs) to qualify under the LWUA program. In 1987, LWUA responsibilities were expanded to include assistance to Level II Rural Waterworks and Sanitation Associations (RWSAs). The provision of Level II and III services and of wastewater disposal systems in communities outside Metropolitan Manila are largely coordinated through the LWUA. The WDs currently serve about 18.43 M consumers in about 703 cities and municipalities. NEDA Resolution No. 4 directs LWUA to focus on its development banking role and to finance

only viable WDs. Since its establishment in 1972, LWUA has formed 583 WDs (486 of which have availed of loans totaling P 4.0 B). It has completed over 880 water supply projects.

Activities: LWUA has since developed a wide array of support services for WD development.

Institutional development services for WDs and RWSAs include: formation, management advisory services, training programs, management audits and operations reviews, installation of uniform commercial practices systems; information and marketing support.

Financial services include: economic and financial analysis, tariff analysis and fund sourcing. Various types of loans are available to finance the construction of water systems; reactivation of non-operating systems, rehabilitation and expansion of facilities; and training. Special loans finance watershed management projects; construction of administration buildings; purchase of service vehicles, communication and computer facilities; restoration of facilities damaged by calamities; initial or emergency operational needs. Commodity loans support generation of additional service connections.

Technical services: LWUA oversees the planning, design, construction, and control of quality standards to improve the water system facilities of WDs and RWSAs. LWUA formulates uniform standards for design, materials and construction to lower project costs and disseminates periodic water supply industry performance indicators.

LWUA consults with interested LGUs on the formation of WDs and RWSAs. Public hearings are held prior to the formation of WDs and tariff adjustments. Where tariff increases are not accepted, improvement projects are either reviewed or shelved altogether. LWUA collaborates with LGUs and consumers on all phases of WD improvement programs especially during the construction of water supply facilities.

Resources: LWUA maintains and fields a pool of management advisors, trainers, engineers and other professionals to give WDs and RWSAs proper guidance in their operation and administration. In addition, the Central Sewerage and Sanitation Program Support Office (CPSO) was recently established at LWUA to coordinate the implementation of sewerage and sanitation projects at the national level and to assist

LGUs and WDs plan and manage sewerage and sanitation projects and programs at the local level.

LWUA training programs embrace efforts directed at the training and education needs of those who manage and operate water supply systems and those who provide assistance from the national level so that the water systems will succeed. Training for the water districts comprise about 20 technical and 20 management courses, while in-house courses cover cadetship training for fresh engineering graduates, management advisors, and supervisors courses on construction project management, and computer education.

(3) Department of Public Works and Highways (DPWH)

Responsibility: The Department is responsible for the construction and major repair/rehabilitation of rural water supply systems (Level 1) and for the planning and execution of sewerage projects in some cities and larger poblaciones in the country with participation of LGUs.

Activities: The actual construction of the projects are done thru contract or force account by the regional and district offices of the Department or other designated agencies under supervision of the PMO and in accordance with approved work programs. The following describes the current project planning and programming process for water supply projects. The central office advises regional office that funding will be available and requests for proposals for a specified number of projects. The regional office allocates the total number of projects among the district offices and directs preparation of a Program of Work (PoW) with a listing of sites. A draft PoW is submitted to the PPDO for comments. In most instances, this is reviewed by the Provincial Board. PPDO endorses the PoW to the DPWH Regional Office. The PoW is sent to the PMO-RWS at the central office which authorizes the release of budget allotment. DEO is now cleared to start construction. Reporting is done based on accomplishments.

Resources: The PMO for Rural Water Supply was established in 1981 (Ministry Order 14) to "manage and direct the planning, design, construction, organization and maintenance of foreign-assisted rural water supply projects" of the Department. It consists of a 44 technical and 26 administrative staff (regular). In addition, as the loan project packages may require, project staff are recruited on contract. At the field level, the Department maintains about 92 District Engineering offices. Most of the DEOs are

staffed with a water engineer, drilling crews and equipment. In some DEOs, staff have been assigned to oversee BWSA formation and training activities.

(4) Department of Health (DOH)

Responsibility: The Department is the principal health policy-making and implementing agency. Its main function is to develop and implement sanitation programs nationwide and administer health education aimed at reducing morbidity due, among others, to waterborne and sanitation related illness specifically diarrhea diseases which ranked second leading cause of morbidity among the population in the past years. Its role in the water supply program is in the promotion of safe water supplies through water quality surveillance.

Activities: A major program of DOH (Environmental Health Service) is the improvement of the environmental sanitation conditions to make it more conducive to promotion and maintenance of the health of the people. The priority program components include water supply and sanitation (water treatment and disinfection, quality monitoring and surveillance), excreta and sewage disposal, wastewater collection and disposal. DOH also implements *Water for Life* project which calls for spring development for use in Level I systems and for organizing BWSAs. DOH is also responsible for the provision of sanitation facilities in rural areas.

Operating budgets come from general appropriations in the national budget. Capital expenditure funds to support construction of excreta and waste disposal systems come from project funds. Under the First Water Supply and Sanitation Project, DOH administered a project subsidy of P105.00 (cost of the bowl) per toilet. Similar arrangements are ongoing with the IBRD-assisted FW4SP. In addition, it supervises the construction of public school toilets, sullage removal units and the distribution of household toilet bowls.

Resources: The health care system is delivered through five organizational levels: Central headquarters; Regional Health Offices and general and special hospitals; Provincial Health Offices, including provincial and district hospitals; Municipal Health Offices; and, Rural Health Units/Barangay Health Stations. Its unique structure enables the Department to reach up to the barangay level through its grassroots network of barangay

health workers and volunteers. DOH manages regional and provincial laboratories with technicians who carry out water quality tests. It should be noted that substantial segments of its institutional structure (from the provincial level downwards) have been devolved and are now supervised by the respective LGU.

Through its far-reaching network, DOH conducts health education campaigns which focus on women and children health in rural communities. The program is supported by centrally-produced information, education and communication materials. Enrichment of hygiene education lesson plans for the school curricula is undertaken by DECS and DOH. Together with UNICEF, CIDA and other bilateral agencies, DOH has produced and distributed IEC materials with key messages on water supply, sanitation and hygiene behavior.

DOH provides training focused on skills development of its health workers, volunteers and community artisans. Its training programs are either conducted by in-house staff or commissioned through non-government organizations (NGOs). Provincial and district sanitary engineers and inspectors are trained on skills development and planning. Chemists and laboratory technicians are trained on tools and techniques to support on-going drinking water quality programs. BWSAs are instructed, among others, on protection and disinfection of water supply sources, constructing and maintaining toilets.

(5) Other National Agencies

Other national agencies provide macro-planning, funding and support, and regulatory guidelines for the water supply and sanitation sector.

The National Economic and Development Authority (NEDA), as the central planning office, ensures that all agency plans and programs are consistent with national priorities in the Medium-Term Public Investment Program and the Priority Sub-Sector Activity Layout. External grants and loan proposals are reviewed and approved at NEDA. It also coordinates the establishment of a system for national sector master planning and the monitoring system (with DILG).

The Department of Finance (DOF) is responsible for the generation and management of the financial resources of the government. It reviews and approves all public sector debt;

and economic growth, and sets the fiscal deficit of major government corporations, as part of the public sector borrowing program.

The Department of Budget and Management (DBM) plans the budget allocations for the government agencies, including capital and operating expenditures, equity infusion to public corporations, grants and subsidies for Congressional approval. DBM also ensures that budget releases conform with approved plans and programs.

The Department of Environment and Natural Resources (DENR) formulates and enforces policies and guidelines for environmental protection and pollution control. It is responsible for watershed protection and water resources management. It checks compliance of major projects with environmental guidelines. DENR works with all environmental management agencies and special regulatory bodies.

The Department of Education, Culture and Sports (DECS) implements hygiene education programs through schools using the *Teacher-Child-Parent (TCP)* approach. Health and sanitation messages are integrated in the curricula and special activities are designed to make the parents and other family members learn and put them into practice. The program is supplemented by a wide range of learning materials (workbooks) while prototypes of safe water sources and water-sealed toilets are set up in schools. DECS assists in the GOP school toilet building project by identifying priority schools and by supporting DOH's integrated health information, education and communication campaign using the formal and non-formal educational system.

The National Water Resources Board (NWRB) coordinates the overall policy framework for water resources development and management. NWRB was created to guide an orderly and scientific development of all water resources in the Philippines consistent with the principles of optimum utilization, conservation and protection to meet present and future needs. NWRB also deals with water rights issues. NEDA Board Resolution No. 4 strengthens the NWRB by increasing its control over the private extraction of groundwater.

The Metropolitan Waterworks and Sewerage System (MWSS) provides for the potable water supply and sewerage needs of Metropolitan Manila and its contiguous areas.

5.5 Sector Agencies at the Local Level

(1) Provincial Level

1) Provincial Planning and Development Office (PPDO) is primarily tasked to formulate the Annual Investment Plans (AIP), Medium-Term Development Plans (MTDP) and Long-Term Development Plans (Comprehensive Development Plans) (refer to Figure 5.5.1, Supporting Report). It provides assistance to various development projects and programs, the documentation of all plans and programs, and coordinates and monitors the planning, evaluation and implementation of all projects. It is engaged in gathering and updating baseline economic data and other essential data for the formulation of development plans. It serves as a vital supporting arm in the various components of development undertakings, including Agriculture; Infrastructure; Education and Manpower; Health and Nutrition; Trade, Industry and Tourism; Social Services. Presently, the PPDO has a staff of 23 who have undergone training on various development subjects under the sponsorships of National Economic and Development Authority (NEDA), Department of the Interior and Local Government (DILG), Development Academy of the Philippines (DAP), Asian Institute of Management (AIM), Civil Service Commission (CSC), and other development oriented government agencies. The personnel are assigned in three (3) divisions and one (1) section, namely, Plans and Programs Division; Research, Evaluation and Statistics Division; Projects Development Division; and Administrative Section (refer to F5.5.1).

2) Provincial Engineer's Office (PEO) takes care of infrastructure development and public works in general (refer to Figure 5.5.2, Supporting Report). To carry out its mandate, it provides engineering services to the local government unit such as investigation and surveys, engineering designs, feasibility studies, and project management. PEO likewise administers, coordinates, supervises, and controls the construction, maintenance, improvement, and repair of roads, bridges, and other engineering and public works projects of the provincial government. The PEO operates under five (5) divisions, namely, Administrative; Planning, Designing and Programming; Construction and Maintenance; Motor Pool; Quality Control. It has an existing personnel force of 104 regular and 42 casual employees. Seminars and workshops to strengthen staff administrative and technical capacity to undertake infrastructure projects are regularly conducted.

3) Provincial Health Office (PHO) takes charge in the promotion and delivery of health services to the people (refer to Figure 5.5.3, Supporting Report). Under the Local Government Code (LGC), the Provincial Health Officer exercises general supervision over provincial health office staff, district hospitals, and municipal health officers and their staff. Accordingly, PHO formulates and implements policies, plans, programs and projects that promote the health of the people in the province. Through the local health board, it recommends to the Sangguniang Panlalawigan (SP) the passage of ordinances as deemed necessary for the preservation of public health and executes and enforces the same to attain the objective. The PHO maintains the Medicare Community Hospital, district hospitals and municipal/city health offices with a total workforce of 359 personnel.

(2) Municipal and Barangay Level

1) Municipal Planning and Development Office (MPDO) operates like the PPDO but its area of jurisdiction is limited to the territorial boundaries of the municipality. Due to its limited resources, it sources additional funds from the provincial and national government and non-governmental organizations (NGO's) to fund some of its developmental projects. Low-income municipalities usually limit the staffing of its MPDO's thus stretching the capabilities of their staff to effectively discharge their duties and responsibilities. Some MPDO's do not even have any "regular" staff thus hampering the developmental efforts of the Municipal Planning and Development Coordinator to formulate plans and programs for the municipality.

2) Municipal Engineer's Office (MEO) is mandated to initiate, review and recommend changes in policies and objectives, plans and programs, techniques, procedures, and practices in infrastructure development and public works in the municipal level. Though mandatory, not all municipalities have Municipal Engineers either due to lack of funds to hire qualified candidates or political considerations. Where Municipal Engineers are hired, they are assisted by one or two staff in carrying out their functions. Lack of equipment hampers to maintain one of municipal and barangay infrastructure facilities.

3) Barangay Councils are the smallest political units in the municipality. Composed of one (1) Barangay Chairman, seven (7) regular Sanggunian Barangay members and the

Sanggunian Kabataan Chairman as members, the Barangay Councils act as the legislative body of the barangay. The barangay councils are empowered to enact tax and revenue ordinances as may be necessary to discharge the responsibilities conferred upon them by law and to promote the general welfare of the inhabitants. They are also tasked to provide/solicit funds for the construction of barangay facilities, maintain and regulate their use and charge reasonable fees for the use thereof. To improve the economic condition and well-being of the residents, the barangay councils assist in the establishment, organization, and promotion of cooperatives and similar enterprises. Whenever necessary, they organize regular lectures, programs or fora on community problems such as sanitation, nutrition, literacy, and drug abuse, and convene assemblies to encourage citizen participation in government. Aside from their share in the Internal Revenue Allotment (IRA) from the National Government, these barangay councils generate revenues from local sources to pursue developmental projects for the barangay residents.

4) Barangay Health Units/Barangay Health Stations are under the direct supervision of the District Hospitals and the City Health Office extending health services to the barangay residents. They provide assistance in family planning activities, emergency/relief services especially in far-flung barangays, and other similar activities that promote the general well-being and health needs of the residents. Midwives and other health workers usually schedule periodic visits to these health units/stations.

(3) Field Offices of Central Sector Agencies

1) DPWH District Engineering Office is responsible for the construction of Level I and Level II water projects in the province. After receiving the indicative number of projects allocated to the province, the district office prepares the Program of Work (PoW) for each project site for budget allotment. Upon approval of the budget allocation, the facilities are constructed. Construction is done either by contract or by administration using its equipment and drilling crew. Barangay Waterworks and Sanitation Associations (BWSAs) are supposed to be formed for every project site. However, there have been difficulties in monitoring the BWSAs formed/organized.

2) DILG Provincial (and Municipal) Local Government Operations Office is tasked to provide general administration and institution-building support to local government

units to strengthen local capacity for delivery of basic services. All thirteen (13) municipalities in the province have Local Government Operations Officers assigned. The Provincial Task Force on Water Supply, Sewerage and Sanitation was headed by the DILG Provincial Action Officer assigned to the sector but was disbanded when the Provincial Sector Planning Team (PSPT) was created.

3) NEDA Regional Office and Regional Development Council coordinates the establishment of a system for regional sector master planning and the monitoring system with DILG. Acting as Secretariat of the Regional Development Council, NEDA ensures that sector plans are consistent with regional and national priorities. It requires project proposals/plans and programs to be approved and endorsed by the Provincial Development Council (PDC) whose task is to incorporate, consolidate and prioritize municipal plans, programs and projects.

(4) Water Districts are formed by municipalities interested in availing of financial and technical assistance from the Local Water Utilities Administration (LWUA) in their waterworks projects. LWUA evaluates application for funding based on financial viability of projects. Water Districts (WDs) are provided with institutional development services like management advisory services, training programs, management audits and operations reviews, installation of uniform commercial practices systems, and information and marketing. Eight (8) Water Districts operate in the province including Olongapo City. These are: 1) Sta. Cruz Water District, 2) Candelaria Water District, 3) Masinloc Water District, 4) Iba Water District, 5) San Felipe Water District, 6) San Antonio Water District, 7) Subic Water District and 8) Olongapo Water District. The other municipalities have pending applications from LWUA like Palauig, Botolan, Cabangan, and San Narciso.

(5) Rural Waterworks and Sanitation Associations (RWSAs) are tasked to operate, manage, and maintain Level II and Level III water systems not covered by Water Districts. LWUA responsibilities were expanded to include assistance to RWSAs. Formed before construction of water supply facilities, these RWSAs coordinate with potential beneficiaries to effectively carry out activities that require consultation and their approval. After the system has been turned over to the association, the RWSA shall have undergone training in administration, billing and collection, operation and maintenance, and other related courses from LWUA.

(6) Barangay Waterworks and Sanitation Associations (BWSAs) are formed to oversee and manage Level I waterworks projects in barangays. The BWSAs are organized to facilitate the participation of beneficiaries in the management of the systems. Capital development is provided as grants, however, the community is required to raise fund for operations, maintenance and rehabilitation.

5.6 External Support Agencies Active in the Sector

(1) Multilateral Agencies

The World Bank (IBRD) currently supports the First Water Supply, Sewerage and Sanitation Sector Project or FW4SP (Loan 3242PH). This project provides capital funds (US$ 58.0 M) for rural water supply in Luzon provinces and sanitation nationwide based on completed provincial master plans. The project concept calls for a community-based approach through BWSAs. The project is due to close in 1995 and preparations for a successor project, with DILG as implementing agency, will be started shortly. In addition, the Bank is preparing two new loans for LWUA implementation - the Urban Water Supply Project and the Urban Sewerage and Sanitation Project. Through its various trust fund facilities, the Bank has arranged for various technical assistance grants and other support activities.

The Asian Development Bank (ADB) supports the Second Island Provinces Project (1052-PHI-SF). The project provides US$24.0 M (loan) to a counterpart budget of Pesos 202.45 M. A small technical assistance component has been allocated for well drilling, training, water quality and installation of pumps. This DWPH-executed project was effective through 1994. Both of the island provinces projects focus on technology and the physical installation of facilities. A follow-on third "islands project" is under discussion. ADB is also supporting the LWUA Municipal Water Supply Project which includes a technical assistance grant for institution building activities at LWUA and the eight (8) participating WDs.

The United Nations Development Programme (UNDP), through its Danish Trust Fund facilities, has actively supported the preparation of provincial master plans. In addition, its Institution Building through Decentralized Implementation of Community-Managed Water and Sanitation Projects, is assisting DILG-PMO in developing models and

approaches for community-based water and sanitation in selected pilot areas. The project bears a strong poverty alleviation focus. UNDP is also in the final stages of a country project to assist GOP in strengthening the groundwater databank in the country through a US$ 682,500 grant.

The United Nations Children's Fund (UNICEF) supports the sector through the Philippines Plan of Action for Children. Apart from hardware support in priority project sites, UNICEF assists NEDA in updating of the national master plan. UNICEF works through the inter-agency committee on environmental health and through NGOs. With the World Health Organization (WHO), UNICEF is assisting in the preparation of information, education and communication (IEC) materials and in strengthening the sector monitoring system.

(2) Bilateral Agencies

The Japan International Cooperation Agency (JICA) extends technical cooperation in the basic design study for the Rural Environmental Sanitation Project (Phase III). This project, to be jointly implemented by DPWH and DOH, envisages the construction of Level I and II water systems and school toilet facilities in rural areas of ten (10) provinces through grants. With DPWH, rural water supply systems are being constructed at the evacuation centers for the Pinatubo refugees. JICA also supports the groundwater development study in Cavite province (with LWUA) and the institutional development activities at MWSS. JICA is providing the services of the Study Team preparing provincial sector plans in nine (9) provinces.

The Overseas Economic Cooperation Fund (OECF) is financing the RWS IV project through 1995. It provides a loan of up to Yen 5.08 B to counterpart funds of Pesos 400 M for the construction/rehabilitation of Level I systems, construction of workshop buildings and procurement of various equipment. OECF is supporting the Provincial Cities Water Supply Project of LWUA and the Angat Water Supply Optimization Project of MWSS.

The Australian International Development Assistance Bureau (AIDAB) is supporting the Central Visayas Water and Sanitation Project through a A$ 14.65 M grant. The project is implemented by the LGUs and the regional development council. Project components

include: planning and monitoring information systems; infrastructure planning and rehabilitation; and institution building with an emphasis on community management based on experiences from other AIDAB-funded projects. The Project has been extended through 1997.

5.7 Current Community Development and Training Approaches

5.7.1 Community Development

There is not much focus on community development approaches in sector projects at present. The common practice is for central provision of facilities, including its operation and maintenance.

In the agricultural sector, productivity is enhanced when there exists markets for farm products, continually changing technology, local sources of supplies and equipment, production encouragement for farmers, and availability of transportation to take farm products to the market. These elements have been put in place with strong participation of communities. Among the proven accelerators that have contributed towards a rapid agricultural development are education and training, production credit, group action by farmers, and improving and enlarging agricultural land.

To meet the cost of irrigating ricefields, farmers are required to pay one cavan of palay for every hectare cultivated. Women's Clubs are organized to take care of marketing activities as well as taught food preservation techniques to augment the income of the family.

These current approaches may be adopted for water supply and sanitation improvement projects.

5.7.2 Human Resources Development and Training

There is minimal sector training activities initiated at the local level. Current activities are mostly organized or sponsored by national agencies. For example, LWUA offers training programs directed to equip WDs with the technical, financial, and administrative capability to manage and operate water supply systems.

Other agencies that could be tapped are DPWH, NMYC, and the President Ramon Magsaysay Memorial Polytechnic College. All of these agencies have training programs geared towards human resources development. Formal and informal instructions are offered, supplemented by Information, Education, and Communication (IEC) instructional materials. On-the-job trainings are also provided to suit the needs of clientele.

Among the courses offered by the technical department of the President Ramon Magsaysay Memorial Polytechnic College are the following NMYC coordinated assisted/programs: Welding, Electronics, Automotive Mechanics, Small Engine Repair, Building Wiring Electricity, Nursing Aide and Basic Computer System.

5.7.3 Sanitation/Hygiene Education

The Provincial Health Office (PHO) implements Public Toilets Program by incorporating in their annual investment program provisions for the construction of public toilets on a yearly basis until the gap between facilities and population is filled up. Priority projects are determined subject to funding allocation. DECS likewise provides school toilets thru its infrastructure program. Every school building constructed has a corresponding toilet facility.

Some schools in the province have a toilet in every classroom for the convenience of the teacher and the pupils, especially during the rainy season. The need for such facilities are discussed during Parents Teachers Association (PTA) meetings. Funds are solicited thru fund-raising activities and/or contributions/donations from parents/patrons. Even labor and materials are provided by concerned citizens. Such activities are encouraged by DECS authorities when the need for immediate provision of such facilities are felt in the area.

In order to effectively implement programs on water and sanitation, mass dissemination of information and other social marketing programs are devised to reach as many clientele as possible. These are done by means of radio programs in the locality, IEC materials like komiks, pamphlets and even school organs where such are featured regularly. Local development council meetings and community gathering could also be utilized for information dissemination.

5.8 Existing Sector Monitoring

(1) National Level

The primary sources of sector data are the field office and staff of DPWH, DOH, LWUA, MWSS and NSO. Other agencies, including NEDA and LGUs, use data from these agencies. Each of these agencies runs its own project (or activity) monitoring systems largely based on required reports of its respective field offices. Current reporting requirements focus on physical accomplishments and capital expenditures. One serious shortcoming is the assumption that all constructed facilities are functioning and in use.

Apart from regular project monitoring, instructions are issued to conduct inventories of facilities (with actual status). The last completed inventory was done in 1990. These surveys are done in conjunction with sector or area planning studies. Only the NSO gathers and assesses information nationwide on a regular basis as part of its Census on Population and Housing (CPH). The CPH "long form" is administered on 10% of the households once every ten years. NSO plans to increase the CPH "short form" frequency to every five years. Water and sanitation is not included in the short form.

There is wide dissatisfaction among implementors themselves over the existing monitoring system. Monitoring report preparation is seen as a nuisance to performing one's job, and is thus haphazardly done. 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.

(2) Local Level

The water resources, sewerage and sanitation sector has not been given a higher priority status in the programming of basic services in the local level. It is only after the eruption of Mt. Pinatubo when this basic need was accorded preferential attention in evacuation centers and relocation sites. Except in some areas, water remains a minor problem due to the geographical location of the province.

The province has organized its provincial monitoring committee. However, local level monitoring generally needs strengthening. Procedures and systems have been prescribed; however, its implementation can be improved.

Chapter 6

PAST FINANCIAL PERFORMANCE IN WATER SUPPLY AND SANITATION

6. PAST FINANCIAL PERFORMANCE IN WATER SUPPLY AND SANITATION

6.1 General

As discussed in Chapter 5, the new direction by the Local Government Code of 1991 and NEDA Board Resolution No. 4 (1994) mandated the LGUs to play a larger role in planning and implementing water supply and sanitation projects. As a result, locally funded projects and programs for the sector have been devolved from central government agencies to LGUs since 1992, although some projects are still on-going by the central government agencies. The Implementing Rules and Regulations (IRR) to effect the devolution of water and sanitation sector responsibilities and resources are under preparation.

This chapter set forth (1) past public investment in the recent years to the water supply and sanitation sector by central government agencies and LGUs; (2) roles of the internal revenue allotment; (3) cost recovery and financial performances of WDs/associations; and (4) affordability of users at present. These discussions will be a basis for the planning of financial arrangements.

6.2 Past Public Investment

6.2.1 Past Public Investment by the Central Government Agencies and LGUs

The recent development of the water supply and sanitation sector in the province was achieved by line agencies such as DPWH, LWUA, DILG, DOH as well as the provincial government, which is shown in Table 6.2.1.

Table 6.2.1 Previous Sector Investment to the Province by Concerned Agency

Unit: 1,000 Pesos

Funding Category		1990-94				
Agency	Funds	Level I	Level II	Level III	Sewerage	Sanitation
DILG						
DPWH	Foregin and local fund	8,620				
LWUA				6,071	N.A.	
DOH					N.A.	N.A.
Province 1)	Provincial Government	904				737
Municipality	Municipal Government					
Others						

Sources: Each central agency and PSPT of the provincial government

Note: 1) Figures in 1994 only

Investments for Level I facilities by DPWH during the period 1990 to 1992 amounted to P8,620 thousand, covering 105 shallow wells, 68 deep wells and 17 rehabilitation works. As locally funded projects were devolved to LGUs since 1992, investment plan of DPWH does not include any projects from 1993 onwards.

The LWUA had released a total of P 6,071 thousand during the period of 1990 to 1992 to improve and expand the water supply facilities for 7 Water Districts; Iba, Masinloc, Olongapo City, San Antonio, San Felipe, Santa Cruz and Subic WDs entailing Feasibility Study and Detailed Engineering Design of Package 4 (Olongapo City and Santa Cruz WDs).

DILG financed a total of P 2,650 thousand during the period of 1988 - 1989 for one (1) Level III system under the Barangay Water Program (BWP), but there are no additional investments since 1990.

DOH has a target of 19 schools in provision of toilets in the province for the year 1994 under the FW4SP program. The provincial government financed an amount of P 1,641 thousand for the water supply sector in 1994.

6.2.2 Sources of Local Fund

According to the Local Government Code of 1991, 40% of the national internal revenue taxes of the 3rd fiscal year preceding the current year (from 1994 onwards) is allocated to LGUs nationwide, specifically to the administrative units of (1) province (23%); (2) city (23%); (3) municipality (34%); and (4) barangay (20%). Further, respective Internal Revenue Allotments (IRA) in different administrative levels are arranged to all administrative units concerned according to the manner of calculation in terms of population, land area and other factors.

As shown in Table 6.2.2, IRA allotted to each province ranged from 0.8 to 1.0 % of the national total IRA between 1990 and 1994. On the other hand, the total IRA to all municipalities of the province was arranged with 0.8 - 0.9 % to the national total IRA for nationwide municipalities (refer to Table 6.2.1, Supporting Report).

For the provincial government, the IRA is the most important financial source of the total revenue. IRA accounted for 60 - 80 % of the total revenue of the provincial government during 1990 and 1992. A large part of investments financed by LGUs to the water and sanitation sector, therefore, was coming from the IRA.

Table 6.2.2 Past Internal Revenue Allotment to the Province from Central Government

Unit: Pesos

		1990	1991	1992	1993
National	1. National Total of IRA *				
	(a) IRA to Provinces	2,031,174,331	2,697,482,707	4,571,136,402	8,445,600,000
	(b) IRA to Cities	2,191,470,949	2,742,969,221	4,559,895,793	8,445,600,000
	(c) IRA to Municipalities	3,054,601,475	4,046,838,742	7,127,522,550	12,484,800,000
Provincial	2. IRA to Zambales Province *				
	(1) Total: (2)+(3)+(4)	75,127,314	98,237,788	172,977,932	309,220,167
	(2) Provincial Government	18,700,440	25,050,021	47,558,556	83,943,312
	Percentage of (a)	(0.92)	(0.93)	(1.04)	(0.99)
	(3) Olongapo city	29,880,798	36,712,897	59,905,499	110,722,610
	Percentage of (b)	(1.36)	(1.34)	(1.31)	(1.31)
	(4) Municipalities	26,546,076	36,474,870	65,513,877	114,554,245
	Percentage of (c)	(0.87)	(0.90)	(0.92)	(0.92)
	3. Total Revenue of the Provincial Government	32,281,459	40,787,275	56,635,855	n a
	Percentage of IRA of Prov. Government	(57.93)	(61.42)	(83.97)	n a
Municipalities	4. IRA to Municipalities **				
	Total	26,546,076	36,474,870	65,513,877	114,554,245
		(100.0)	(100.0)	(100.0)	(100.0)
	Botolan	3,058,495	4,137,696	7,611,987	13,456,450
		(11.5)	(11.3)	(11.6)	(11.7)
	Cabangan	1,356,825	1,843,143	3,874,368	6,673,404
		(5.1)	(5.1)	(5.9)	(5.8)
	Candelaria	2,010,782	2,610,720	5,257,225	9,279,265
		(7.6)	(7.2)	(8.0)	(8.1)
	Castillejos	1,465,645	2,886,534	3,762,883	6,481,299
		(5.5)	(7.9)	(5.7)	(5.7)
	Iba (Capital)	1,813,933	2,438,281	4,370,809	7,542,509
		(6.8)	(6.7)	(6.7)	(6.6)
	Masinloc	2,313,156	2,939,512	5,175,600	9,087,394
		(8.7)	(8.1)	(7.9)	(7.9)
	Palauig	1,833,244	2,433,396	4,739,778	8,269,315
		(6.9)	(6.7)	(7.2)	(7.2)
	San Antonio	1,886,501	2,445,074	4,483,705	7,813,641
		(7.1)	(6.7)	(6.8)	(6.8)
	San Felipe	1,211,217	1,511,078	3,081,662	5,213,892
		(4.6)	(4.1)	(4.7)	(4.6)
	San Marcelino	2,541,939	3,654,697	6,603,891	11,680,209
		(9.6)	(10.0)	(10.1)	(10.2)
	San Narciso	1,430,274	1,836,101	3,436,941	5,811,251
		(5.4)	(5.0)	(5.2)	(5.1)
	Santa Cruz	3,118,201	3,945,592	6,764,331	11,996,659
		(11.7)	(10.8)	(10.3)	(10.5)
	Subic	2,505,864	3,793,046	6,350,697	11,248,957
		(9.4)	(10.4)	(9.7)	(9.8)

Sources: (1) Department of Budget and Management and (2) Bureau of Local Government Finance

Notes: *IRA to barangays is not included. ** Figures in bracket are shares (%) in the total of all municipalities in the Province.

As for municipality, distribution share to each municipality in the province was within a certain range between 1990 and 1993. Municipalities, which had the share of more than 10% of the provincial total in 1993, are Botolan, Santa Cruz and San Marcelino.

The expenditures of the provincial government for the relevant sector in 1993 were reported at P 1,422 thousand, about 3% of the IRA.

6.3 Cost Recovery

The capital cost for Level I systems is free to the community, while operation and maintenance is the responsibility of the associations. As for Level II systems, the capital cost is shouldered by the RWSA through a loan or grants. Water charges collected by each association cover cost of operation and maintenance, and loan amortization. According to the Loan Department of LWUA, the new loan disbursement to RWSAs is being stopped for the last couple of years.

For Level III system, WDs or RWSAs bear the entire capital cost financed by LWUA through loans with concessional terms of 8.5% - 12.5% interest rate and repayment period extending up to 30 years. Less capable WDs are granted to receive soft loans which are interest free during the first 5 years of operation. At the initial time, 100% of the total investment will be covered by a loan. After the second time or more, 90 % will be granted by a loan and 10% will be by equity. The cost of amortizing the loan and operating and maintaining the system is recovered through monthly water bills. Details of financial performance with cost recovery is discussed in section 6.5.

Regarding sanitation sector, toilet bowls have been distributed to households without charges, although construction of the superstructure and the depository of household toilet is through self-help.

6.4 Affordability

Table 6.4.1 indicates the affordability by level of sector service. At present, the current water bills in the province seem to be within an affordable range based on the experiences, although actual income is different from municipality to municipality and barangay to barangay.

On the other hand, construction cost of household toilet seems to be expensive comparing with the family income. If users pay a 5% of the monthly family income, the total costs shall be

amortized with a period of more than 19 months. Therefore, subsidy from LGUs may be necessary.

Table 6.4.1 Affordability in Water and Sanitation Services

Income/Level of Services	Amount (Peso)	% to Monthly Income	Affordable Range (%) 5)
Median of Monthly Income 1)	4,875	100.0	-
Average Level III: Monthly Water Bill 2)	97	2.0	5.0 or less
Average Level II: Monthly Water Bill 3)	30 - 60	0.6 - 1.2	2.0 - 3.0
Mo. Level I Expenditure 3)	5 - 10	0.1 - 0.2	1.0 or less
Private Toilet Construction Cost 4)	4,700	-	-

Notes
1) 1991 Family Income and Expenditures Survey, NSO.
(Median of the provincial figure is inflated to 1994 prices.)
2) LWUA, (as of April 1994). It is assumed that 20 m^3 will be used per family.
3) Common figures in the province.
4) First Stage Feasibility Report for Sanitation and Sewerage, Dagupan, 1993, WB.
(The figure is inflated to 1994 prices.)
5) Based on the experiences mainly from LWUA, DPWH and DILG.

6.5 Past Financial Performance of WDs and RWSAs/BWSAs

There are 13 water districts in Zambales. Table 6.5.1 shows the financial indicators of 8 WDs in 1994. Some WDs are not shown because they are only at the stage of institutional arrangements. Among the 8 WDs, only 3 have a sound financial status with the revenues exceeding their operation and maintenance costs. To raise water rates within an appropriate range is one of the solutions in view of the cost recovery.

Loan status of 7 WDs are shown in Table 6.5.2. At present, they have received loans of P 46,330 thousand from LWUA. Four (4) out of 7 water districts are in arrears. Three WDs, which are in good standing, are equal to the ones which have a revenue exceeding costs.

Most of the facilities managed by RWSAs and BWSAs were constructed under grant conditions by central government agencies and LGUs with the recipient providing some equity contribution in the form of materials or labor. The associations are responsible for the operation and maintenance of the systems, but financial performance of the associations tends to face difficulties partly because the beneficiaries do not recognize the cost requirements, although there is no systematic reporting by RWSAs and BWSAs.

Table 6.5.1 Financial Indicators of Water Districts

Water District	Descriptions						
	No. of Metered Connections	No. of Flat Rate Connections	Average Monthly Rate	Average Consump. per Conn.	Average O&M Costs	Average Revenue	Collection Efficiency
	Nos.	Nos.	Pesos/cu.m.	cu.m./month	Pesos/month	Pesos/month	Percent(%)
Candelaria	408	0	3.50	15	16,000	15,000	93
Iba	846	0	4.80	23	134,034	107,462	96
Masinloc	996	185	3.60	20	99,375	78,198	40
Olongapo	15,675	0	6.75	42	3,801,501	4,002,069	92
San Antonio	936	0	3.85	19	90,478	74,571	87
San Felipe	718	0	4.50	20	63,646	80,294	98
Sta. Cruz	367	0	4.00	15	44,881	29,971	80
Subic	3,644	1	6.15	28	529,711	538,715	96

Source: IDS, LWUA
Note: The following WDs do not have water distribution systems yet although institutional set up have been completed.
(1) Botolan WD, (2) Cabangan WD, (3) Palauig WD, (4) San Marcelino WD and (5) San Narciso WD.

Table 6.5.2 Loan Status of Water Districts

Water District	Descriptions			
	Total Loan Availed	Remaining Payment Period 1)	Average Monthly Amortization	Current Arrears
	1000 Pesos	Months	Pesos	Pesos
Iba	5,096	262	32,797	215,384
Masinloc	2,331	286	18,144	316,943
Olongapo	28,110	202	323,626	0
San Antonio	1,654	268	14,657	411,635
San Felipe	177	100	2,560	0
Sta. Cruz	1,304	280	11,342	233,318
Subic	7,658	275	74,355	0

Source: Loans Operation Dept., LWUA (As of August 30, 1994)
Note: 1) The longest remaining payment period among several loans is indicated.

Chapter 7

WATER SOURCE DEVELOPMENT

7. WATER SOURCE DEVELOPMENT

7.1 General

Water source development study was made covering the entire province to come up with a "Groundwater Availability Map" to identify available potable water sources. An emphasis has been placed on groundwater sources rather than surface water based on current practices and assessment of the groundwater potential in the province.

The study entailed two major components: (1) clarification of existing geological conditions and groundwater situation, and (2) preparation of Groundwater Availability Map to show groundwater potential under three kinds of categorized areas. Standard well specifications by municipality are also studied for the reference of water supply plan.

The major bases for the study are data and reports prepared by concerned agencies (NAMRIA, BMGS, NWRB, LWUA, DPWH and PPDO) supplemented by collected data in the province through this study. Among the effective information, Groundwater Resource Survey Report by BMGS, Water Resource Investigation Report by NWRB and Well Inventory Database by NWRB are essential for the analysis of geological characteristics, projection of high yielding area and possible area of salt water intrusion, and classification of groundwater potential, respectively.

The Groundwater Availability Map may be used for provincial level master plan at present. However, updating the map is a requisite to increase individual well information using the questionnaire form prepared for the study. Annual review and updating of the data will enable the LGUs to implement water source development on a project site basis.

Database in the province confirmed existing groundwater sources and conditions as summarized in Table 7.1.1 (Data by municipality are included, 7.1.1 Water Source Information, Data Report). There are 19,870 shallow wells, 2064 deep wells and 5 springs reported in the province during the study period. All deep wells in the province are constructed by the government. Groundwater is generally potable, but 11% of the total has a quality problem, while most of the wells are functioning. Only one (1) untapped spring was reported to be available for water supply.

Table 7.1.1 Existing Groundwater Sources in the Province

Description	Shallow Well	Deep Well	Spring	Total
1. Number of water sources	19,870	2,064	5	21,939
2. Profile of different sources	90.6%	9.4%	0.1%<	100%
3. Owned by Government Agency	1,767	2,064	4	3,835
4. Privately owned	18,103	0	0	18,103
5. Sources with a quality problem	2,384	126	0	2,510
6. Non-functional wells	6,133	1,758	[illegible]	7,891
7. Untapped springs	[illegible]	[illegible]	1	1

7.2 Geology

The geologic rock units observed in the province have been categorized into three (3) main groups based on the ages of the different rock formations: Pliocene and older Rock units; Pleistocene and Pliocene rock units; and Recent Deposits. In ferred boundaries between these rock groups are shown in the Geological Map of the Province (refer to Figure 7.2.1).

(1) Pliocene and Older rock units

Zambales is dominated by a broad expanse of the Zambales Ultramafics and volcanic rocks. The rocks are exposed along the north-south trending Zambales Mountain Range and within the immediate vicinity of Mount Pinatubo. They cover about 60% of the total land area of the province. Groundwater potential is low under these consolidated rock units. A rare possibility of exploiting groundwater may be through secondary fissures resulting from faulting and folding.

(2) Pliocene and Pleistocene

Limited deposits of the Pliocene to Pleistocene rocks exist in Zambales and constitute approximately 20% of the rocks covering the province. They cover the coastal areas between Iba and Santa Cruz. These rock units consist of marine clastics overlain by pyroclastics and tuffaceous sedimentary rocks. Groundwater potential is generally high with sufficient thickness of aquifer to allow for ground water development by means of deep wells.

(3) Recent Deposits

The Recent deposits cover the depression caused by the thrust faults between San Antonio and San Felipe, and the areas along the coastal and flood plains. These comprise about 20% of the province. The deposits consist of unconsolidated clay, silt, sand and gravel. They have potential groundwater at shallow and greater depths.

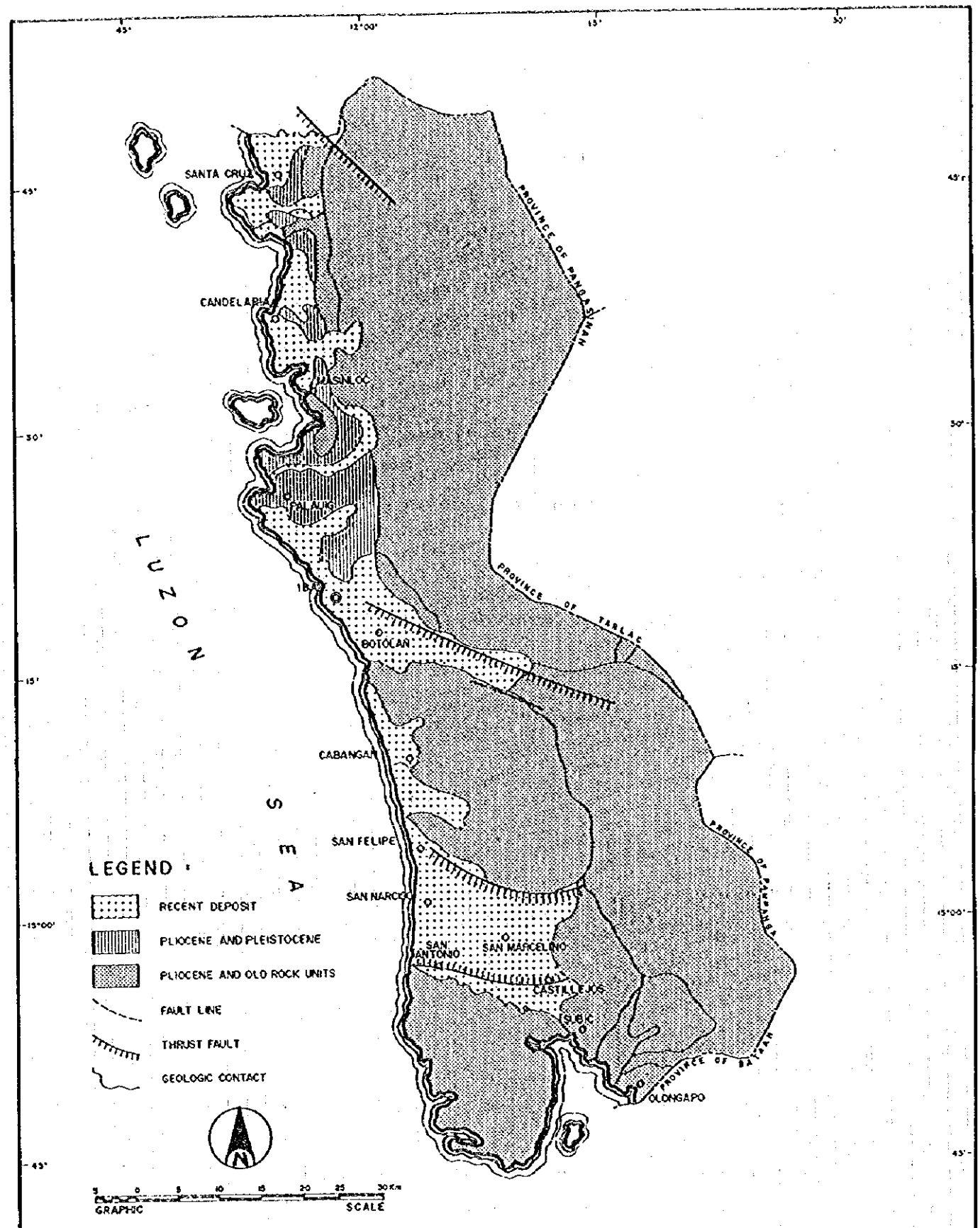


FIGURE 7.2.1
GEOLOGICAL MAP

7.3 Groundwater Sources

7.3.1 Classification of Groundwater Sources

For planning purpose, the provincial area is divided into the following sub-areas in terms of groundwater availability.

(1) Shallow well area

Generally, there are Recent deposits in the shallow well area underlain by basement rock units or impervious formation, where alluvial deposits exist covering river flood plains, valleys and coastal areas. The extent of completely shallow well areas are limited, because most Recent formation is underlain by Pleistocene and Late Pliocene formations where deeper aquifers commonly exist.

(2) Deep well area

Deep aquifers may be available under Recent to Pleistocene, and Pliocene pervious and semi-pervious formations. In most of these areas, several aquifers are available including those for shallow well development.

(3) Difficult area

The area falls in Pliocene and older rock units. Groundwater availability is very low in this area.

The potential areas with a high yield from deep aquifers and a problem of salt water intrusion are also presented based on NWRBs well database (geo-resistivity survey) and water quality examination results of some wells.

7.3.2 Groundwater Availability in the Province

The Groundwater Availability Map is presented in Figure 7.3.1. The major database used were prepared by BMGS and NWRB. The methodology and study processes with respective outputs are included in 7.3, Supporting Report. Technical information on the wells by municipality is also shown in the same Report.

(1) Shallow well area

Shallow well areas are present in the municipalities of Palauig, Iba, and some part of Botolan and Santa Cruz. Wells are generally driven/drilled with an average depth of 12

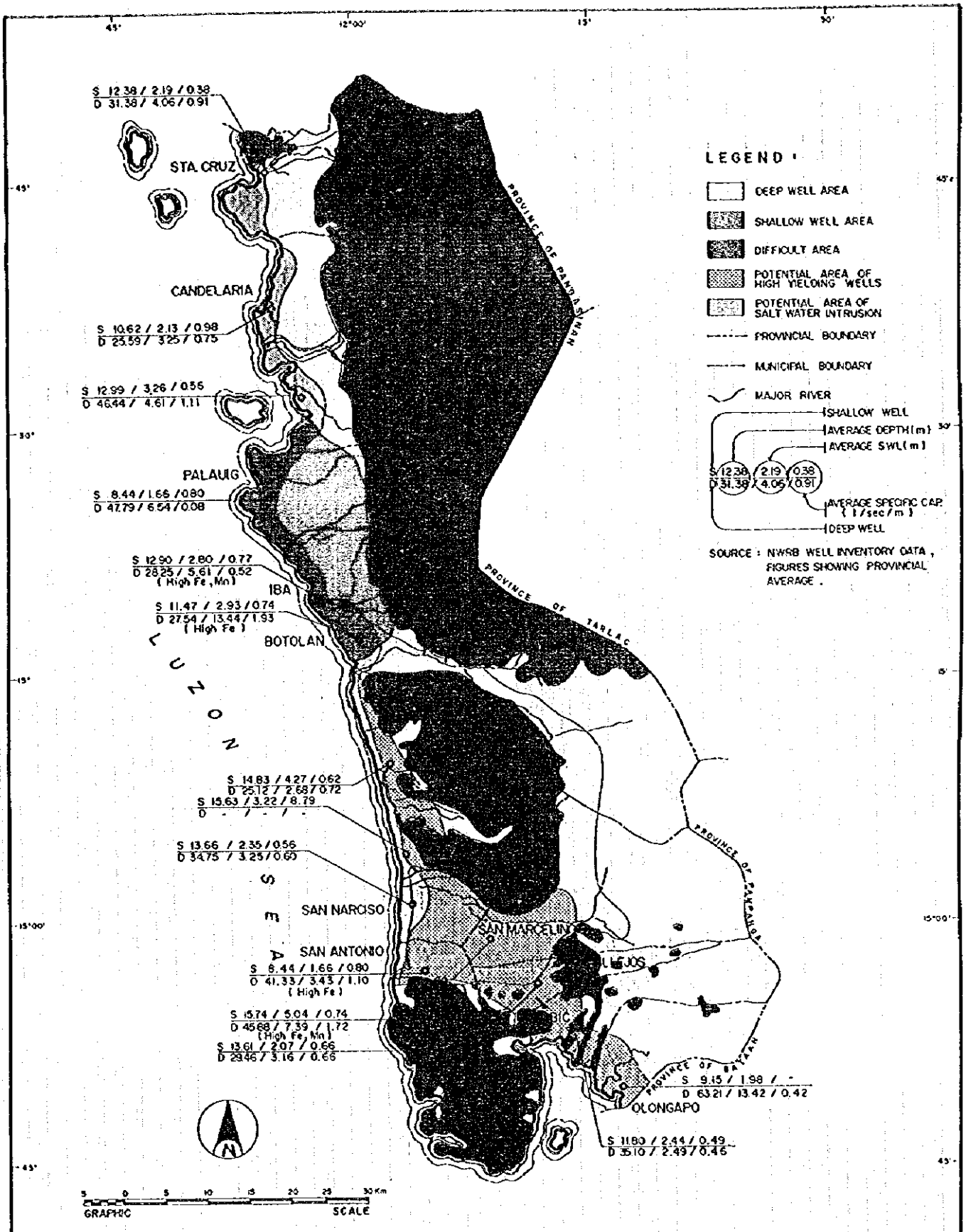


FIGURE 7.3.1

GROUNDWATER AVAILABILITY MAP

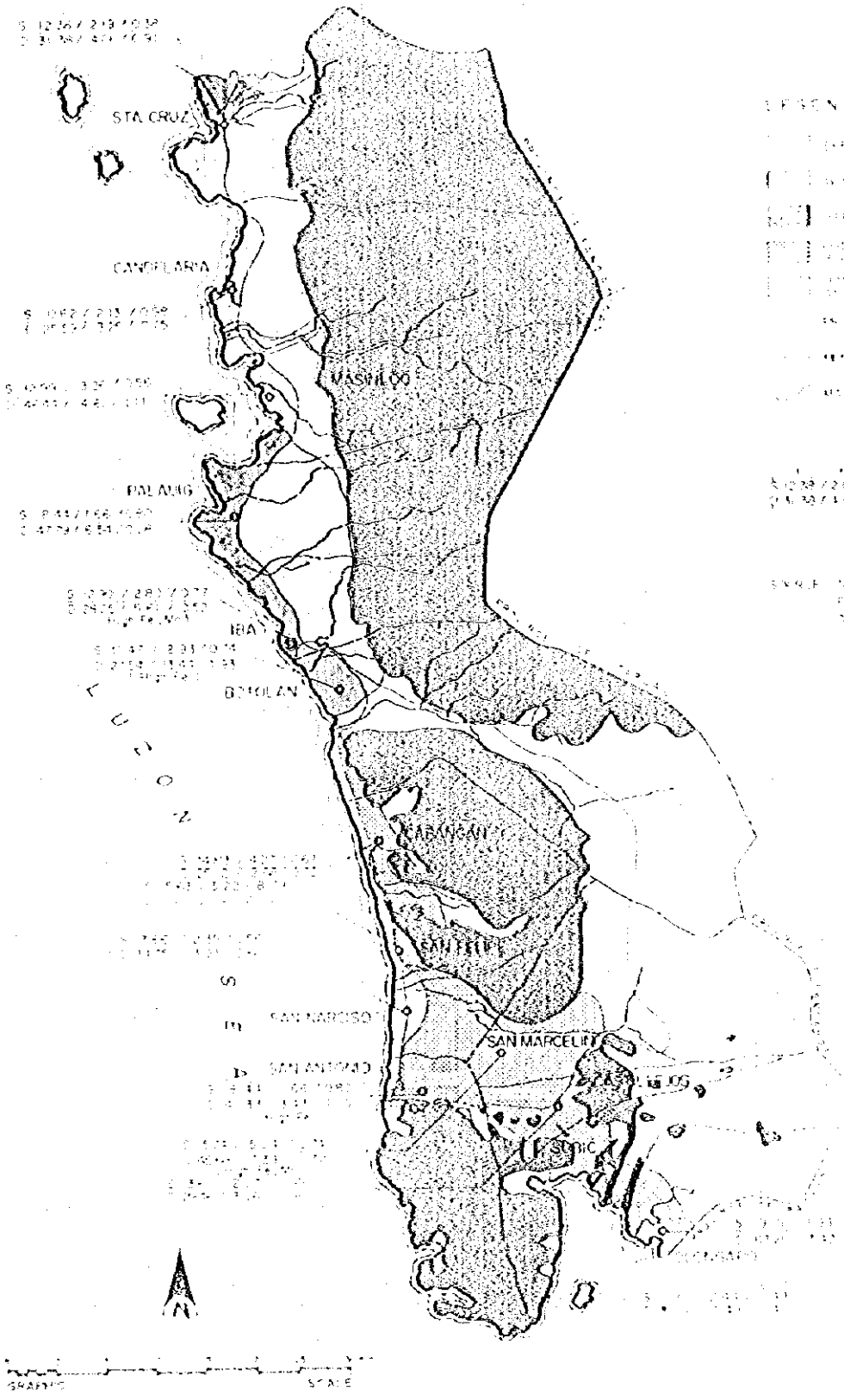


FIGURE 3.1

GROUNDWATER AVAILABILITY MAP

mbgl and the water level is 2.6 mbgl. Average specific capacity is estimated at about 0.9 l/sec/m. Shallow basement complex and/or the consolidated rocks of the Pliocene to Pleistocene age underlain the Recent deposits in the area. Although a limited number of deep wells exists in the area, static water table is relatively deep with poor yield.

(2) Deep well area

The deep well area covers approximately 35% of the province. The San Felipe valley and the northern portion of the province (Santa Cruz, Candelaria and Mansinloc) are potential areas for deepwell development. Average depth of existing wells is 36 mbgl with an average water table of 4.8 mbgl and specific capacity of 0.9 l/sec/m. Areas surrounding Mount Pinatubo contain possible aquifer of tuff and loam, but the eruption of the volcano makes it difficult for future development of the area.

(3) Difficult area

About 60% of the provincial area is classified as difficult area to exploit groundwater for water supply. Groundwater in the area is generally scarce and the chances to hit productive wells are low. The areas are hilly and mountainous situated in the Central mountain ranges mainly in the eastern portion of the province. It is underlain by Ultramaphic complex and igneous rocks which are dense, massive and impervious in character.

(4) Water quality of groundwater

The groundwater is generally potable except in some areas with a high content of iron and manganese and salinity. Water resources investigation for the province conducted by NWRB revealed problem area with respect to water quality as follows:

1) Possible area of salt water intrusion

Geo-electric survey revealed that the western shore of the province is a possible area of salt water intrusion.

2) Iron and Manganese problem area

According to BMGS's Groundwater Resources Survey of Zambales Province, Iba, Botolan, San Antonio and San Marcelino have a problem with high iron and manganese content. The problem of the groundwater is caused by the continuous erosion of Ultramaphic rocks rich in iron and manganese. The possible areas of salt water intrusion and high iron and manganese content are indicated in the Groundwater Availability Map.

7.4 Spring Sources

Spring is a natural outlet of groundwater at ground surface. It occurs when the water table intersects the ground surface through the contacts of pervious and impervious rock formation, and along fractures of unconsolidated rock units. Because of the mountain ranges and high lands covered by the Pleistocene and Older Rock units and complex faulting system, existence of limestone and permeable materials, there is favorable environment for the development of spring.

Fourteen (14) springs along fractures of consolidated rock formation are reported in the municipalities of Cabangan, Iba, Masinloc, San Antonio, San Marcelino and Santa Cruz. Untapped springs to be used for water supply are listed in Cabangan, San Antonio, San Marcelino and Santa Cruz. Technical information on the spring by municipality is presented in Table 7.4.1, Supporting Report.

7.5 Surface Water Sources

The province has several rivers namely: Sto. Tomas, Bucao, Nayum and Sta. Rita rivers. Drainage systems are generally westward flowing and emptying into the South China sea. Minimum flow rates recorded range from 9.8 to 0.06 cu.m/sec. Drainage areas vary from 615 to 68sqkm. Current use of river water is primarily for irrigation purposes. However, Sta. Rita river is used as the water source of the Olongapo City Water District.

Water quality analysis of Nayum and Bagsit rivers, comparatively large rivers in the province, was conducted to determine surface water quality in the province. River water was found to be turbid, with some color and high iron content (refer to 7.5 Water Quality Analysis Result, Supporting Report and Table 7.5.1, Data Report). Based on the examination results, the river water falls under Classification A of the Water Quality Criteria for Fresh Water. It will require complete treatment for the use of water supply.

7.6 Future Development Potential of Water Sources

Based on the study of existing water sources, groundwater was identified as a safe and economical source for water supply of the province.

Shallow wells are the most economical source for Level I service. However, the yield of the wells are affected by the lowering of water table during dry season and exposed to the danger of bacteriological contamination.

Deep wells are generally safe and stable in quantity with a provision of appropriate technology for the development. Additional wells should be developed taking into account water quality problem and hydrogeological conditions entailing detailed survey.

Groundwater Availability Map as shown in Figure 7.3.1 presents basic information for the municipalities with available data; average depth, static water level and specific capacity. For planning purpose, the potential water sources and their standard specifications by well type for the municipalities are further tabulated in Table 7.6.1, Supporting Report.

Some springs may be used for rural water supply in mountainous area. Prior to spring development, supplementary studies should be conducted to determine the effect of seasonal fluctuation of the discharge rate.

Chapter 8

FUTURE REQUIREMENTS IN WATER SUPPLY AND SANITATION IMPROVEMENT

8. FUTURE REQUIREMENTS IN WATER SUPPLY AND SANITATION IMPROVEMENT

8.1 General

Phased investments for provincial sector development are planned in the same manner as adopted in the National Sector Master Plan (NSMP); Medium-Term Investment covering the years 1996 to 2000 and Long-Term Development covering the period 2001 to 2010.

Targets of provincial service coverage for the two phases are established as percentages of beneficiaries or utilities to be served by sub-sector. Service coverage in the base year (1994) and national sector targets indicated in the NSMP and the Medium-Term Philippine Development Plan (MTPDP) are the bases of the study. Sector targets which are not prescribed in the national plan; school and public toilets as well as sewerage are assumed based on the current conditions. In addition, preliminary discussions on solid waste management are included as a vital component of sanitation sector.

Projection of frame values by municipality is undertaken for respective sub-sectors; future population by urban and rural area, the number of student enrollment to public schools and the number of public utilities. Base figures for the study of framework are referred to the 1990 Census of Population and Housing and the statistical data of the province and information from relevant agencies. NSO projection is employed for municipal population at the target years and base year (1994), while population distribution to urban and rural areas prepared by NSO in 1990 is modified to meet actual conditions in the classification of the areas.

Types of required facilities and their implementation criteria according to service level standards are referred to the said Master Plan. Some planning conditions and assumptions not prescribed in the national plan are conferred to the relevant standards of sector agencies and provincial government. For sewerage requirements, the deficit in sanitation must first be addressed. Partial upgrading of on-site disposal to a sewerage system (off-site disposal) is envisaged in the final target year.

In estimating future requirements by municipality, additional population (or number of students/public utilities) to be served by sub-sector is first calculated as a shortfall at target years in comparison between target and base year service coverage. In this regard, planned/ongoing projects to be completed by 1995 are considered as the part of base year service cover-

age. Required number of facilities by sector component is then estimated corresponding to the said additional population (or number of students/public utilities) to be served. Rehabilitation work for Level I facilities limited to new deep wells to be constructed under PW4SP is taken into account. Generally, rehabilitation of deep wells and shallow wells constructed by means of conventional method is difficult.

Logistic support was considered as a minimum requirement of LGUs for community development and training, and other relevant activities along with the implementation of PW4SP. The types and number of well drilling/rehabilitation equipment and supporting vehicle for Level I facilities are also suggested as reference information.

Project priority for medium-term development is discussed entailing general criteria to identify specific projects. However, at the provincial level master plan, municipal priority ranking is rather suggested to be used for allocation of provincial fund.

8.2 Targets of Provincial Sector Plan

Provincial sector targets for the year 2000 and 2010 are determined as the provincial average of the desirable minimum level for each sub-sector. Table 8.2.1 summarizes the target percentages to be served by sub-sector. Details by sub-sector are discussed in this sub-section.

(1) Water supply

The base year service coverage was calculated as a total of those in 1994 and expected by planned/on-going projects scheduled to be completed by 1995. Table 8.2.2 shows service coverage for the planning purpose (details are referred to Supporting Report).

The base year service coverage in urban area (90%) is already exceeding the national sector target (71% in 2000) of the MTPDP, while that in rural area (40%) is far behind the 85% target. As identified in Chapter 4, the lower service coverage in rural area is caused by the presence of large number of unsafe sources/facilities (mostly shallow wells and open dug wells) and/or no provision of water supply facilities.

Considering the existing conditions, water supply sector targets were determined by urban and rural area. Phase I development of urban water supply shall maintain the present service level, while in rural area, 65% is adopted as a moderate target. Phase II targets

Table 8.2.1 Provincial Sector Targets

Sub-Sectors		Phase I (1996-2000)		Phase II (2001-2010)	
Water Supply		Population Coverage (%)	Additional Population to be Served	Population Coverage (%)	Additional Population to be Served
Urban Water Supply		90	20,929	93	157,883
Rural Water Supply		65	74,758	95	103,596
Sanitation		Households Coverage (%)	Additional Households to be Served	Households Coverage (%)	Additional Households to be Served
Household Toilets		93	24,825	95	47,367
Urban	Flush	30	6,543	50	18,762
	Pour Flush	70	1,552	50	1,130
	VIP	0	0	0	0
Rural	Flush	10	445	10	910
	Pour Flush	80	13,892	90	26,565
	VIP	10	2,393	0	0
School Toilet		Coverage (%)	Additional Public School Students to be Served	Coverage (%)	Additional Public School Students to be Served
		50	15,485	70	27,782
Public Toilet		Coverage (%)	Additional Public Utilities with Sanitary Toilets	Coverage (%)	Additional Public Utilities with Sanitary Toilets
		100	9	100	25
Sewerage		Not Applicable		Coverage (%)	Population to be Served
				50	113,792
Solid Waste		Coverage (%)	Additional Households to be Served	Not Applicable	
		80	11,268		

Table 8.2.2 Base Year Service Coverage of Water Supply

Municipality	Type	Population (1994)	Population Served by 1994 Facilities				
			Level III	Level II	Level I	Total	% Coverage
Botolan	Urban	3,915	0	0	1,564	1,564	40
	Rural	33,120	0	3,675	10,074	13,749	42
	Total	37,035	0	3,675	11,638	15,313	41
Cabangan	Urban	3,145	0	0	2,764	2,764	88
	Rural	14,049	0	970	11,698	12,668	90
	Total	17,194	0	970	14,462	15,432	90
Candelaria	Urban	4,229	1,921	0	2,308	4,229	100
	Rural	17,035	3,999	0	7,935	11,934	70
	Total	21,264	5,920	0	10,243	16,163	76
Castillejos	Urban	21,713	0	0	18,502	18,502	85
	Rural	5,959	0	0	4,199	4,199	70
	Total	27,672	0	0	22,701	22,701	82
Iba (Capital)	Urban	15,616	2,560	0	9,160	11,720	75
	Rural	19,322	1,130	0	12,710	13,840	72
	Total	34,938	3,690	0	21,870	25,560	73
Masinloc	Urban	15,456	7,606	0	7,850	15,456	100
	Rural	24,627	1,970	75	2,639	4,684	19
	Total	40,083	9,576	75	10,489	20,140	50
Palauig	Urban	2,500	0	0	1,907	1,907	76
	Rural	24,523	0	2,225	2,694	4,919	20
	Total	27,023	0	2,225	4,601	6,826	25
San Antonio	Urban	22,807	8,034	0	13,680	21,714	95
	Rural	7,197	0	0	4,837	4,837	67
	Total	30,004	8,034	0	18,517	26,551	88
San Felipe	Urban	14,341	3,721	0	9,304	13,025	91
	Rural	2,207	132	217	1,793	2,142	97
	Total	16,548	3,853	217	11,097	15,167	92
San Marcelino	Urban	20,001	4,451	225	15,325	20,001	100
	Rural	9,364	0	0	547	547	6
	Total	29,365	4,451	225	15,872	20,548	70
San Narciso	Urban	13,266	1,849	0	11,417	13,266	100
	Rural	9,466	0	2,025	1,555	3,580	38
	Total	22,732	1,849	2,025	12,972	16,846	74
Santa Cruz	Urban	9,695	2,625	0	4,616	7,241	75
	Rural	37,499	381	349	4,427	5,157	14
	Total	47,194	3,006	349	9,043	12,398	26
Subic	Urban	44,443	16,525	0	23,610	40,135	90
	Rural	12,302	1,889	0	1,652	3,541	29
	Total	56,745	18,414	0	25,262	43,676	77
PW4SP Study Area	Urban	191,127	49,292	225	122,007	171,524	90
	Rural	216,670	9,501	9,536	66,760	85,797	40
	Total	407,797	58,793	9,761	188,767	257,321	63

are planned to upgrade both urban and rural water supply coverage to 93% and 95%, respectively as envisaged in the NSMP.

(2) Sanitation

1) Household toilets

As with water supply, the base year service coverage is calculated as shown in Table 8.2.3 reflecting any planned or on-going projects scheduled to be completed by 1995 (details are referred to Supporting Report).

The province has a base year service coverage of 79%. Urban area registers a high level of 91% that is almost on the same level as the national target of 93% set by the MTPDP. Rural area however, has only 68% considering the numerous unsanitary facilities. By type of sanitary toilet facility, the existing percentage composition to total households is as follows:

Type	Urban (%)	Rural (%)
• Flush	10	1
• Pour-flush	78	58
• VIP latrine	3	9

To lessen the wide gap of the service coverage between the urban and rural area and to attain an equitable distribution of this basic facility, the same targets are applied to both areas. Provincial target of Phase I for household toilets is planned to be 93% as set by the MTPDP. For Phase II, 95% which is a little bit higher than the set target in the National Sector Master Plan is adopted.

The existing composition of the 3 facility types serves as an indicator in the distribution for Phase I, while for Phase II, VIP latrine is phased-out.

2) School toilets

The base year service coverage of public school students is shown in Table 8.2.4 counting expected coverage of any planned or on-going projects scheduled to be completed by 1995 (details are referred to Supporting Report).

Table 8.2.3 Base Year Service Coverage of Household Toilets

Municipality	Area	1994		Households and Population Using Sanitary Toilets								
				Number of Households					Coverage (%)			
		Population	No. of HHs	Flush	Pour Flush	VIP Latrine	Total	Served Population	Flush	Pour Flush	VIP Latrine	Total
Botolan	Urban	3,915	739	0	535	189	724	3,837	0	72	26	98
	Rural	33,120	6,369	0	4,297	975	5,272	27,490	0	67	15	83
	Total	37,035	7,108	0	4,832	1,164	5,996	31,109	0	68	16	84
Cabangan	Urban	3,145	655	0	447	208	655	3,145	0	68	32	100
	Rural	14,049	2,867	0	1,494	537	2,031	9,975	0	52	19	71
	Total	17,194	3,522	0	1,941	745	2,686	13,067	0	55	21	76
Candelaria	Urban	4,229	755	156	557	0	713	3,975	21	74	0	94
	Rural	17,035	2,937	119	1,818	0	1,937	11,243	4	62	0	66
	Total	21,264	3,692	275	2,375	0	2,650	15,310	7	64	0	72
Castillejos	Urban	21,713	4,343	0	4,343	0	4,343	21,713	0	100	0	100
	Rural	5,959	1,268	0	763	0	763	3,575	0	60	0	60
	Total	27,672	5,611	0	5,106	0	5,106	25,182	0	91	0	91
Iba (Capital)	Urban	15,616	3,003	256	1,713	0	1,969	10,307	9	57	0	66
	Rural	19,322	3,716	113	3,535	0	3,648	18,936	3	95	0	98
	Total	34,938	6,719	369	5,248	0	5,617	29,348	5	78	0	84
Masinloc	Urban	15,456	2,810	526	2,242	0	2,768	15,301	19	80	0	99
	Rural	24,627	4,478	79	2,492	0	2,571	14,037	2	56	0	57
	Total	40,083	7,288	605	4,734	0	5,339	29,261	8	65	0	73
Palauig	Urban	2,500	472	0	472	0	472	2,500	0	100	0	100
	Rural	24,523	4,459	0	2,719	0	2,719	14,959	0	61	0	61
	Total	27,023	4,931	0	3,191	0	3,191	17,565	0	65	0	65
San Antonio	Urban	22,807	4,958	662	3,419	258	4,339	20,070	13	69	5	88
	Rural	7,197	1,565	0	870	43	913	4,174	0	56	3	58
	Total	30,004	6,523	662	4,289	301	5,252	24,303	10	66	5	81
San Felipe	Urban	14,341	3,118	404	2,529	0	2,933	13,481	13	81	0	94
	Rural	2,207	460	14	101	0	115	552	3	22	0	25
	Total	16,548	3,578	418	2,630	0	3,048	14,066	12	74	0	85
San Marcelino	Urban	20,001	4,082	0	3,955	127	4,082	20,001	0	97	3	100
	Rural	9,364	1,951	0	661	309	970	4,682	0	34	16	50
	Total	29,365	6,033	0	4,616	436	5,052	24,667	0	77	7	84
San Narciso	Urban	13,266	2,884	0	2,884	0	2,884	13,266	0	100	0	100
	Rural	9,466	1,972	0	1,786	0	1,786	8,614	0	91	0	91
	Total	22,732	4,856	0	4,670	0	4,670	21,823	0	96	0	96
Santa Cruz	Urban	9,695	1,795	168	1,321	306	1,795	9,695	9	74	17	100
	Rural	37,499	7,075	0	2,456	1,855	4,311	22,874	0	35	26	61
	Total	47,194	8,870	168	3,777	2,161	6,106	32,564	2	43	24	69
Subic	Urban	44,443	8,889	1,652	5,742	0	7,394	36,888	19	65	0	83
	Rural	12,302	2,563	197	1,063	0	1,260	6,028	8	41	0	49
	Total	56,745	11,452	1,849	6,805	0	8,654	43,126	16	59	0	76
PW4SP Study Area	Urban	191,127	38,503	3,824	30,159	1,088	35,071	173,926	10	78	3	91
	Rural	216,670	41,680	522	24,055	3,719	28,296	147,336	1	58	9	68
	Total	407,797	80,183	4,346	54,214	4,807	63,367	322,160	5	68	6	79

Table 8.2.4 Base Year Service Coverage of Public School Toilets and Public Toilets

Municipality	Public Schools Toilets			Public Toilets		
	1994 Total No. of Public Schools Students	Std. No. of Public School Students that can be Served by Base Year (1994) Sanitary Toilets	Coverage (%)	Number of PU with Toilets in 1994	Number of PU with Sanitary Toilets in Base Year (1994)	Coverage (%)
Botolan	6,578	4,900	74	1	1	100
Cabangan	2,924	1,400	48	1	1	100
Candelaria	4,501	1,800	40	1	1	100
Castillejos	4,463	1,100	25	1	1	100
Iba (Capital)	8,374	5,750	69	2	2	100
Masinloc	6,973	3,250	47	1	1	100
Palauig	4,863	1,000	21	1	1	100
San Antonio	3,569	1,600	45	1	1	100
San Felipe	2,408	1,170	49	3	3	100
San Marcelino	4,665	950	20	2	2	100
San Narciso	3,521	1,600	45	1	1	100
Santa Cruz	8,807	4,650	53	3	3	100
Subic	11,293	2,450	22	1	1	100
PW4SP Study Area	72,939	31,620	43	19	19	100

Note: PU - Public Utilities

Present service coverage is 43% applying the standard number of students to be served by one (1) unit of toilet facility. The low level is due to a large number of un-sanitary or absence of facilities.

In the absence of national targets for school toilets, the existing level of service coverage is the base in setting up the targets. For Phase I and II, 50% and 70% are set, respectively.

3) Public toilets

The base year service coverage considering expected additional coverage by 1995 is shown in Table 8.2.4 (details are referred to Supporting Report).

All existing public utilities are served with sanitary toilets. This can be attributed by the fact that majority of the public utilities (mostly public markets) are newly-constructed with provision of sanitary toilet facilities.

In setting up the targets without national targets as of now, the indicator would be the existing level of coverage. Accordingly, a 100% coverage both for Phase I and II is assumed.

(3) Sewerage

Given the non-existence of sewerage systems in any municipality at the present time, this plan does not consider the service during Phase I. For Phase II, a target of 50% coverage is applied to urban population of municipalities with more than 10,000 population provided by Level III water supply systems.

(4) Solid waste

The municipal level data in 1994 on the number of households served by the municipal refuse collection revealed that the current practice is limited to urban areas. The base year service coverage for urban area by municipality is reflected in Table 8.2.5.

About 30% of the total households in the province relied on the municipal refuse collection using trucks or a 62% urban household coverage. These municipalities have a total of 12 units of collection truck.

Table 8.2.5 Base Year Service Coverage of Municipal Solid Waste System in 1994

Municipality	Total No. of Households	No. of Urban Households	No. of Households Served*	Coverage of Households (%)	Coverage of Urban HHs (%)
Botolan	7,108	739	0	0	0
Cabangan	3,522	655	0	0	0
Candelaria	3,692	755	718	19	95
Castillejos	5,611	4,343	1,476	26	34
Iba (Capital)	6,719	3,003	2,622	39	87
Masinloc	7,288	2,810	2,600	36	93
Palauig	4,931	472	0	0	0
San Antonio	6,523	4,958	3,471	53	70
San Felipe	3,578	3,118	0	0	0
San Marcelino	6,033	4,082	1,808	30	44
San Narciso	4,856	2,884	2,731	56	95
Santa Cruz	8,870	1,795	2,110	24	118**
Subic	11,452	8,889	6,437	56	72
PW4SP Study Area	80,183	38,503	23,973	30	62

Note: * - Equivalent to total number of urban households served.
** - Covers some rural barangays/households.

No national targets have yet been set. However, considering the present level of coverage, an 80% urban household coverage is applied for the medium-term period (2000).

8.3 Projection of Frame Values

8.3.1 Population Projection

Future population for all municipalities by urban and rural area was projected for the target years of 2000 and 2010 together with the present population in 1994 as a planning base year.

Reference figures used for the study were the population census data of 1980 and 1990, the 1993 POPCOM survey results, and the future population projected by NSO (base year 1980) at different administrative levels; region, province and municipality with breakdown to urban and rural areas. The population projection based on the 1990 population census was not yet prepared by NSO at the time of the study due to unstable natural and socio-economic conditions in the province caused by Mt. Pinatubo eruption.

The study was carried out in the following manner (details are included in Supporting Report).

1) Review of past population development including 1990 and 1993 population distribution to urban and rural areas.
2) Review of NSO projection both in total population and annual growth rate at regional, provincial and municipal levels.
3) Review of population distribution (NSO projection) to urban and rural areas at municipal level in comparison with the 1993 population distribution.

The past population development during the census period from 1980 to 1990 revealed that:

- The province recorded 2.4% of annual growth rate slightly lower than that of the region at 2.6% and
- Percentage of provincial population to the regional population decreased from 9.3% in 1980 to 9.1% in 1990, although rural population percentage increased.

The future population may therefore remain under similar conditions as experienced in the last census decade, unless specific development takes place in the province.

Through the review of NSO projection, it was confirmed that:

- Total population of the province and its growth rates by target year reflect the trend of past population development and
- Municipal population is generally within the range of the past population development (moderate increase of population).

However, total population of some municipalities was adjusted corresponding to the 1993 POPCOM survey results within the total population of the province. Population distribution to urban and rural areas was accordingly adjusted in consonance to reclassification of some barangays as identified for the year 1993.

Population by target year and in 1994 is presented in Table 8.3.1 covering all municipalities broken down to urban and rural areas. Number of households by target year was also studied and included in Table 8.3.5, Supporting Report.

Table 8.3.1 Future Population by Urban and Rural Area by Municipality

Municipality	1990			1994			2000			2010		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Botolan	3,290	32,314	35,604	3,915	33,120	37,035	4,380	37,055	41,435	5,024	42,503	47,527
Cabangan	3,082	12,255	15,337	3,145	14,049	17,194	3,519	15,718	19,237	4,036	18,029	22,065
Candelaria	3,383	15,156	18,539	4,229	17,035	21,264	4,732	19,059	23,791	5,427	21,861	27,288
Castillejos	21,400	5,353	26,753	21,713	5,959	27,672	24,293	6,667	30,960	27,865	7,648	35,513
Iba (Capital)	9,850	19,371	29,221	15,616	19,322	34,938	17,472	21,618	39,090	20,041	24,796	44,837
Masinloc	14,890	17,485	32,375	15,456	24,627	40,083	17,292	27,553	44,845	19,834	31,604	51,438
Palauig	2,343	19,234	21,577	2,500	24,523	27,023	2,797	27,436	30,233	3,208	31,470	34,678
San Antonio	20,086	6,858	26,944	22,807	7,197	30,004	25,516	8,052	33,568	29,268	9,236	38,504
San Felipe	13,511	2,113	15,624	14,341	2,207	16,548	16,045	2,469	18,514	18,404	2,832	21,236
San Marcelino	22,806	13,792	36,598	20,001	9,364	29,365	22,378	10,476	32,854	25,668	12,016	37,684
San Narciso	13,263	9,628	22,891	13,266	9,466	22,732	14,842	10,591	25,433	17,025	12,148	29,173
Santa Cruz	9,884	31,389	41,273	9,695	37,499	47,194	10,847	41,954	52,801	12,442	48,122	60,564
Subic	36,844	10,085	46,929	44,443	12,302	56,745	49,723	13,763	63,486	57,033	15,787	72,820
PW4SP Study Area	174,632	195,033	369,665	191,127	216,670	407,797	213,836	242,411	456,247	245,275	278,052	523,327

8.3.2 School Enrollment Projection

From the 1994 total population of the Study Area, the number of children who would attend or enroll elementary and high school levels for all municipalities is derived.

School age population is extrapolated from the NSO age group classification of 5-9, 10-14 and 15-19 years old bracket by municipality. The age group for the elementary level is from 7 to 13 years, while that for the high school level is from 14 to 17 years. The percentages of school age population for the target years are based on the existing composition or structure of the 1990 population.

From the school age population, the number of children who would attend either private or public school, by target year is computed using the projected participation rate. The participation rate by target year varies depending on the socio-economic condition of the province. Generally, an improved economy will result to a higher participation rate. However, for the study area, no increase in the participation rate in both private and public schools is foreseen by 2000 and 2010.

The number of public school students by target year is then derived from the projected number of children who will attend school. A participation rate for public school enrollment

is established based on the existing participation rate of public school students to the total school age population. No increase is foreseen for years 2000 and 2010 (details are referred to Table 8.3.6, Supporting Report).

Table 8.3.2 shows the projected number of public school students by municipality in target years. A total of 91,728 and 105,214 public school students is estimated to enroll for years 2000 and 2010, respectively.

Table 8.3.2 Projected Public School Enrollment and Number of Public Utilities by Municipality

Municipalities	Number of Public School Student			Number of Public Utilities		
	1994	2000	2010	1994	2000	2010
Botolan	6,578	7,611	8,730	1	2	2
Cabangan	2,924	3,680	4,221	1	2	3
Candelaria	4,501	5,769	6,617	1	2	3
Castillejos	4,463	5,128	5,882	1	2	2
Iba (Capital)	8,374	11,213	12,862	2	3	4
Masinloc	6,973	9,606	11,018	1	2	2
Palauig	4,863	6,772	7,767	1	1	2
San Antonio	3,569	4,445	5,099	1	2	3
San Felipe	2,408	2,893	3,318	3	4	6
San Marcelino	4,665	4,191	4,807	2	3	6
San Narciso	3,521	3,859	4,427	1	1	2
Santa Cruz	8,807	11,242	12,894	3	3	8
Subic	11,293	15,319	17,572	1	1	10
PW4SP Study Area	72,939	91,728	105,214	19	28	53

8.3.3 Projection of the Number of Public Utilities

The number of public utilities (public markets and bus/jeepney terminals) by target year is projected in urban areas for all municipalities. The provincial physical framework plan and the hierarchy of urban settlements study serve as references in the projection. Bus or jeepney terminals are considered in major transport routes of the province.

Nine (9) public markets/bus terminals are planned by year 2000, and another 25 facilities by 2010. Refer to Table 8.3.2 for the number of public utilities by municipality by target year (details are referred to Supporting Report).

8.3.4 Planning Area and Population to be Served by the Sewerage System

Urban areas with more than 10,000 population provided by Level III water supply systems in 2010 are assumed as the planning area. Population in the area is considered as the potential population to be served.

A total of 9 municipalities with 978,528 urban population is considered (refer to Table 8.5.5).

8.3.5 Number of Households to be Served by Municipal Solid Waste Collection System

The number of urban households by 2000 is the potential households for the planning (refer to Table 8.3.5, Supporting Report).

8.4 Types of Facilities and Implementation Criteria

In principle, types of facilities and their implementation criteria as prescribed in the National Sector Master Plan are adopted to this PW4SP.

8.4.1 Water Supply

The following are major conditions and assumptions applied to urban and rural water supply, which are intended as a guide for the implementation of sector projects.

(1) Urban water supply

1) Service level

It shall be noted that a national policy for urban water supply is a Level III system in general as the most suitable measure. Therefore, for the investment needs of the sector development, it is assumed in this PW4SP that underserved and/or unserved urban population at present and in the future will be provided with individual house connections. However, it does not intend to exclude Level I and II facilities from being implemented in urban area in the future as individual cases.

2) Utilization of existing facilities

The existing Level I and II facilities are considered to be utilized during the Phase I period. However, the population served by these facilities are assumed to be absorbed by Level III service in Phase II.

3) Water source

Majority of existing Level III systems are utilizing deep wells in view of economy and easy O&M. In this context, priority is given to deep wells wherever applicable.

The groundwater productivity was estimated as shown in Table 8.4.1 based on the water source evaluation results in Chapter 7 and data on operating deep wells in WDs.

Table 8.4.1 Groundwater Productivity

Municipality	Specific Capacity (liter/sec./m)	Well Depth (meter)	Groundwater Productivity per Deep Well (cu. m/16 hr)
Antipolo	1.00	120	1,440
Baras	2.00	120	2,880
Binangonan (Talim)	1.00	80	960
Cardona	2.00	80	1,920
Jala-jala	2.00	80	1,920
Morong	1.00	120	1,440
Pililla	2.00	120	2,880
Rodriguez	2.00	80	1,920
San Mateo	1.00	80	960
Tanay	2.00	120	2,880
Teresa	1.00	120	1,440

4) Number of systems

In principle, one Level III system is considered for urban area of every municipality. When any Level III system exists, the future requirements are considered as an expansion of the existing system, otherwise a new system was considered.

In addition to the above, any rural barangay/s being served by the existing urban Level III system are considered to be continued throughout the future. A merged Level III system covering more than two municipalities is also considered, if technical and economic conditions are being met.

5) Rehabilitation

Rehabilitation of existing and future facilities is assumed to be undertaken by the operating bodies.

(2) Rural water supply

1) Service level

The Level I systems are generally planned for rural areas where houses are scattered (deep and/or shallow wells). The spring development is excluded from the Level I planning in view of cost effectiveness. Level II systems are considered where houses are clustered and suitable untapped spring is available.

Service level standards are setforth as 15 households per source for Level I and 5 households per communal faucet for Level II, as defined in the national plan.

Application of Level III systems in rural areas may be considered in a case-to-case basis in actual implementation.

2) Utilization of existing facilities

The existing facilities/systems in all service levels were considered to be utilized throughout the future.

3) Water source

For Level I facilities, deep well construction is given priority wherever applicable in view of safety against possible contamination and stable water supply. Standard specifications of shallow and deep wells are summarized in Table 8.4.1 based on the water source evaluation results presented in Chapter 7. Conventional construction

method (driven well) may be employed under the preferred substrata/hydrogeological conditions. The standard structure of wells in application of "open-hole drilling and gravel pack" is presented in Figure 8.4.1, Supporting Report.

Table 8.4.1 Standard Specifications of Level I Wells

Specification	Shallow Well	Deep Well
Construction Method	Open-hole drilling and gravel pack	
Casing Diameter	50 mm	100 mm
Borehole Diameter	150 mm	200 mm
Ranges of Well Depth	Standard Depth	
0 - 20 m	20 m	N.A.
21 - 50 m	N.A.	40 m
51 - 100 m	N.A.	80 m
101 - 150 m	N.A.	120 m

For Level II systems, only untapped springs suitable for water supply purpose are considered. However, no Level II system is taken up in this PW4SP since no suitable untapped spring has yet been confirmed.

4) Number of systems/facility

Number of Level I wells is estimated based on the service level standard. On the other hand,the number of springs coincides with the number of Level II systems.

5) Rehabilitation

Rehabilitation of existing Level I wells is not considered since most of the existing wells constructed by driving method are not suitable for rehabilitation to recover their functions. However, minor repair work for handpump and concrete apron is a requisite.

8.4.2 Sanitation

The conditions and assumptions are established for the different sanitation components to serve as guides in the implementation of projects.

(1) Household toilets

Three types of sanitary toilet facilities for individual houses are considered for Phase I; flush, pour-flush and VIP. While for Phase II, flush and pour-flush are planned considering the improvement of living standard.

The type of toilet facilities is dependent on the existing or planned service level of water supply in the community. In urban and rural areas with Levels I or II water supply facilities, only pour-flush and/or VIP are considered, while in urban areas with Level III water supply systems, flush type toilets requiring a piped water connection are included.

(2) School toilets

Standard service level currently used by DECS (50 students per unit facility) is employed for both phases.

The standard toilet facility (1 building) with 5 units of toilet bowl to serve for 250 students is adopted for the planning purpose, which is modified from FW4SP design to provide a shallow well as a water source.

(3) Public toilets

As a minimum requirement, at least 1 sanitary toilet facility is assumed to be provided for respective utilities: public market and bus/jeepney terminal.

The standard FW4SP design with 6-units of toilet bowl for the market is adopted. In this design, it is assumed that water supply will be tapped from the existing system, hence an elevated water tank is provided.

8.4.3 Urban Sewerage

The commencement of staged implementation of the sewerage program is planned in Phase II for the limited urban area (50% of urban population served by Level III system for the municipalities with urban population of more than 10,000). It is practical to start the program fully utilizing the existing facilities to allow for lower initial investment cost than starting at once a conventional sewerage system (refer to Figure 8.4.2 Staged Improvement in Sewage Collection Method, Supporting Report).

Low cost off-site technologies such as small bore sewer for collection of effluent from septic tank are to be adopted. Improvement of sewage collection method may be gradually achieved from combined to separate sewerage system.

Sewage treatment facilities may range from community scale septic tank or imhoff tank to aerated lagoon systems and to a more advanced treatment process such as oxidation ditch. For

this PW4SP, aerated lagoons are assumed as a representative treatment facility for planning purpose. Daily average wastewater quantity is assumed to be 100 liters per capita per day.

8.4.4 Solid Waste

In terms of facility requirements, this PW4SP only studied the number of refuse collection trucks required for the year 2000. A rated capacity of 5 cu.m truck/vehicle is considered for calculation of required units of truck. Disposal of solid waste shall be studied in detail through investigations, F/S and D/D. Unit solid waste generation for urban area is assumed to be 0.418 kg. per capita per day.

8.5 Service Coverage by Target Year

8.5.1 Water Supply

The service coverage in terms of population to be served by target year was estimated by urban and rural area by municipality. The service coverage in rural area was further subdivided by service level (Level I & Level II) to finally come up with physical requirements.

Base figures applied to estimate the future service coverage and the additional population to be served are:

- provincial sector targets,
- population projection by target year, and
- base year service coverage (served population) by existing facilities.

Future requirements in terms of additional population to be served were then estimated by urban (Level III) and rural (Level I & II) area by municipality as a shortfall to meet the population to be served in each target year. The population served in base year is adopted as the population served in target year, when the former population exceeds the population to be served in the target years. Manner of calculation is specifically presented by phase.

(1) Phase I requirements

Additional service coverage was estimated as a shortfall of the population to be served in Phase I comparing with the population served in base year. In this connection, existing facilities both in urban and rural areas are assumed to be utilized during the Phase I period.

The utilization of untapped springs for Level II systems is given priority during Phase I period for rural water supply. However, no such springs are reported.

(2) Phase II requirements

Additional service coverage was estimated as a shortfall of the population to be served in Phase II comparing with the population served in Phase I. In this regard, existing facilities in rural area were assumed to be utilized through the two Phases, while urban population served by Level I and II facilities in base year was assumed to be absorbed by Level III service during Phase II period.

Table 8.5.1 exhibits the population to be served by target year, while Figures 8.5.1 and 8.5.2 present maps showing service coverage by 2000 and 2010, respectively details are referred to Supporting Report).

Through the Phase I development, approximately 95,700 persons in the PW4SP area will be served by additional water supply services, of which 21,000 persons or 22% of them will be urban population and 74,700 persons or 78% will be rural population.

In the Phase II period, a total of 261,500 persons, of which 157,900 persons or 60% in urban area and 103,600 persons or 40% in rural area, will be further benefited by water supply services. This additional service coverage in urban area includes upgrade of service level for 122,000 persons served by Level I and II facilities in 1994.

8.5.2 Sanitation

(1) Household toilets

The service coverage (number of households to be served) by different types of sanitary facility is estimated by urban and rural area by municipality for the years 2000 and 2010.

The future service coverage and additional households to be served are estimated to meet the provincial sector targets using the number of household served in the base year and the number of households in target years.

Additional number of households to be served by different type of facility by urban and rural area by municipality is the shortfall of the number of households to be served in target years comparing with either that in base year or in Phase I (details are referred to

Table 8.5.1 Population to be Served by Target Year (Water Supply)

Municipalities	Type	Phase I (2000)								Phase II (2010)								
		Total Population	Service Coverage				Additional Population to be Served				Total Population	Service Coverage				Additional Population to be Served			
			Level III	Level II	Level I	Total	Level III	Level II	Level I	Total		Level III	Level II	Level I	Total	Level III	Level II	Level I	Total
Botolan	Urban	4,380	2,378	0	1,564	3,942	2,378	0	0	2,378	5,024	4,672	0	0	4,672	2,294	0	0	2,294
	Rural	37,055	0	3,675	20,411	24,086	0	0	10,337	10,337	42,503	0	3,675	36,703	40,378	0	0	16,292	16,292
	Total	41,435	2,378	3,675	21,975	28,028	2,378	0	10,337	12,715	47,527	4,672	3,675	36,703	45,050	2,294	0	16,292	18,586
Cabangan	Urban	3,519	403	0	2,764	3,167	403	0	0	403	4,036	3,753	0	0	3,753	3,350	0	0	3,350
	Rural	15,718	0	970	11,698	12,668	0	0	0	0	18,029	0	970	16,158	17,128	0	0	4,460	4,460
	Total	19,237	403	970	14,462	15,835	403	0	0	403	22,065	3,753	970	16,158	20,881	3,350	0	4,460	7,810
Candelaria	Urban	4,732	1,951	0	2,308	4,259	30	0	0	30	5,427	5,047	0	0	5,047	3,096	0	0	3,096
	Rural	19,059	3,999	0	8,389	12,388	0	0	454	454	21,861	3,999	0	16,769	20,768	0	0	8,380	8,380
	Total	23,791	5,950	0	10,697	16,647	30	0	454	484	27,288	9,046	0	16,769	25,815	3,096	0	8,380	11,476
Castillejos	Urban	24,293	3,362	0	18,502	21,864	3,362	0	0	3,362	27,865	25,914	0	0	25,914	22,552	0	0	22,552
	Rural	6,667	0	0	4,334	4,334	0	0	135	135	7,648	0	0	7,266	7,266	0	0	2,932	2,932
	Total	30,960	3,362	0	22,836	26,198	3,362	0	135	3,497	35,513	25,914	0	7,266	33,180	22,552	0	2,932	25,484
Iba (Capital)	Urban	17,472	6,565	0	9,160	15,725	4,005	0	0	4,005	20,041	18,638	0	0	18,638	12,073	0	0	12,073
	Rural	21,618	1,130	0	12,922	14,052	0	0	212	212	24,796	1,130	0	22,426	23,556	0	0	9,504	9,504
	Total	39,090	7,695	0	22,082	29,777	4,005	0	212	4,217	44,837	19,768	0	22,426	42,194	12,073	0	9,504	21,577
Masinloc	Urban	17,292	7,713	0	7,850	15,563	107	0	0	107	19,834	18,446	0	0	18,446	10,733	0	0	10,733
	Rural	27,553	1,970	75	15,864	17,909	0	0	13,225	13,225	31,604	1,970	75	27,979	30,024	0	0	12,115	12,115
	Total	44,845	9,683	75	23,714	33,472	107	0	13,225	13,332	51,438	20,416	75	27,979	48,470	10,733	0	12,115	22,848
Palauig	Urban	2,797	610	0	1,907	2,517	610	0	0	610	3,208	2,983	0	0	2,983	2,373	0	0	2,373
	Rural	27,436	0	2,225	15,608	17,833	0	0	12,914	12,914	31,470	0	2,225	27,672	29,897	0	0	12,064	12,064
	Total	30,233	610	2,225	17,515	20,350	610	0	12,914	13,524	34,678	2,983	2,225	27,672	32,880	2,373	0	12,064	14,437
San Antonio	Urban	25,516	9,284	0	13,680	22,964	1,250	0	0	1,250	29,268	27,219	0	0	27,219	17,935	0	0	17,935
	Rural	8,052	0	0	5,234	5,234	0	0	397	397	9,236	0	0	8,774	8,774	0	0	3,540	3,540
	Total	33,568	9,284	0	18,914	28,198	1,250	0	397	1,647	38,504	27,219	0	8,774	35,993	17,935	0	3,540	21,475
San Felipe	Urban	16,045	5,137	0	9,304	14,441	1,416	0	0	1,416	18,404	17,116	0	0	17,116	11,979	0	0	11,979
	Rural	2,469	132	217	1,793	2,142	0	0	0	0	2,832	132	217	2,341	2,690	0	0	548	548
	Total	18,514	5,269	217	11,097	16,583	1,416	0	0	1,416	21,236	17,248	217	2,341	19,806	11,979	0	548	12,527
San Marcelino	Urban	22,378	4,590	225	15,325	20,140	139	0	0	139	25,668	23,871	0	0	23,871	19,281	0	0	19,281
	Rural	10,476	0	0	6,809	6,809	0	0	6,262	6,262	12,016	0	0	11,415	11,415	0	0	4,606	4,606
	Total	32,854	4,590	225	22,134	26,949	139	0	6,262	6,401	37,684	23,871	0	11,415	35,286	19,281	0	4,606	23,887
San Narciso	Urban	14,842	1,941	0	11,417	13,358	92	0	0	92	17,025	15,833	0	0	15,833	13,892	0	0	13,892
	Rural	10,591	0	2,025	4,859	6,884	0	0	3,304	3,304	12,148	0	2,025	9,516	11,541	0	0	4,657	4,657
	Total	25,433	1,941	2,025	16,276	20,242	92	0	3,304	3,396	29,173	15,833	2,025	9,516	27,374	13,892	0	4,657	18,549
Santa Cruz	Urban	10,847	5,146	0	4,616	9,762	2,521	0	0	2,521	12,442	11,571	0	0	11,571	6,425	0	0	6,425
	Rural	41,954	381	349	26,540	27,270	0	0	22,113	22,113	48,122	381	349	44,986	45,716	0	0	18,446	18,446
	Total	52,801	5,527	349	31,156	37,032	2,521	0	22,113	24,634	60,564	11,952	349	44,986	57,287	6,425	0	18,446	24,871
Subic	Urban	49,723	21,141	0	23,610	44,751	4,616	0	0	4,616	57,033	53,041	0	0	53,041	31,900	0	0	31,900
	Rural	13,763	1,889	0	7,057	8,946	0	0	5,405	5,405	15,787	1,889	0	13,109	14,998	0	0	6,052	6,052
	Total	63,486	23,030	0	30,667	53,697	4,616	0	5,405	10,021	72,820	54,930	0	13,109	68,039	31,900	0	6,052	37,952
PW4SP Study Area	Urban	213,836	70,221	225	122,007	192,453	20,929	0	0	20,929	245,275	228,104	0	0	228,104	157,883	0	0	157,883
	Rural	242,411	9,501	9,536	141,518	160,555	0	0	74,758	74,758	278,052	9,501	9,536	245,114	264,151	0	0	103,596	103,596
	Total	456,247	79,722	9,761	263,525	353,008	20,929	0	74,758	95,687	523,327	237,605	9,536	245,114	492,255	157,883	0	103,596	261,479

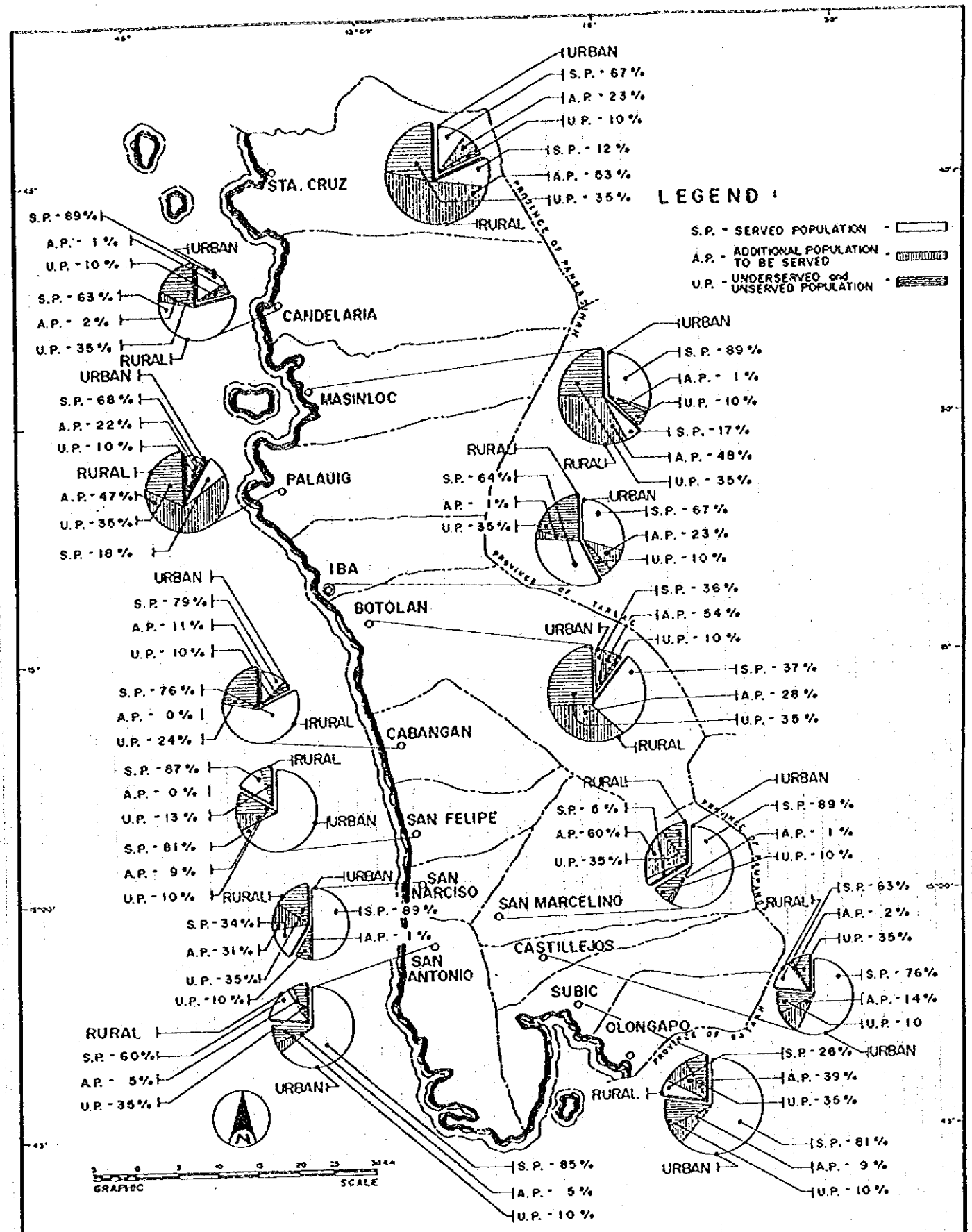


FIGURE 8.5.1

MAP SHOWING FUTURE WATER SUPPLY SERVICE COVERAGE BY 2000

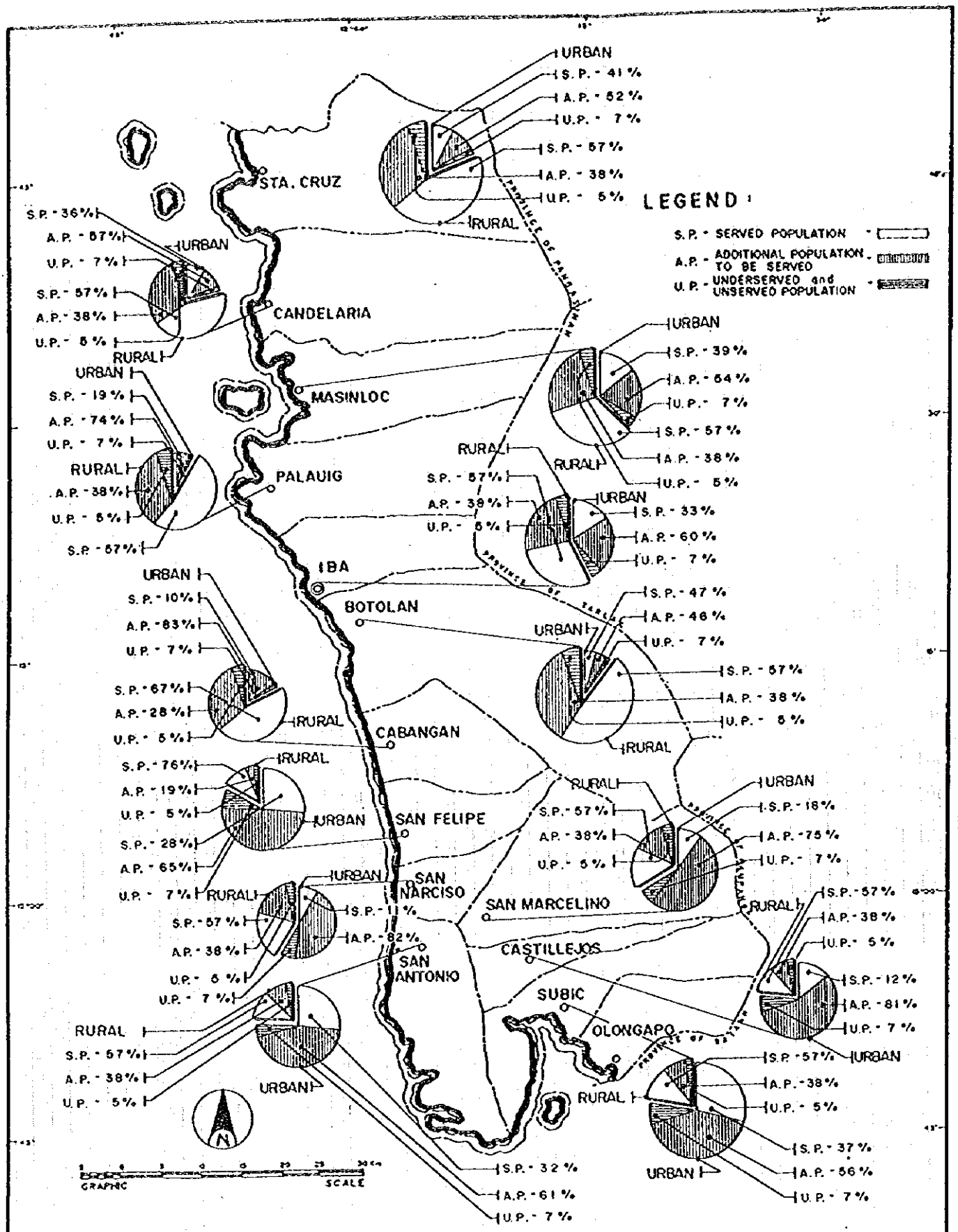


FIGURE 8.5.2

MAP SHOWING FUTURE WATER SUPPLY SERVICE COVERAGE BY 2010

Supporting Report). However, when the number of households to be served in target year/s is less than or equal to that in base year, no additional number of households to be served is counted.

In the determination of the number of households to be served by flush type toilet, when the number of households to be served in the target year is bigger than in base year, the target coverage is applied with conditions. When the target coverage is bigger than Level III water supply coverage, the latter coverage is adopted, while in the other case, the target coverage is applied. In cases where the target coverage is less than that in base year, the base year coverage is adopted.

For Phase I, any type of existing facilities both in urban and rural areas are to be utilized during Phase I period. For Phase II, only water-sealed toilet facilities in Phase I both in urban and rural areas are to be utilized.

The projected number of served households at the end of the Phase I period is 82,962. The additional households to be served totaled to 24,825, of which 33% is urban households and 67% is rural. While at the end of Phase II period, the projected number of served households is 124,295 with an additional households to be served at 47,367. Of this, 42% is urban households and the remaining 58%, rural. Table 8.5.2 summarizes the additional number of households to be served by target year for urban and rural areas by municipality. Figures 8.5.3 and 8.5.4 present maps showing service coverage by 2000 and 2010, respectively.

(2) School toilets

The service coverage (number of public school students to be served) is estimated by municipality for the years 2000 and 2010.

The future service coverage and additional number of students to be served are estimated using the number of public school students served in the base year, the number of public school students in target years and the provincial sector targets.

Additional number of students to be served by municipality is the shortfall of the number of students to be served in target years comparing with either that in base year or in Phase I (details are referred to Supporting Report). However, when the number of students to

Table 8.5.2 Additional Number of Households to be Served by Target Year (Household Toilets)

Municipality	Area	Phase I (2000)									Phase I I (2010)								
			No. of Served Households				Add'l. No. of Households to be Served					No. of Served Households				Add'l. No. of Households to be Served			
		Total Households	Flush	Pour Flush	VIP Latrine	Total	Flush	Pour Flush	VIP Latrine	Total	Total Households	Flush	Pour Flush	VIP Latrine	Total	Flush	Pour Flush	VIP Latrine	Total
Botolan	Urban	826	230	538	0	768	230	3	0	233	1,256	597	597	0	1,194	367	59	0	426
	Rural	7,126	0	5,964	663	6,627	0	1,667	0	1,667	10,626	0	10,094	0	10,094	0	4,130	0	4,130
	Total	7,952	230	6502	663	7,395	230	1,670	0	1,900	11,882	597	10,691	0	11,288	367	4,189	0	4,556
Cabangan	Urban	733	84	598	0	682	84	151	0	235	1,009	479	479	0	958	395	0	0	395
	Rural	3,208	0	2,685	298	2,983	0	1,191	0	1,191	4,507	0	4,281	0	4,281	0	1,596	0	1,596
	Total	3,941	84	3283	298	3,665	84	1,342	0	1,426	5,516	479	4,760	0	5,239	395	1,596	0	1,991
Candelaria	Urban	845	236	550	0	786	80	0	0	80	1,357	645	645	0	1,290	409	95	0	504
	Rural	3,286	306	2,445	306	3,056	187	627	306	1,119	5,465	519	4,673	0	5,192	213	2,228	0	2,441
	Total	4,131	541	2995	306	3,842	266	627	306	1,199	6,822	1,164	5,318	0	6,482	623	2,323	0	2,946
Castillejos	Urban	4,859	672	3,847	0	4,519	672	0	0	672	6,966	3,309	3,309	0	6,618	2,637	0	0	2,637
	Rural	1,419	0	1,188	132	1,320	0	425	132	557	1,912	0	1,817	0	1,817	0	629	0	629
	Total	6,278	672	5035	132	5,839	672	425	132	1,229	8,878	3,309	5,126	0	8,435	2,637	629	0	3,266
Iba (Capital)	Urban	3,360	937	2,187	0	3,124	681	474	0	1,155	5,010	2,380	2,380	0	4,760	1,443	193	0	1,636
	Rural	4,157	217	3,262	387	3,866	104	0	387	491	6,199	283	5,606	0	5,889	66	2,344	0	2,410
	Total	7,517	1,154	5449	387	6,990	785	474	387	1,646	11,209	2,663	7,986	0	10,649	1,509	2,537	0	4,046
Masinloc	Urban	3,144	877	2,047	0	2,924	351	0	0	351	4,959	2,356	2,356	0	4,712	1,479	309	0	1,788
	Rural	5,010	0	3,727	466	4,193	0	1,235	466	1,701	7,901	493	7,013	0	7,506	493	3,286	0	3,779
	Total	8,154	877	5774	466	7,117	351	1,235	466	2,052	12,860	2,849	9,369	0	12,218	1,972	3,595	0	5,567
Palauig	Urban	528	115	376	0	491	115	0	0	115	802	381	381	0	762	266	5	0	271
	Rural	4,988	0	4,175	464	4,639	0	1,456	464	1,920	7,868	0	7,474	0	7,474	0	3,299	0	3,299
	Total	5,516	115	4551	464	5,130	115	1,456	464	2,035	8,670	381	7,855	0	8,236	266	3,304	0	3,570
San Antonio	Urban	5,547	1,548	3,611	0	5,159	886	192	0	1,078	7,317	3,476	3,476	0	6,952	1,928	0	0	1,928
	Rural	1,750	0	1,465	163	1,628	0	595	120	715	2,309	0	2,193	0	2,193	0	728	0	728
	Total	7,297	1,548	5076	163	6,786	886	787	120	1,792	9,626	3,476	5,669	0	9,145	1,928	728	0	2,656
San Felipe	Urban	3,488	973	2,271	0	3,244	569	0	0	569	4,601	2,185	2,185	0	4,370	1,212	0	0	1,212
	Rural	514	27	403	48	478	13	302	48	363	708	33	639	0	672	6	236	0	242
	Total	4,002	1,000	2674	48	3,722	582	302	48	932	5,309	2,218	2,824	0	5,042	1,218	236	0	1,454
San Marcelino	Urban	4,567	937	3,310	0	4,247	937	0	0	937	6,417	3,048	3,048	0	6,096	2,111	0	0	2,111
	Rural	2,183	0	1,827	203	2,030	0	1,166	0	1,166	3,004	0	2,853	0	2,853	0	1,026	0	1,026
	Total	6,750	937	5137	203	6,277	937	1,166	0	2,103	9,421	3,048	5,901	0	8,949	2,111	1,026	0	3,137
San Narciso	Urban	3,227	422	2,579	0	3,001	422	0	0	422	4,256	2,022	2,022	0	4,044	1,600	0	0	1,600
	Rural	2,206	0	1,846	205	2,051	0	60	205	265	3,037	0	2,886	0	2,886	0	1,040	0	1,040
	Total	5,433	422	4425	205	5,052	422	60	205	687	7,293	2,022	4,908	0	6,930	1,600	1,040	0	2,640
Santa Cruz	Urban	2,009	561	1,308	0	1,869	393	0	0	393	3,111	1,478	1,478	0	2,956	917	170	0	1,087
	Rural	7,916	72	6,554	736	7,362	72	4,098	0	4,170	12,031	95	11,335	0	11,430	23	4,781	0	4,804
	Total	9,925	633	7862	736	9,231	465	4,098	0	4,563	15,142	1,573	12,813	0	14,386	940	4,951	0	5,891
Subic	Urban	9,945	2,775	6,474	0	9,249	1,123	732	0	1,855	14,258	6,773	6,773	0	13,546	3,998	299	0	4,297
	Rural	2,867	267	2,133	267	2,666	70	1,070	267	1,406	3,947	375	3,375	0	3,750	108	1,242	0	1,350
	Total	12,812	3,041	8607	267	11,915	1,192	1,802	267	3,261	18,205	7,148	10,148	0	17,296	4,107	1,541	0	5,648
PW4SP Study Area	Urban	43,078	10,367	29,696	0	40,063	6,543	1,552	0	8,095	61,319	29,129	29,129	0	58,258	18,762	1,130	0	19,892
	Rural	46,630	888	37,674	4,337	42,899	445	13,892	2,393	16,731	69,514	1,798	64,239	0	66,037	910	26,565	0	27,475
	Total	89,708	11,255	67,370	4,337	82,962	6,988	15,444	2,393	24,825	130,833	30,927	93,368	0	124,295	19,672	27,695	0	47,367

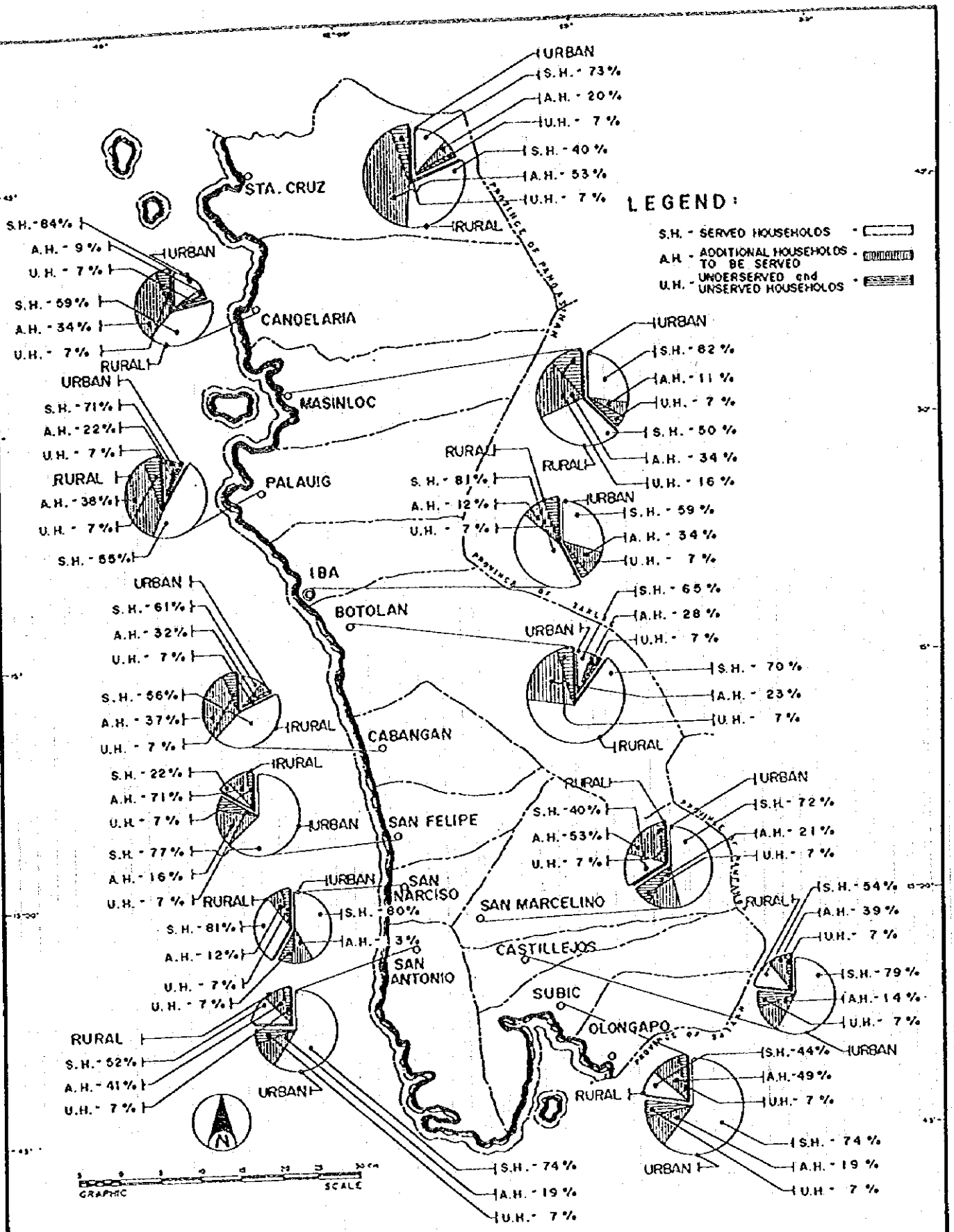


FIGURE 8.5.3

MAP SHOWING HOUSEHOLD TOILETS SERVICE COVERAGE BY 2000

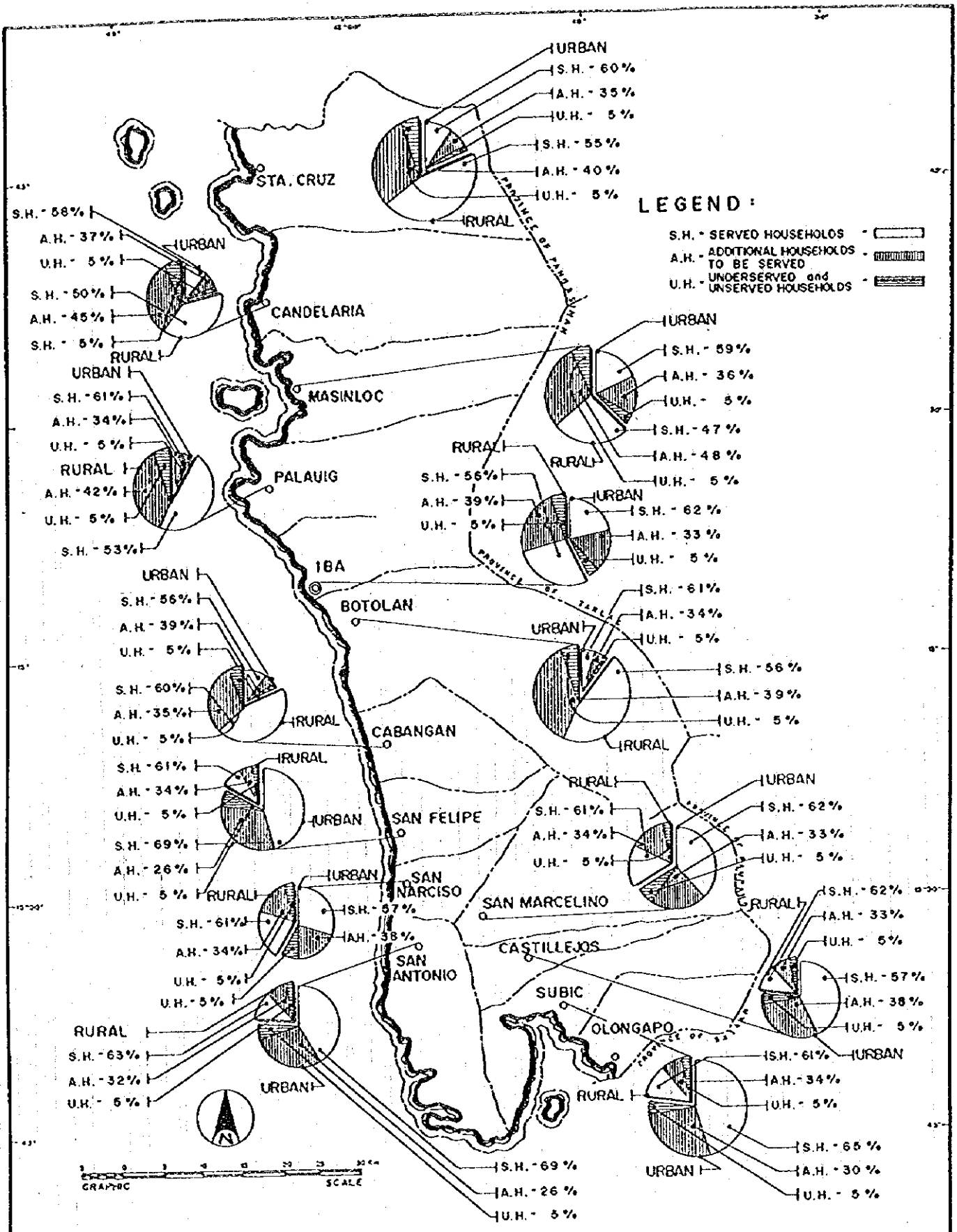


FIGURE 8.5.4

MAP SHOWING HOUSEHOLD TOILETS SERVICE COVERAGE BY 2010

be served in target year/s is less than or equal to the base year, no additional number of students to be served is considered

The existing facilities are to be utilized during Phase I period, while the facilities in Phase I are to be utilized during Phase II period.

The projected number of served students at the end of Phase I period is 45,868. The additional students to be served totaled to 15,485. While at the end of Phase II period, the projected number of served students is 73,650 with an additional students to be served at 27,782. Table 8.5.3 summarizes the additional number of public school students to be served by target year by municipality.

Table 8.5.3 Additional Number of Public School Students to be Served by Target Year (School Toilets)

Municipality	Phase I (2000)			Phase II (2010)		
	Total No. of Public School Students	Std. No. of Public School Students to be Served	Add'l. No. of Public School Students to be Served	Total No. of Public School Students	Std. No. of Public School Students to be Served	Add'l. No. of Public School Students to be Served
Botolan	7,611	3,806	0	8,730	6,111	2,305
Cabangan	3,680	1,840	440	4,221	2,955	1,115
Candelaria	5,769	2,885	1,085	6,617	4,632	1,747
Castillejos	5,128	2,564	1,464	5,882	4,117	1,553
Iba (Capital)	11,213	5,607	0	12,862	9,003	3,396
Masinloc	9,606	4,803	1,553	11,018	7,713	2,910
Palauig	6,772	3,386	2,386	7,767	5,437	2,051
San Antonio	4,445	2,223	623	5,099	3,569	1,346
San Felipe	2,893	1,447	277	3,318	2,323	876
San Marcelino	4,191	2,096	1,146	4,807	3,365	1,269
San Narciso	3,859	1,930	330	4,427	3,099	1,169
Santa Cruz	11,242	5,621	971	12,894	9,026	3,405
Subic	15,319	7,660	5,210	17,572	12,300	4,640
PW4SP Study Area	91,728	45,868	15,485	105,214	73,650	27,782

(3) Public toilets

The service coverage of public utilities with sanitary toilet facility is estimated by municipality for the years 2000 and 2010.

The future service coverage and additional coverage are estimated using the existing number of public utilities with sanitary toilets in the base year, the number of public utilities in target years, and provincial sector targets.

The additional number of public utilities with sanitary toilets needed by municipality is the shortfall of the number of public utilities in target year comparing with either the existing coverage or Phase I coverage (details are referred to Supporting Report).

The existing sanitary facilities are to be utilized during Phase I period. The facilities in Phase I are to be utilized during Phase II period.

The projected number of served public utilities at the end of Phase I period is 28 with an additional public utilities to be served at 9. While at the end of Phase II period, the projected number of served public utilities is 53. The additional public utilities to be served are 25. Table 8.5.4 summarizes additional number of public utilities to be served by municipality by target year.

Table 8.5.4 Additional Number of Number of Public Utilities with Sanitary Toilets by Target Year

Municipality	Type	Phase I Coverage (2000)		Phase II Coverage (2010)	
		Add'l. No. of Public Utilities with Sanitary Toilets	Number of Public Utilities with Sanitary Toilets	Add'l. No. of Public Utilities with Sanitary Toilets	Number of Public Utilities with Sanitary Toilets
Botolan	Public Market	0	1	0	1
	Bus/Jeep Terminal	1	1	0	1
	Total	1	2	0	2
Cabangan	Public Market	1	2	0	2
	Bus/Jeep Terminal	0	0	1	1
	Total	1	2	1	3
Candelaria	Public Market	1	2	0	2
	Bus/Jeep Terminal	0	0	1	1
	Total	1	2	1	3
Castillejos	Public Market	1	2	0	2
	Bus/Jeep Terminal	0	0	0	0
	Total	1	2	0	2
Iba (Capital)	Public Market	1	2	0	2
	Bus/Jeep Terminal	0	1	1	2
	Total	1	3	1	4
Masinloc	Public Market	0	1	0	1
	Bus/Jeep Terminal	1	1	0	1
	Total	1	2	0	2
Palauig	Public Market	0	1	0	1
	Bus/Jeep Terminal	0	0	1	1
	Total	0	1	1	2
San Antonio	Public Market	1	2	0	2
	Bus/Jeep Terminal	0	0	1	1
	Total	1	2	1	3
San Felipe	Public Market	0	1	1	2
	Bus/Jeep Terminal	1	3	1	4
	Total	1	4	2	6
San Marcelino	Public Market	0	2	2	4
	Bus/Jeep Terminal	1	1	1	2
	Total	1	3	3	6
San Narciso	Public Market	0	1	0	1
	Bus/Jeep Terminal	0	0	1	1
	Total	0	1	1	2
Santa Cruz	Public Market	0	1	2	3
	Bus/Jeep Terminal	0	2	3	5
	Total	0	3	5	8
Subic	Public Market	0	1	4	5
	Bus/Jeep Terminal	0	0	5	5
	Total	0	1	9	10
PW4SP Study Area	Public Market	5	19	9	28
	Bus/Jeep Terminal	4	9	16	25
	Total	9	28	25	53

8.5.3 Urban Sewerage

The service coverage in 2010 (Phase II) is estimated for the municipalities with population of more than 10,000 in urban area provided by Level III water supply. It is assumed that half of the population in the area/s is to be served by the sewerage systems. Table 8.5.5 shows the population to be served in Phase II.

Table 8.5.5 Population to be Served by Urban Sewerage in Phase II

Municipality	Urban Population in 2010	Level III Water Supply Coverage	Population to be Served
Castillejos	27,865	25,914	13,933
Iba (Capital)	20,041	18,638	10,021
Masinloc	19,834	18,446	9,917
San Antonio	29,268	27,219	14,634
San Felipe	18,404	17,116	9,202
San Marcelino	25,668	23,871	12,834
San Narciso	17,025	15,833	8,513
Santa Cruz	12,442	11,571	6,221
Subic	57,033	53,041	28,517
PW4SP Study Area	227,580	211,649	113,792

8.5.4 Solid Waste

Future requirements in the sub-sector are studied giving priority to urban area for the Phase I. Staged improvement for the rural area shall be studied in the future.

Service coverage in Phase I is assumed to be 80% with reference to the current service coverage of 62%. Additional service coverage in Phase I is calculated as a shortfall of target coverage in Phase I comparing with existing service coverage. Table 8.5.6 presents additional service coverage for Phase I in the urban area.

Table 8.5.6 Add'l. No. of Urban Households to be Served by Municipal Solid Waste System in Phase I

Municipality	No. of Urban Households Served in the Base Year	No. of Urban Households (2000)	Urban Household Coverage (2000)	Add'l. No. of Urban Households to be Served
Botolan	0	826	661	661
Cabangan	0	733	586	586
Candelaria	718	845	718	0
Castillejos	1,476	4,859	3,887	2,411
Iba (Capital)	2,622	3,360	2,688	66
Masinloc	2,600	3,144	2,600	0
Palauig	0	528	422	422
San Antonio	3,471	5,547	4,438	967
San Felipe	0	3,488	2,790	2,790
San Marcelino	1,808	4,567	3,654	1,846
San Narciso	2,731	3,227	2,731	0
Santa Cruz	2,110	2,009	2,110	0
Subic	6,437	9,945	7,956	1,519
PW4SP Study Area	23,973	43,078	35,241	11,268

8.6 Facilities, Equipment and Rehabilitation to Meet the Target Services

8.6.1 Water Supply

(1) Required facilities

Water supply facilities required by service level were estimated by urban and rural area by municipality based on the additional service coverage by target year and summarized in Table 8.6.1 (details are referred to Supporting Report).

Urban water supply:

Physical requirements of Level III systems are estimated as the number of required house connections. Mode of project indicates whether future urban water supply will be implemented as expansion of existing system or construction of a new system. Number of deep wells was also estimated based on the water source evaluation results in Chapter 7.

Rural water supply:

Physical requirements of Level II systems are estimated as the number of systems and number of communal faucets, while that of Level I wells are estimated as the number of wells with classification of deep and shallow wells. Deep wells are further subdivided in terms of three different standard depths based on the water source evaluation results.

(2) Rehabilitation

Rehabilitation requirements are estimated as 10% of the total number of deep wells to be constructed under PW4SP. Rehabilitation work is mainly redevelopment of wells by means of air surging, while minor repair of concrete apron and handpump was considered to be undertaken by respective beneficiary organizations.

(3) Equipment

Logistic support:

For rural water supply development, each 1 unit or set of the following equipment was considered necessary for the provincial government to conduct various activities of PW4SP implementation;

Transportation- service vehicle.

Office equipment- computer with printer, typewriter, mimeo machine, scanning machine and copier.

Field equipment- water testing kit, sound system, tape recorder and tools for maintenance.

Table 8.6.1 Water Supply Facilities Required by Target Year

Municipality	Phase I (2000) Requirements										Phase II (2010) Requirements							
	Urban Water Supply (Level III)			Rural Water Supply							Urban Water Supply (Level III)		Rural Water Supply (Level I)					
				Level II		Level I												
	Mode of Project	No. of Additional Deep Wells	Number of House Connections	Number of System	No. of Communal Faucets	Number of Deep Wells				Number of Shallow Wells	Total No. of Wells	No. of Additional Deep Wells	Number of House Connections	Number of Deep Wells				Number of Shallow Wells	Total No. of Wells
						40 m	80 m	120 m	Sub-total					40 m	80 m	120 m	Sub-total		
Botolan	New	1	448	0	0	100	0	0	100	33	133	1	574	204	0	0	204	68	272
Cabangan	New	1	84	0	0	0	0	0	0	0	0	1	838	45	0	0	45	30	75
Candelaria	Expansion	1	5	0	0	4	0	0	4	2	6	1	774	84	0	0	84	56	140
Castillejos	New	1	672	0	0	1	0	0	1	1	2	2	5,638	34	0	0	34	15	49
Iba (Capital)	Expansion	1	770	0	0	2	0	0	2	1	3	2	3,018	111	0	0	111	48	159
Masinloc	Expansion	1	19	0	0	97	0	0	97	64	161	1	2,683	121	0	0	121	81	202
Palauig	New	1	115	0	0	0	0	0	0	157	157	1	593	0	0	0	0	202	202
San Antonio	Expansion	1	272	0	0	4	0	0	4	2	6	2	4,484	41	0	0	41	18	59
San Felipe	Expansion	1	308	0	0	0	0	0	0	0	0	2	2,995	8	0	0	8	2	10
San Marcelino	New	1	28	0	0	74	0	0	74	13	87	2	4,820	65	0	0	65	12	77
San Narciso	New	1	20	0	0	41	0	0	41	5	46	2	3,473	70	0	0	70	8	78
Santa Cruz	Expansion	1	467	0	0	195	0	0	195	84	279	1	1,606	216	0	0	216	92	308
Subic	Expansion	1	923	0	0	68	0	0	68	8	76	3	7,975	91	0	0	91	10	101
PW4SP Study Area	New------- 6 Expansion- 7	13	4,131	0	0	586	0	0	586	370	956	21	39,471	1,090	0	0	1,090	642	1,732

For urban water supply, no hardware was considered.

Well drilling and rehabilitation equipment:

As a reference information, necessary types and number of well drilling and rehabilitation equipment were studied considering the existing equipment of sector agencies in the province.

During the Phase I period, a total of 956 Level I wells (586 deep and 370 shallow wells) shall be newly constructed and 10% of these deep wells will be rehabilitated annually. Although there are huge requirements, only 1 unit of truck-mounted percussion type drilling rig is available at DPWH-DEO in the province.

Therefore, a total of 15 sets of drilling rigs (4 sets of small size rotary type, 5 sets of medium size rotary type and 6 sets of medium size percussion type) together with 1 set of well rehabilitation equipment, 5 units of support vehicles and 11 units of service trucks for medium size drilling rigs shall be mobilized/procured either by private sector or LGUs (details are referred to Supporting Report).

8.6.2 Sanitation

This sub-section refers to physical requirements by target year covering household, school and public toilet facilities. Table 8.6.2 presents the required sanitation facilities by target year. Rehabilitation for the sanitation facilities is considered as part of recurrent cost.

(1) Household toilets

Future requirements in the number of household toilets by different type for urban and rural areas are estimated based on the additional households to be served by type of facility both for urban and rural areas by target year (details are referred to Supporting Report).

(2) School toilets

The future requirements in the number of toilet facilities are estimated based on the standard number of students to be served by a 5-unit standard facility and the additional students to be served by target year (details are referred to Supporting Report).

Total required facilities are further broken down into urban and rural areas by applying the percentage share of urban and rural population.

Table 8.6.2 Sanitation Facilities Required by Target Year

Municipality	Phase I (2000) Requirements												Phase I (2010) Requirements											
	Urban Sanitation							Rural Sanitation					Urban Sanitation							Rural Sanitation				
	Number of Household Toilets				Number of	No. of Public Toilets		Number of Household Toilets				Number of	Number of Household Toilets				Number of	No. of Public Toilets		Number of Household Toilets				Number of
	Flush	Pour Flush	VIP Latrine	Total	Public School Toilets	Public Markets	Bus Terminal	Flush	Pour Flush	VIP Latrine	Total	Public School Toilets	Flush	Pour Flush	VIP Latrine	Total	Public School Toilets	Public Markets	Bus Terminals	Flush	Pour Flush	VIP Latrine	Total	Public School Toilets
Botolan	230	3	0	233	0	0	1	0	1,667	0	1,667	0	367	59	0	426	0	0	0	0	4,130	0	4,130	9
Cabangan	84	151	0	235	0	1	0	0	1,191	0	1,191	2	395	0	0	395	0	0	1	0	1,596	0	1,596	4
Candelaria	80	0	0	80	0	1	0	187	627	306	1,119	4	409	95	0	504	1	0	1	213	2,228	0	2,441	6
Castillejos	672	0	0	672	5	1	0	0	425	132	557	1	2,637	0	0	2,637	5	0	0	0	629	0	629	1
Iba (Capital)	681	474	0	1,155	0	1	0	104	0	387	491	0	1,443	193	0	1,636	6	0	1	66	2,344	0	2,410	8
Masinloc	351	0	0	351	2	0	1	0	1,235	466	1,701	4	1,479	309	0	1,788	4	0	0	493	3,286	0	3,779	8
Palauig	115	0	0	115	0	0	0	0	1,456	464	1,920	10	266	5	0	271	0	0	1	0	3,299	0	3,299	8
San Antonio	886	192	0	1,078	2	1	0	0	595	120	715	0	1,928	0	0	1,928	4	0	1	0	728	0	728	1
San Felipe	569	0	0	569	0	0	1	13	302	48	363	1	1,212	0	0	1,212	3	1	1	6	236	0	242	1
San Marcelino	937	0	0	937	3	0	1	0	1,166	0	1,166	2	2,111	0	0	2,111	3	2	1	0	1,026	0	1,026	2
San Narciso	422	0	0	422	0	0	0	0	60	205	265	1	1,600	0	0	1,600	3	0	1	0	1,040	0	1,040	2
Santa Cruz	393	0	0	393	0	0	0	72	4,098	0	4,170	4	917	170	0	1,087	3	2	3	23	4,781	0	4,804	11
Subic	1,123	732	0	1,855	16	0	0	70	1,070	267	1,406	5	3,998	299	0	4,297	15	4	5	108	1,242	0	1,350	4
PWaSP Study Area	6,543	1,552	0	8,095	28	5	4	445	13,892	2,393	16,731	34	18,762	1,130	0	19,892	47	9	16	910	26,565	0	27,475	65

(3) Public toilets

Future requirements in the number of toilet facilities are estimated based on the additional number of toilets for public markets and bus/jeepney terminals located in urban areas (details are referred to Supporting Report).

8.6.3 Urban Sewerage and Solid Waste

Physical requirements for the sewerage facilities are not discussed in this sub-section. Further study shall be conducted in the future.

As reference information, the number of refuse collection truck is estimated for the urban area in Phase I. Nine (9) additional units of truck are needed to meet assumed service coverage as reflected in Table 8.6.3.

Table 8.6.3 Number of Refuse Collection Trucks Required in Phase I

Municipality	Additional Urban Households to be Served	Estimated Daily Amount of Refuse to be Generated (Kg)	Number of Collection Truck Required
Botolan	661	276	1
Cabangan	586	245	1
Candelaria	0	0	0
Castillejos	2,411	1,008	1
Iba (Capital)	66	28	1
Masinloc	0	0	0
Palauig	422	176	1
San Antonio	967	404	1
San Felipe	2,790	1,166	1
San Marcelino	1,846	772	1
San Narciso	0	0	0
Santa Cruz	0	0	0
Subic	1,519	635	1
PW4SP Study Area	11,268	4,710	9

8.7 Identification of Priority Projects for Medium-Term Development Plan

In general, the present service coverage by municipality with reference to the target coverage indicates the direction of development effort for implementing PW4SP with municipal priorities.

Specific projects shall be selected subject to detailed studies and rather not discussed in provincial master plan. In addition, pertinent information to identify priority projects is not

available both at provincial and municipal level during this PW4SP preparation, except some WDs for future expansion work.

The general criteria for identifying priority projects as guide for implementing the PW4SP are summarized below.

The first level of priority should be given to those projects with positive feasibility studies and identified funding. Next level of priority would be given to those projects with positive feasibility studies, although no funding source has been identified. The third level should be those for which feasibility study has been conducted. Within each level, if funds were insufficient, a ranking could be carried out in application of some factors such as willingness to pay, water-related diseases status and per capita cost. Under the above-mentioned conditions, a list of projects shall be prepared by the implementors.

Due attention shall be paid on the importance of integrated development of relevant subsectors to maximize the effects and benefits through simultaneous implementation of water supply and sanitation projects. On a municipal level priority, synthetic evaluation of sector components for concerned municipalities (which is studied in the financial arrangements, Chapter 11) may be used for implementation arrangements.

Chapter 9

SECTOR MANAGEMENT PLAN

9. SECTOR MANAGEMENT PLAN

9.1 General

In order to effectively manage the water and sanitation sector, the provincial and municipal governments will have to make some adjustments in their current structures and policies. This Chapter proposes the mechanisms, processes and structures needed in the medium-term to achieve the coverage targets with sustainability. Not all recommendations can be laid out with the same level of detail at this time as some are dependent on further policy guidelines being formulated at the national level. These include, for example: the ongoing study on access of LGUs to external financing assistance and the formulation of the Implementing Rules and Regulations to guide, among others, the sector devolution process.

9.2 Sector Management

(1) Development of the vision

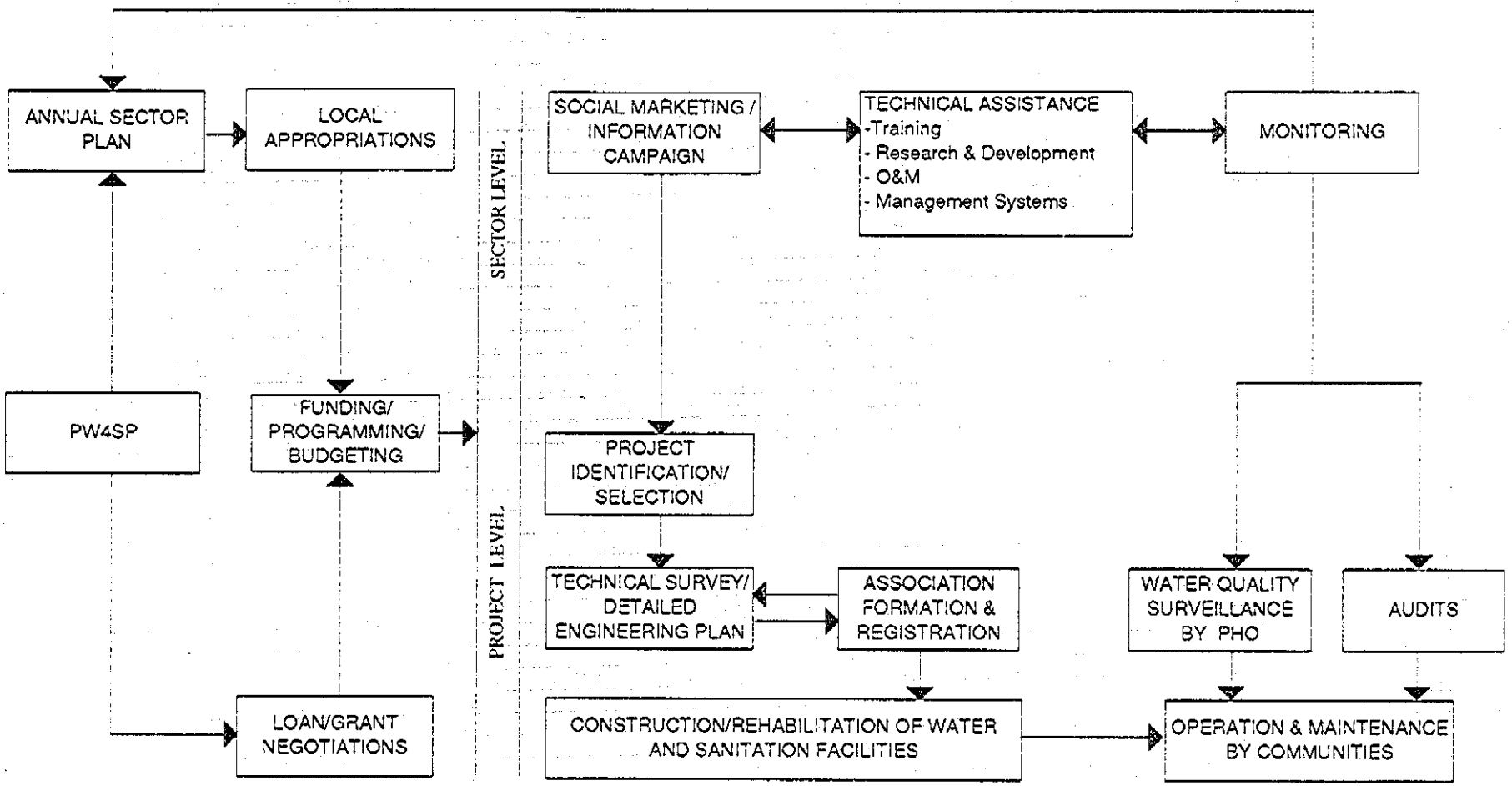
One glaring institutional need at the local level is the absence of a common vision and mission statement for the sector. A critical mass of people and resources who share in the vision must be identified and harnessed for project implementation. Local planners need to focus on the long-term requirements i.e., beyond forming users' associations, drilling wells, distributing bowls, etc. Based on a realistic assessment of constraints, opportunities and demand, the province of has set its vision and mission for the sector.

Initial vision statement: The province has formulated a two-phased plan which seeks to dramatically improve the provision of water supply & sanitation. In the medium-term (2000), the province seeks to increase water supply in urban areas to 90%; 65%, in rural areas. Sanitation facilities will be made available to 93% of the population; 50% of the public school students will have adequate sanitary toilet facilities. In the long-term (2010), urban water supply coverage will rise to 93%; rural water supply to 95%. Sanitation coverage will rise to 95%; public school students coverage will rise to 70%.

(2) Sector management

A Sector Management Model is presented in Figure 9.2.1 for sector management and project development. It is envisaged that this PW4SP will be used as a basis for the Annual

Figure 9.2.1 Sector Management Model



Sector Plan, and/or input into Loan or Grant Negotiations in the future. The Annual Sector Plan together with the budgets will be reviewed by the Governor and passed upon by the legislation as part of the annual provincial budget approval process.

The Sector Level Implementation activities consist principally of three (3) broad areas: social marketing; technical assistance; and monitoring. Project selection follows on from a self-selection process. The identification of a responsible community-based association and technical studies, as needed, will be done. Only after the institutional, financial and technical studies have been done, construction or rehabilitation will take place. Operation and maintenance, including arrangements for finances of the system will be the responsibility of the community organization. The Monitoring Function, on the other hand, will be augmented with water quality surveillance by the Provincial Health Office (PHO) and operational audits done by the LGU.

(3) Service provision policies and objectives

The LGU seeks to provide an adequate level of water and sanitation facilities defined as follows:

1) Level I facilities serve, at most, 15 (fifteen) households; Level II public taps serve 5 (five) households; and Level III provides individual household connections.
2) Water supply provision will be at least 20 lpcd for Level I; 60 lpcd for Level II; and 100 lpcd for Level III.
3) A critical mass of 70% of the individual households in every barangay has sanitary toilet facilities.
4) All schools shall have adequate water supply and at least one sanitary toilet facility for every 50 students.

(4) Operating policies

The following policy and strategy statements are adopted by the Provincial Government. These may be reviewed and revised from time to time by the Provincial Government. The key policy statements include the following:

1) Sustainability shall be promoted through increased community responsibility for management of facilities. Unless potential users demonstrate initiative and commitment (beyond making the request for assistance) to maintain the systems, no support shall be provided by the LGU. To the extent possible, the LGU should utilize existing local resources (self reliance).

2) Selection and prioritization of projects shall be based on demonstrated commitment of the beneficiaries to participate in the project, willingness to pay; the current water and sanitation and overall health conditions; potentials for growth; and cost implications.

3) Technology to be used for the projects shall be appropriate to the local conditions and resources. Furthermore, construction of economical facilities shall be pursued not necessarily insisting on low-cost. Phased upward integration and future upgrading of systems and facilities shall also be promoted utilizing to the extent possible previously constructed facilities. In urban centers, a range of technologies may be adopted for wastewater collection and treatment, as well as for drainage.

4) An integrated approach to the provision of potable water supply, sanitation and hygiene education shall be promoted. All projects to be developed by the LGUs must involve these three elements.

5) The LGU shall seek to provide water and sanitation in an equitable manner between rural and urban areas; between wealthy and depressed areas.

6) Cost Recovery and Cost Sharing (Subsidy Policies): The LGUs shall enforce a rational and consistent policy on the application of subsidies and loans for water supply and sanitation. The current national policy is that 100% of the capital costs for Level I systems are provided as grant; communities, however, have to establish an O&M reserve fund and are responsible for all maintenance and operating costs. Water source development is provided as grants for Level II systems; full cost recovery is required for all other capital costs. Full capital and O&M cost recovery is required for Level III systems.

7) Private Sector Participation: The government shall give the private sector a substantial and preferential role in the attainment of the PW4SP objectives. In harnessing their participation, less government intervention shall be exercised in areas where the private sector is or can be a key player. An environment designed to empower them to absorb new social responsibilities and proactively convey to the government their aspirations and interests shall be established. The formation of private sector groups, NGOs, community organizations, cooperatives and people's organizations shall be encouraged. The implementation of programs to develop their capabilities in the sector development programs shall be promoted.

8) In order to attain the targets, the provincial government will allocate 30% of its IRA Development Fund yearly for the next five years and try to access funds from other sources. Hopefully, funds for the sector from the Dept. of Public Works and Highways (DPWH), Dept. of Health (DOH), Dept. of Interior and Local Government (DILG), and the Province of Zambales will be pooled into a Provincial Trust Fund to be set up by

the province solely for the sector. Loans and grants should likewise be channeled through the Trust Fund.

The annual appropriation shall cover funding for social marketing/information campaigns; technical survey/detailed engineering; formation and registration of associations; construction/rehabilitation of water and sanitation facilities; technical assistance for training, research and development, operation and maintenance and management system; for monitoring; water quality surveillance; and audits.

9) Sector development shall be consistent with broader concerns for the environmental protection and management. Pollution control, conservation and proper utilization of water and land resources are critical issues. An environmentally-responsive management approach to resource use shall be pursued.

10) Disaster Response and Emergency Coordination: The LGU shall formulate, as part of its contingency plans, a program to address emergency conditions. The program shall include maintenance of stocks of chlorine, organization and training of local communities on restoration of water supplies and provision of emergency sanitary facilities. The LGU should coordinate closely and regularly with the local officials of the Regional Disaster Coordinating Council (RDCC).

(5) Regulatory policies

In coordination with appropriate national and local agencies, the LGUs shall endeavor to set up an effective regulatory framework considering the following:

1) Water allocation and water rights policies (conflict resolution) are within the mandate of the National Water Resources Board. Studies are underway to strengthen the linkages between the Board and other agencies, including LGUs, particularly in the enforcement of NWRB policies.

2) Water Rate Review: While the rate setting and approval functions remain largely as a concern of the associations or the water districts (and LWUA), a vehicle for redressing grievances against unrealistic tariffs (or other practices) can be instituted by the LGUs. The court system, of course, remains as the final arbiter in conflicts.

3) Association Registration: The LGU shall likewise adopt a registration and franchising system for associations responsible for water supply facilities. Annual reporting requirements will have to be established for monitoring and possibly, auditing purposes.

4) Water Quality: The National Drinking Water Standards have been established. The LGU will have to establish a viable mechanism, including water testing and standards enforcement, to ensure that water delivered meet the potability standards. The DOH currently has the responsibility and the regulatory power to stop the operations of water systems not delivering potable water.

(6) Financing system

Current policy shifts present an opportunity for the LGU to establish the conduit for future local and foreign-assisted projects. Presently, funds are brought to the field level through the government allotment and sub-allotment systems. Apart from being cumbersome and subject to delays, the more critical idiosyncrasy of this system is that the actual project implementation "power" still lies in the hands of national agencies.

Overall, it is the LGU responsibility to raise funds to support capital development sector projects and to ensure that adequate O&M reserves are raised by the beneficiary communities.

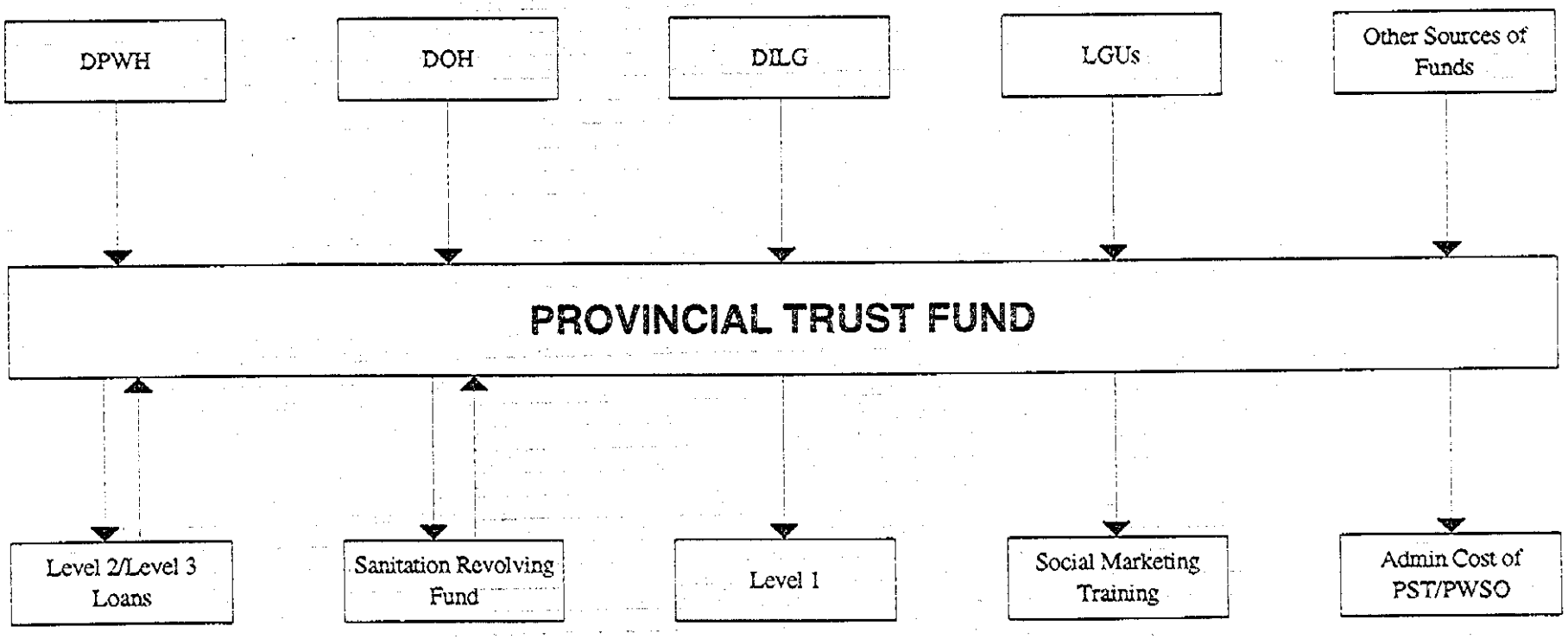
In the medium-term, the primary source of funds are envisaged to be provincial & local taxes & allocation from the IRA 20% Development Fund. Also, in the medium-term, it is envisaged that national & external funds will, although diminishing, continue to be channeled through local offices of central agencies.

Studies are underway to look into the feasibility of direct access of LGUs to external funds. The LGU will continue to monitor the developments and policy decision to be established as there will invariably affect local financing mechanisms.

In the long-term, the Provincial Sector Trust Fund approach (Fig. 9.2.2) is an additional mechanism for financing project-related activities. This Fund can be the transition arrangement as the line departments gradually reduce their direct control over sector funds. The Trust Fund also raises the LGU responsibility for effective and efficient utilization of these funds. The Trust Fund may be regularly replenished by the line departments upon liquidation. The controlling device at the national level will be in the replenishment of the trust fund. If the results are not satisfactory, national government should be able to institute changes as conditions to fund replenishment. Reviews can be done regularly. This arrangement is subject to agreement with respective line departments.

To support sanitation activities, housing improvement loans for installing in-house sanitary facilities should be studied and instituted by the LGUs. Such a mechanism can be organized with the rural banks or the existing credit cooperatives. Seed funding for this revolving fund also needs to be raised.

Figure 9.2.2 Flow of Funds



Upon agreement by the parties, the enabling local legislation establishing the Trust Fund and the sanitation revolving fund will have to be enacted.

9.3 Institutional Arrangements

In the medium-term, a full-time Provincial Sector Team (PST) for coordination and institution-building shall be set up. The LGU should ensure that adequate logistics and incentives are provided. This Team may be supplemented by staff detailed full-time from national and local agencies, as needed. In the long term, the core group from the Team could be established into a new Provincial Water and Sanitation Office (PWSO) to continue to promote, 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 PST/PWSO.

With the on-going discussions, it is not entirely clear at this time, how the water supply development capacity at the DPWH-DEO may be harnessed. One scenario is for the DEO to provide technical services at cost and in competition with other private contractors. Another scenario might call for the actual transfer of resources (equipment and staff) to the LGU. Policy decision and guidelines will be taken shortly at the national level.

The initial professional-level staffing of the PST/PWSO are estimated as follows:

Provincial Water Supply & Sanitation Coordinator	1
Assistant Provincial Water Supply & Sanitation Coordinator	1
Community Development & Training Specialist	2
Water Supply & Sanitation Engineer	2
Monitoring Specialist	1
Total Personnel Required	7

The Governor will then make the appointment based on the short list. DILG will assist in preparing the shortlist of candidates for PST/PWSO Coordinator. The draft Terms of Reference for the various posts is proposed follows.

(1) The Provincial Water Supply & Sanitation Coordinator (PWSC) will lead an interdisciplinary Provincial Sector Team. He will ensure timely preparation, implementation and reporting of sector and project progress based on the annual sector plan. For day to day operations, the PWSC will report to the Governor. He/she will also liaise with all project

implementors at the municipal level. The PWSC shall be the key contact person of the DILG PMO. Specific duties include:

1) Prepare guidelines, work plans and schedules for project implementation work at the municipal level; coordinate the work of consultants and NGOs in their various tasks.
2) Prepare a detailed work plan and program of activities for project implementation at the provincial level (including technical, financial and organizational aspects) and ensure regular reports on the progress of activities.
3) Guide the conduct of sector and project management and the supervision, and coordination of the PST/PWSO; ensure the quality and timeliness of the outputs of the other agencies and consultants.
4) Assess all future inputs required for project planning, design, supervision of construction and monitoring in subsequent phases of project implementation.
5) Take steps to ensure that adequate financing is available to support the sector capital development requirements.
6) Assist in the negotiations for external grants and loans.
7) Recommend policy and policy revisions to govern sector and project management activities.

(2) An Assistant Provincial Water Supply and Sanitation Coordinator will likewise be appointed to assist the PWSC in discharge of his/her duties and responsibilities of the PWSO.

(3) The Community Development and Training Specialist (CDTS) will be particularly responsible for implementing the community development and involvement aspects of the project. His/her task will include frequent contact with the municipal liaison staff and barangays to ensure that all project activities are demand-driven and sustainable. The CDTS will report to the PWSC. Specific duties include:

1) Identify initial areas and develop implementation arrangements for launching the project in the various municipalities.
2) Conduct regular dialogue and disseminate information among local leaders on water, sanitation and health issues.
3) Assist municipalities in overseeing the organization (or accreditation) of associations who will be responsible for water supply and sanitation facilities.
4) Coordinate the health and hygiene education program province-wide.
5) Review past training programs for water supply and sanitation, hygiene and sanitation education, and community organization and development, including any manuals or other training materials used.

6) Guide municipal liaison staff in developing/adapting a community training strategy and methodology based on the principles of participation, adult education, experiential learning and task specific activities, including the review and development of training materials.

7) Prepare the overall provincial training plan enhancing management skills, institutional strengthening, improving technical skills, and community promotion, awareness and development. This should include: training methodologies; types and numbers of training events for staff and communities; training of trainers; training packages, manuals and audio visuals; management aspects of training program; and staff requirements and cost estimates for all categories of training including equipment and materials.

8) Assist municipal staff in identifying and selecting target communities and sites based on agreed upon criteria; develop methodologies and coordinate preliminary village surveys and gender analysis.

9) Assist in coordinating activities of the municipal liaison.

(4) The Water Supply and Sanitation Engineer (WSSE) will be responsible for all the technical aspects of the project including feasibility studies, design, construction, operation and maintenance. The WSSE will report to the PWSC. Specific duties include:

1) Review the existing technical and environmental situation relating to water supply and sanitation facilities and assess the needs for new facilities and rehabilitation.

2) Prepare and update criteria and process for the selection of water supply and sanitation facilities appropriate to the conditions prevailing in the project areas focusing on systems that can be operated and maintained by the community.

3) Review design standards for water supply and for on-site sanitation (human excreta disposal) facilities for individual households, communal and school latrines.

4) Establish appropriate design technical specification for water and sanitation materials and equipment applicable to systems proposed in the project. Establish quality control mechanisms for the procurement of materials and equipment as appropriate.

5) Prepare standard contract documents, specifications and cost estimates for civil works and procurement.

6) Ensure proper construction supervision and monitoring in coordination with the municipal liaison. Ensure timely transport of LGUs-provided materials to project sites.

7) Provide for adequate maintenance of LGUs equipment and tools for water and sanitation facilities, including drilling rigs and vehicles.

8) Supervise major repair or rehabilitation work beyond the capacity of communities to undertake.

9) Implement, in coordination with the PHO, the water quality surveillance system. Assist the PHO in enforcing sanctions or remedial measures to controlling drinking water quality.

(5) The Monitoring Specialist (MS) will be responsible for ensuring that the status of sector projects and outputs are properly reported and fed back to management. His/her task will include frequent contact with the municipalities to ensure that all project activities are demand-driven and sustainable. The MS will report to the PWSC and liaise closely with the PPDO who has the responsibility for monitoring all development activities and needs in the province. Specific duties include:

1) Draft all project reports and documents including the quarterly and annual Sector Report.

2) Maintain the Registry of associations responsible for water and sanitation in their respective communities.

3) Coordinate and develop indicators for monitoring and evaluating the achievement of project objectives.

4) Monitor actual costs for typical water supply and sanitation systems.

(6) At the municipal level, a Municipal Sector Liaison (MSL) will be appointed by the respective mayors. Staff appointed may be the municipal development coordinator, the municipal engineer, the municipal health officer or any other qualified staff selected by the mayor. The role of the MSL will be very critical at all stages of sector and project management. The MSL should ensure that the activities guided by PST/PWSO are implemented at the barangay level, particularly information dissemination about funding opportunities. The MSL receives all requests for water and sanitation facilities including the commitment of the barangays to provide counterpart funds or labor for the projects. The MSL also programs the municipal funds (from municipal IRA allocation or other sources) to provide counterpart support or fully finance the projects.

Supported by the PST/PWSO, the MSL ensures that a viable organization is set up or appointed to handle the operation, maintenance and fee collection for the water system. The MSL also reviews the detailed project plan and design. During implementation, the MSL monitors the construction and drilling activities. The activities of the MSL will be closely coordinated and reported to the PST/PWSO. If waranted, the mayor should

establish a municipal water and sanitation office in the long-term future to handle all the above functions when the level of activities shall have become substantial.

(7) At the barangay level, the Barangay Councils (BC), through their Committee on Health, and the Rural Health Units (RHU) plays a major role in concretizing the community aspiration for improved water and sanitation services.

The BC is the entry point for all development activities in the community. Particularly, it will play an important role in preparatory stage before setting up the association (or appointment of the responsible group). The BC prepares the request for assistance and assembles available local resources (funds, manpower, materials) to serve as initial community counterpart to demonstrate barangay commitment.

The RHUs and their network of barangay health workers (volunteers), on the other hand, have established an effective primary health care delivery system in the province. The system will continue to provide, among others, health and hygiene education services focussing on the interdependence of safe water supplies and sanitary toilet facilities to achieve overall health and environmental benefits. The RHUs will be the principal data collectors to monitor the conditions in access and coverage of water supply and sanitation services.

(8) At the national level, DPWH, DOH and DILG will continue to provide technical assistance to LGUs per NEDA Resolution No. 4, either directly or through their local field offices and staff. In addition, mandated government agencies, such as LWUA, will continue to provide technical and managerial services and loans to duly-organized water districts and RWSAs. Through the DOF and DBM, the IRA allocations will continue to be provided from which a portion can be allocated for sector projects. Since this IRA allocation for water and sanitation projects will likely be very limited, the LGU will have to coordinate with appropriate national agencies to gain access to external funds. Regulations, promulgated and enforced by national regulatory bodies, like the NWRB, will have to be complied with by the LGU. Further national policy guidelines will be issued by NEDA and the Office of the President.

9.4 Project Management Arrangements

(1) Level I

1) Project Selection: Self-selection and local initiative should be the basis. All barangays should be well-informed about sector opportunities and policies. The barangays

should take the first step by assessing their needs, deciding that they want to improve their water and sanitation above all other needs and expressing their aspiration. LGUs' initial tasks will be social marketing and information dissemination. The barangay should also decide desired service level/s, with a full understanding of the cost recovery aspects and other responsibilities.

2) Organization of associations: More flexibility is needed in order to tap local community resources. The issue of the necessity of forming BWSAs has been raised on several occasions. The proliferation of single-purpose associations for every government-sponsored project tends to divide barangay resources and complicate barangay structures. Many socio-civic groups have in fact "adopted" facilities and are looking after their maintenance voluntarily. Actual success rate seems to be higher in areas where water supply is extremely difficult regardless of whether there is monitoring or not.

   The basic principle is that the community agrees that a particular group at the local level will be responsible. Existing local groups with other socio-civic objectives, an active track record and who are ready, willing and able to take on the BWSA functions may be tasked with the responsibility for the facilities. LGUs will assess the situation and, if justified, approve alternative non-BWSA arrangements. BWSA formation, of course, remains an option. An "institutional accreditation" system can be organized. If the association fails to live up to its responsibilities, it can lose its accreditation to another group.

   The association can decide how to organize it self internally in coordination with the municipal sector liaison. The important condition is that all functions have to be attended to. Thus, an association may subdivide itself by "puroks" or it may choose to operate as one institution.

3) Technology and Technical Design Standards: The former Rural Waterworks Development Corporation (whose functions were absorbed by LWUA) and the DPWH have developed a simplified procedure for conducting the initial data gathering. The format which are appended (Table. 9.4.1 Supporting Report) may be adopted and used by the LGUs. If necessary, these forms can be revised to suit the specific needs of the barangay or municipality.

4) Bidding of works and procurement of services and materials should follow provision of PD 1594 and other appropriate government policies and practices. Where possible, major capital procurement shall be sourced within the province.

5) Construction and Drilling: Drillers and civil work contractors will be needed for any major rural water supply and sanitation undertaking. Construction inspection shall be done with the municipal sector liaison.

6) Right of Way Acquisition: Deed of Donation (or written permits to grant use of land) for proposed facility sites should be executed in favor of the municipal government/barangay prior to project approval.

7) Major rehabilitation work, beyond the capacity of the associations, shall be referred to the municipality for action. Clear definition of "major rehabilitation work" is needed. All costs incident to the rehabilitation shall be to the account of the association O&M reserve fund. The municipality supported by PST/PWSO will assist, if needed, the association in securing soft loans, if the reserve funds are inadequate.

8) Operation & Maintenance will generally be the reponsibility of the association. To support the caretakers, a franchising system for major O&M activities may be instituted by the municipality (through a private firm, a major water district in the area or any other competent group). Mechanics and plumbers can organize well-equipped "mobile service centers" which visits all the facilities monthly to check-up facilities and provide technical advice on behalf of the LGUs.

   With standardization, local hardware stores will find it more profitable to stock up on needed spare parts. The LGUs should not maintain the spare parts, although it is expected to maintain a ready stock of fast-moving spares.

9) Water Rate Setting: Fees and rates shall be established and approved by the community prior to construction. The fees shall be sufficient to cover all monthly operation, maintenance and administration costs, as well as to establish a reserve fund.

10) Fees Collection and Funds Management: The association shall collect monthly fees. All funds of the association shall be deposited in a bank to be selected by the association.

(2) Level II

1) Project Selection: Guidelines similar to that of Level I project selection shall be followed , i.e., self-selection and local initiative. Two or more barangays (or its puroks) may agree to have a joint water and sanitation project.

2) Organization: The RWSA model may be followed by the participating communities. Again, flexibility will be followed and alternative models for managing the system may be considered.

3) Technology and Technical Design Standards: Technical standards have been in use by LWUA for RWSAs and by DPWH for Level II systems. (See Table 9.4.2 with annexes, Supporting Report). As these are considered as national standards, they will be adopted by the LGUs.

4) Bidding of works and procurement of services and materials should follow provision of PD 1594 and all other applicable national and local legislation on bidding and award of contracts using public funds: LWUA uses standard formats and procedures for this process, which may be adopted by the LGUs.

5) Construction would usually be done by a contractor. Inspection would be undertaken by the RWSA; by the cooperative or the private developer; or by the LGUs depending on the institutional arrangement adopted.

6) Right of Way Acquisition: The association shall negotiate for the purchase of land on which facilities will be constructed. Should negotiations fail, the government may exercise the power of eminent domain to secure needed land.

7) Operation & maintenance and rehabilitation will be the responsibility of the association. It shall ensure that adequate tools and spare parts are available. It shall employ needed staff and caretakers.

8) Water Rate Setting: All fees shall be subject to public hearing and approval by the appropriate regulatory authority.

9) Fees Collection and Funds Management: Same policies for Level I shall apply. However, fee computation shall include provision for debt service and possibly a higher reserve requirement.

(3) Level III

1) Project Selection: Most Level III systems are to be initiated by the municipal governments. In principle, all communities, including rural areas, may request level III services provided that they are willing and able to take on the financial and managerial obligations for higher service levels. The point is that service level selection are community decisions.

2) Organization: There are several viable Level III models which may be adopted: the Water District Concept; an LGUs-managed system: a cooperative-run system; or a privately-owned and managed system. The LWUA-water district concept was briefly described in the preceding chapters. For detailed information, the LGUs should contact and coordinate with LWUA. The second option for the LGUs is to maintain operational control over the utility. Current experiences, however, revealed many difficulties because of numerous government controls and restrictions. The private