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 ₱39.3 B will be needed. Of this, only ₱12.8 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, ₱17.268 B was allocated of which only ₱10.453 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 fund only financially viable WDs. Since its establishment in 1972, LWUA has formed 544 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; re-activation 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 I) 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 through 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; oversees the fiscal soundness of public investments based on equity, cost recovery 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)

The primary mandate of the PPDO is the formulation of an integrated economic, social, physical, and other development plans and policies for consideration of the Provincial Development Council (refer to Figure 5.5.1, Supporting Report). It is the planning, coordinating and monitoring arm of the province with regard to the varied programs, projects and activities which must be in conformity with the provincial policies, goals and objectives.

The Office conducts continuing studies, research and training programs necessary to evolve plans and programs for implementation. It integrates and coordinates sector plans and studies undertaken by the different functional groups or agencies. It regularly coordinates with the Provincial Engineer's Office on infrastructure projects such as roads, bridges, markets, multi-purpose halls, school buildings, and water and power systems.

It is likewise tasked with the programming of the 20% Development Fund and the Livelihood Fund. As a member or secretariat, it serves in the various councils, boards, committees and task forces such as the Provincial Development Council (PDC), Provincial School Board (PSB), Provincial Bids and Awards Committee (PBAC) and Peace and Order Council (POC).

Under the existing organizational set-up, the PPDO is divided into four (4) divisions composed of 32 personnel including the PPDC, to wit: Administrative Division (3); Plans and Programs Division (15); Research, Evaluation and Statistics Division (7); and Special Projects Division (6).

2) Provincial Engineer's Office (PEO)

The PEO is the lead agency initiating, reviewing and recommending changes in policies, objectives, plans and programs, techniques, procedures and practices for infrastructure development and public works, in general (refer to Figure 5.5.2, Supporting Report). It advises the Governor on infrastructure, public works and other engineering matters.

The Office administers, coordinates, supervises and controls the construction maintenance, improvement and repair of roads, bridges, school buildings, markets, irrigation canals, artesian and deep wells, water systems, and other engineering and public works projects of the province. It also provides engineering services to the province including investigation and survey, engineering designs, feasibility studies, project management and preparation of plans, specifications, program of works and cost estimates. Likewise, it exercises technical supervision over all municipal engineering offices of the province.

The PEO has the following seven (7) divisions/sections with the corresponding number of personnel: Administrative (18); Planning, Design and Programming (40); Construction (7); Maintenance (28); Equipment Motorpool (29); Quality Control (9); and Waterworks and Plumbing (5).

3) Provincial Health Office (PHO)

The PHO takes charge of health services and formulates program implementation guidelines, rules and regulations for the operation of the Office for the approval of the Governor (refer to Figure 5.5.3, Supporting Report). It formulates measures for the consideration of the Provincial Board (Sangguniang Panlalawigan), develops plans and strategies, and provides technical assistance and support to the Governor in carrying out activities to ensure the delivery of basic services and provision of adequate facilities relative to health services. It advises the Governor and the Sanggunian on matters pertaining to health.

Specifically, the PHO provides consultative and advisory services in environmental sanitation, such as the provision of safe and potable water supply, solid waste management, wastewater collection and disposal, abatement of nuisance, elimination of insect vectors and sanitation in public and private premises, parks and playgrounds. It also directs the sanitary inspection of all business establishments selling food items or providing accommodations and coordinates with other government agencies and NGOs, in the promotion and delivery of health services. The general supervision over municipal health offices of the province is likewise exercised by the Office. During and in the aftermath of man-made and natural disasters and calamities, the PHO has always been in the front-line of health services delivery.

The present Provincial Health Office is presently under reorganization.

(2) Municipal and Barangay Level

1) Municipal Planning and Development Office (MPDO)

The powers and duties of the MPDO are similar to those of the PPDO and differs only in scope or jurisdiction, i.e., within the municipality. It formulates integrated economic, social, physical and other development plans and policies for consideration of the Municipal Development Council.

The Office monitors and evaluates the implementation of the different development plans, projects and activities in the municipality in accordance with the approved development plans. It also prepares comprehensive plans and other planning documents for the consideration of the Municipal Development Council and promotes people participation in development planning within the municipality.

The MPDO staff depends on the capability and needs of the municipality where a municipality has a staff complement, and usually includes a Planning Officer, a Project Evaluation Officer and a Draftsman.

2) Municipal Engineer's Office (MEO)

As in the case of the MPDO, the powers and duties of the MEO are almost the same as those of the PEO but on a municipal level. It initiates, reviews and recommends changes in the policies and objectives, plans and programs, techniques, procedures and practices in infrastructure development and public works in general of the municipality and advises the Mayor on infrastructure, public works and other engineering matters. It also exercises other powers and performs other duties and functions prescribed by law or ordinance.

The regular activities of the Office consist of the administration, supervision and control of the construction, maintenance, improvement and repair of roads, bridges and other engineering and public work projects of the municipality. The engineering services include investigation and survey, engineering designs, feasibility studies and project management. It likewise inspects the works of contractors based on the approved plans and specifications.

The MEO normally has 6 personnel depending on the capability and needs of the municipality.

3) Barangay Councils (BC)

The Barangay Council serves as the primary planning and implementing unit of government policies, plans, programs, projects and activities in the community and as a forum wherein the collective view of the people may be expressed, crystallized and considered and where disputes may be amicably settled.

The Council prepares barangay development plans based on local requirements; monitors and evaluates the implementation of national and local programs and projects such as the maintenance of barangay facilities related to general hygiene, sanitation, solid waste collection and barangay health; and mobilizes people's participation in local development efforts.

The Council is provided with a regular staff complement of two (2) personnel and depending on the needs and funding, may be provided with additional staff.

4) Rural Health Units/Barangay Health Stations (RHU/BHS)

The Units and/or Stations implement the provincial sanitation program through routine inspections of water quality and of public and private facilities. They also attend to complaints and referrals related to sanitation.

(3) Field Offices of Central Sector Agencies

1) Department of Public Works and Highways - District Engineering Office (DPWH-DEO)

The main responsibility of the DPWH-DEO is the management of the maintenance, construction, rehabilitation and improvement of national roads, bridges, buildings, structures, port works and river controls as well as the management of the planning, programming and designing of said projects. In relation specifically to water supply, the DEO is tasked to direct and coordinate the planning, design, consultation, organization and maintenance of Level I water systems (i.e., point sources or shallow and deep wells, rain collectors and springs).

The District Office directs, coordinates and gathers data for special studies for the planning and design of the foregoing projects and prepares their program of work and

estimates. It also undertakes preliminary project investigations, surveys of right-of-way, detailed topographic map cross sections, profiles and hydrographic surveys.

The Office is headed by a District Engineer and an Assistant District Engineer and consists of six (6) sections with a workforce of 70 personnel, namely: Planning and Design Section (11), Construction Section (12), Maintenance Section (17), Research and Standard Section (3), Administrative Section (22) and Comptrollership Section (5).

2) Department of Interior and Local Government (DILG)

The DILG is mandated to promote peace and order, ensure public safety and further strengthen local government capability aimed towards the effective delivery of basic services to the citizenry.

Aside from monitoring LGU's compliance with the provisions of the Local Government Code (LGC) vis-à-vis the delivery of basic services to the people, the Department also serves as a coordinating arm between and among the local officials, national government agencies, NGOs and the private sector. The bulk of its work involves consultancy, training and capability building services, including seminars, workshops and conferences.

The provincial office of the DILG is led by a Provincial Local Government Operations Officer (PLGOO) and assisted by one (1) Assistant PLGOO. Senior staff members and rank-and-file employees complete the staff of the provincial field office. Each municipality is assigned with one (1) or two (2) Municipal Local Government Operations Officer (MLGOO) who are under the control and supervision of the PLGOO. Municipalities having more barangays are also assigned with Barangay Workers. The 29 DILG staff and field members also include MLGOOs (18), Administrative Section (6), Planning and Training Section (2), and Technical/Consultancy Section (1).

3) Provincial Development Council (PDC)

The PDC's role is to initiate a comprehensive multi-sectoral development plan with the approval of the Sangguniang Panlalawigan. It also assists the Sanggunian in setting the direction of economic and social development and coordinates development efforts within its territorial jurisdiction. The Council formulates long-

term, medium-term and annual socio-economic development plans and policies, as well as medium-term and annual public investment programs. It also appraises and prioritizes socio-economic development programs and project and coordinates, monitors and evaluates the implementation of development programs and projects.

The PDC is headed by the Governor and is composed of the Mayors, the Chairman of the Committee on Appropriations, the Congressmen or his representatives and representation of NGOs who shall constitute not less than 1/4 of the members of the fully organized council.

(4) Water Districts (WDs)

A water district is a local government corporation formed pursuant to Presidential Decree No. 98, organized for the purpose of serving the water supply requirements of the residents within its franchise area. Technical and financial assistance (loans) are provided by LWUA to the water districts. LWUA also exercises regulatory functions vis-a-vis the districts.

A water district, to be self-sufficient, is operated in a business-like manner to generate enough revenues from its water sales. The income is used to meet operational expenses, debt service and reasonable reserves for contingencies.

Water Districts ordinarily are headed by a 5-man Board of Directors who sets the policies and appoints a General Manager and have the following divisions/sections: Administrative Division (Finance/Personnel Section and Plant Maintenance Section), Commercial Division (Customer Account Section and Customer Relation Section), Production Division, and Design and Construction Division.

In Rizal, there are 3 WDs, namely: Tanay, Morong and Pililla.

(5) Others

1) Private Sector

Some members of the private sector have been involved in the water supply development in the form of investments, undertaking water supply and sanitation facilities. There are 7 drilling companies and 78 hardware/construction supply firms in Rizal. Drilling companies include: 1) R.N.M. Deepwell Drilling, 2) Millare

Rotary Drilling Services, 3) L.V.P. Enterprises Well Drilling, 4) J & R Dadivo Deepwell Drilling and Construction, 6) N.R. Dollentos Deepwell Drilling and Services, and 7) JUSLYNED Deepwell Drilling and Construction.

2) Non-Government Organization (Rizal People's Economic Council, Inc. or RIZPEC)

The RIZPEC has taken the responsibility of enhancing the development of remote and depressed communities of Rizal through involvement and active participation of the local residents. It assists them in identifying their needs and in tapping local resources in the solution of such needs. It also institutionalizes sectoral groups for purposes of facilitating socio-economic growth of the communities.

Founded in 1986 and registered with the SEC in 1987 with 14 Municipal PEC Chapters to date, the council establishes linkages and bridges the gap between the people, the government and other NGOs. It trains indigenous community leaders preparatory to implementing and managing their own affairs. It organizes and participates in seminars, workshops, training, conventions and trade fairs such as those related to development planning, institutional development, food processing and preservation, LGC, PEC National, Regional and Provincial Conventions and PEC trade fair.

The Council also launches or funds various projects like goat raising, hog-breeding, shallow and deep wells, school buildings and livelihood projects. Likewise, it represents different committees/boards/councils such as the Rizal Provincial Physical Framework Plan Technical Committee, Rizal Provincial Agrarian Reform Coordinating Committee, Rizal Provincial Mining Regulatory Board and RDC, PDC and all MDCs in the province. It also organizes cooperatives and federations in Rizal.

With its active involvement in multi-purpose activities, the RIZPEC has been the recipient of several awards/nominations, among which are the following: First Most Outstanding PEC awarded by then President Corazon C. Aquino, Most Outstanding PEC in Region IV and Outstanding NGO-Partner of the President's Social Fund.

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 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 are: planning and monitoring information systems; infrastructure planning and rehabilitation; and institution building focusing on community management based on experiences from other AIDAB projects. The Project has been extended through 1997.

5.7 Current Community Development and Training Approaches

5.7.1 Community Development

The community development approaches to promote participation of local beneficiaries vary from one office/project to another. Yet, the common goal and desired results are attained such that the people participate actively in the development endeavors which benefit them. In livelihood programs, for instance, the people especially from depressed areas request directly for assistance from the Governor who, in turn, directs the PPDO or the DSWD or any other

appropriate government office to attend to their requests. The offices concerned make field inspections for evaluation and verification which often make favorable recommendations. The forms/kinds of support/aid consists of loans or grants and supplies of materials or equipment.

On health matters, Rizal Province has a program called "Alay Kalusugan" where doctors, dentists, nurses and other medical personnel go to remote barrios and barangays to treat the resident's sickness or illness. They regularly distribute medicines during their field works.

While the initial entry point is the barangay councils, many homeowners associations, socio-civic clubs have been organized to follow through community development assistance projects.

5.7.2 Human Resources Development and Training

(1) Provincial Planning and Development Office (PPDO)

The PPDO conducts training in cooperation with other government and private sector agencies, such as the Human Resource Management Office (RHMO), Department of Interior and Local Government (DILG), National Economic and Development Authority (NEDA), National Irrigation Administration (NIA), University of the Philippines (UP), Department of Trade and Industry (DTI), Department of Public Works and Highways (DPWH), Asian Institute of Management (AIM) and other consultancy firms. Such training, seminars and conferences delve on such subjects as Land Use Plans, Project Planning and Preparation, Provincial Physical Framework Plan, Medium-Term Regional Development Plan (MTRDP), Water Supply Planning and others. The Office itself meets potential beneficiaries of the Livelihood Program and briefs them on the terms and conditions of the loan agreement.

(2) Provincial Health Office (PHO)

The PHO conducts seminars/workshops, such as the Community-Based Planning and Management of Nutrition Programs, Mothercraft Feeding, Basic Course for Non-Medical Workers on Family Planning, Training Course on Population on Development Planning, etc. It likewise has the following activities:

1) health education through lectures and advisory services;
2) free consultation and medicines;
3) training on minor surgical procedures; and

4) health and dental care campaigns utilizing community assemblies, posters and comic magazines.

5.7.3 Sanitation/Hygiene Education

The PHO conducts intensive information campaigns and advisory services to promote improved health and hygiene behavior. Materials (brochures, posters, handouts) are available through the various RHUs and BHSs.

The Department of Education, Culture and Sports (DECS) has a continuing program for the construction of toilets in all the public elementary and secondary schools in Rizal. Normally, the toilets are built simultaneously with the construction of additional school buildings/rooms. The number of toilets to be installed depends upon the school needs and available funds which are distributed proportionately to all schools. Lately, the toilets are being constructed inside the school rooms for ease and convenience of the students.

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 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

1) Provincial Planning Development Office (PPDO)

The PPDO first evaluates the viability of the proposed projects which were either requested by the concerned constituents or by the provincial, municipal or barangay officials. Upon approval by the Governor and the Provincial Board, the projects are implemented whether for construction, installation, repair, rehabilitation or improvement. The office again comes into the picture by monitoring the on-going implementation of said projects which must conform to the established specifications and standards. The bill of materials, program of works and other project documents serve as indicators whether the project implementation is in accordance with the plan. With the completion of the projects, the office must also certify that they have been 100% completed according to the planned specifications. Turn-over of the projects to the proper official or body then follows.

Most projects monitored by the PPDO come from the Annual Development Plan and financed by the 20% Development Fund.

2) Provincial Engineer's Office (PEO)

The PEO has its own monitoring system but almost analogous to that of the PPDO. The former, draws the plans, estimates the project costs and evaluates the projects. It then regularly monitors the implementation of the projects upon their approval. It also provides the necessary tools and equipment such as road roller, road grader, dump truck and water truck whenever available. It likewise approves the completion of the projects. The office has its own budget to fund the various infrastructure programs and projects.

3) Project Monitoring Committee (PMC)

The Rizal Provincial Government creates a project monitoring committee from time to time as the need arises when there is a heavy load of projects or when there is a special purpose to establish said committee as determined by the Governor. In this manner, the projects implementation in conformity with the plans and specifications is ensured. There is, however, no duplication or overlapping since the PMC coordinates and consults with the other appropriate agencies or officers such as the DPWH, DILG, PEO and PPDO.

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 in the sector had been devolved from central government agencies to LGUs since 1992, although some projects are still on going by 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 sets 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 mainly achieved by line agencies such as DPWH, LWUA, DILG and 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		1990-93				
Agency	Funds	Level I	Level II	Level III	Sewerage	Sanitation
DILG						
DPWH	Foregin and local fund	34,034				
LWUA				4,298	N.A.	
DOH					N.A.	N.A.
Province 1)	Provincial Government	4,295	2,772			
Municipality	Municipal Government					
Others						

Sources: Each central agency and PSPT of the provincial government
Note: 1) Figures in 1993 only

Investments for Level I facilities by DPWH amounted to P34,034 thousand during the period 1990 to 1992 covering 232 shallow wells, 557 deep wells, 59 spring development, 40 rain collectors and 5 rehabilitation works. As locally funded projects were devolved to LGUs since 1992, the investment plan of DPWH does not include any projects from 1993 onwards.

The LWUA had released a total of P 4,298 thousand during the period of 1990 to 1993 to improve and expand the water supply facilities for 3 Water Districts; Pililia, Eastern Rizal and Morong WDs and 1 RWSA in Looc, Cardona.

DILG had no investments during the period of 1990 to 1993 under the Barangay Water Program (BWP) and FW4SP. DOH accomplished 6 school toilets in the province in 1993 under the FW4SP program. The provincial government financed an amount of P2,795 thousand for the water supply sector in 1993.

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 1.3 to 1.6 % of the national total IRA between 1990 and 1993. On the other hand, the total IRA to all municipalities of the province was arranged with 1.2 - 1.6% to the national total IRA for nationwide municipalities (refer to Table 6.2.1, Supporting Report).

For the provincial government, the IRA was only a partial source of the total revenue in 1990 and 1991, because the province had large amount of receipts from its property (land) sales. However, it turned to be a major one in 1992 and 1993, which accounted for almost half of the total revenue of the provincial government.

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 were Antipolo, Binangonan, Cainta and Taytay.

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 all provinces	2,031,174,331	2,697,482,707	4,571,136,402	8,445,600,000
	(b) IRA to all municipalities	3,054,601,475	4,046,838,742	7,127,522,550	12,484,800,000
Province	2. IRA to Rizal Province *				
	(1) Total: (2)+(3)	62,303,769	107,474,503	161,837,818	288,742,007
	(2) Provincial government	25,457,551	43,644,520	66,993,414	117,622,200
	Percentage of (a)	(1.25)	(1.62)	(1.47)	(1.39)
	(3) Municipalities	36,846,218	63,829,983	94,844,404	171,119,807
	Percentage of (b)	(1.21)	(1.58)	(1.33)	(1.37)
	3. Total Revenue of the Provincial Government	467,078,180	396,287,904	150,481,298	208,856,148
	Percentage of IRA of Prov. Government	(5.45)	(11.01)	(44.52)	(56.32)
Municipalities	4. IRA to Municipalities **				
	Total	36,846,218	63,829,983	94,844,404	171,119,807
		(100.0)	(100.0)	(100.0)	(100.0)
	Angono	1,745,523	2,985,885	4,693,827	8,335,762
		(4.7)	(4.7)	(4.9)	(4.9)
	Antipolo	4,745,840	12,706,916	17,617,030	32,614,711
		(12.9)	(19.9)	(18.6)	(19.1)
	Baras	877,267	1,311,910	2,685,703	4,492,447
		(2.4)	(2.1)	(2.8)	(2.6)
	Binangonan	4,899,140	7,872,840	10,763,364	19,528,248
		(13.3)	(12.3)	(11.3)	(11.4)
	Cainta	3,538,710	7,483,107	10,159,720	18,744,192
		(9.6)	(11.7)	(10.7)	(11.0)
	Cardona	1,642,120	2,295,252	3,813,986	6,684,180
		(4.5)	(3.6)	(4.0)	(3.9)
	Jala-Jala	974,545	1,363,441	2,770,667	4,704,600
		(2.6)	(2.1)	(2.9)	(2.7)
	Morong	1,669,730	2,267,905	3,798,874	6,650,433
		(4.5)	(3.6)	(4.0)	(3.9)
	Pililla	1,666,992	2,401,855	4,064,530	7,131,357
		(4.5)	(3.8)	(4.3)	(4.2)
	Rodriguez	3,239,877	5,062,986	7,888,076	14,257,310
		(8.8)	(7.9)	(8.3)	(8.3)
	San Mateo	3,248,530	5,219,474	7,486,277	13,517,302
		(8.8)	(8.2)	(7.9)	(7.9)
	Tanay	2,968,367	4,352,246	6,891,683	12,357,252
		(8.1)	(6.8)	(7.3)	(7.2)
	Taytay	4,510,571	6,930,017	9,321,948	17,169,554
		(12.2)	(10.9)	(9.8)	(10.0)
	Teresa	1,119,006	1,576,149	2,888,719	4,932,459
		(3.0)	(2.5)	(3.0)	(2.9)

Sources: (1) Department of Budget and Management, (2) Bureau of Local Government Finance (MOF) and (3) Office of Budget of the Rizal Province

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

The expenditures of the provincial government for the relevant sector in 1993 were reported at P2,795, about 2.4% 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 costs 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 the 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 14 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)	6,750	100.0	-
Average Level III: Monthly Water Bill 2)	102	1.5	5.0 or less
Average Level II: Monthly Water Bill 3)	30 - 60	0.4 - 0.9	2.0 - 3.0
Mo. Level I Expenditure 3)	5 - 10	0.1	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 3 water districts in Rizal. Table 6.5.1 shows the financial indicators of these water districts in 1994. Operation and maintenance costs of these WDs exceeded the revenues. To raise water rates within an appropriate range is one of the solutions in view of the cost recovery.

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(%)
Morong	2,425	0	5.96	25.33	373,000	78,333	95
Eastern Rizal	4,527	0	5.35	28.12	78,909	68,596	94
Pililla	1,213	0	5.42	27.40	169,030	56,686	96

Source: IDS, LWUA

Loan status of 3 water districts are shown in Table 6.5.2. At present, they have received loans of P 15,516 thousand from LWUA. One of the 3 water districts is in arrears.

Table 6.5.2 Loan Status of Water Districts

Water District	Descriptions			
	Total Loan Availed 1000 Pesos	Remaining Payment Period 1) Months	Ave. Monthly Amortization Pesos	Current Arrears Pesos
Morong	338	268	2,653	131,642
Eastern Rizal	9,156	304	94,894	0
Pililla	6,022	214	71,022	0

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

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. According to LWUA, Looc RWSA in Cardona had a total of ₱ 187.6 thousand loan and arrears of ₱ 11.2 thousand with average monthly amortization of ₱ 349 as of August 1994.

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 the 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). During the study period, 432 shallow wells, 609 deep wells and 12 springs were reported. Of the total shallow wells, 292 or 67 percent of the provincial total are privately owned. Water quality problem was identified with 20 percent of the total wells, while non-functioning wells were reported to be 11 percent of all wells. The number of untapped springs was found to be 5, some of which may be utilized for water supply.

Table 7.1.1 Existing Groundwater Sources in the Province

Data Description	Shallow Well	Deep Well	Spring	Total
1. Number of water source	432	609	12	1053
2. Profile of different sources	41%	58%	1%	100%
3. Owned by Government Agency	140	307	6	453
4. Privately owned	292	302	6	600
5. Sources with a quality problem	86	121	5	211
6. Non-Functional Well	57	63		120
7. Untapped Spring			5	5

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 Deposit. Inferred 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

The oldest geologic unit existing in the province is the volcanic rock which consists of dacite and andesitic flows. The rock unit is observed in the northern and eastern portions covering about 30% of the province. These rocks are mainly found in Antipolo, Cainta, San Mateo, Tanay and Taytay. Groundwater potential is low under these rock units. A rare possibility of exploiting groundwater may be through secondary fissures resulting from faulting and folding.

(2) Pliocene to Pleistocene

Sedimentary deposit consisting of pyroclastics and volcanic debris exists in the province. This semi-consolidated formation constitutes about 65% of Rizal, particularly in the southern half section that include the municipalities of Jalajala, Pililla, Angono, Binangonan, Cardona, Morong, Teresa, Baras and Tanay. Groundwater potential is generally high with sufficient thickness of aquifer to allow for groundwater development by means of deep wells.

(3) Recent Deposits

The Recent deposits cover about 5% of the province. These are limited in Rodriguez, San Mateo, Cainta and Taytay located along the Marikina river. They consist mainly of clay, silt, sand and gravel deposits. The deposits contain significant amount of groundwater both in shallow and deep aquifers.

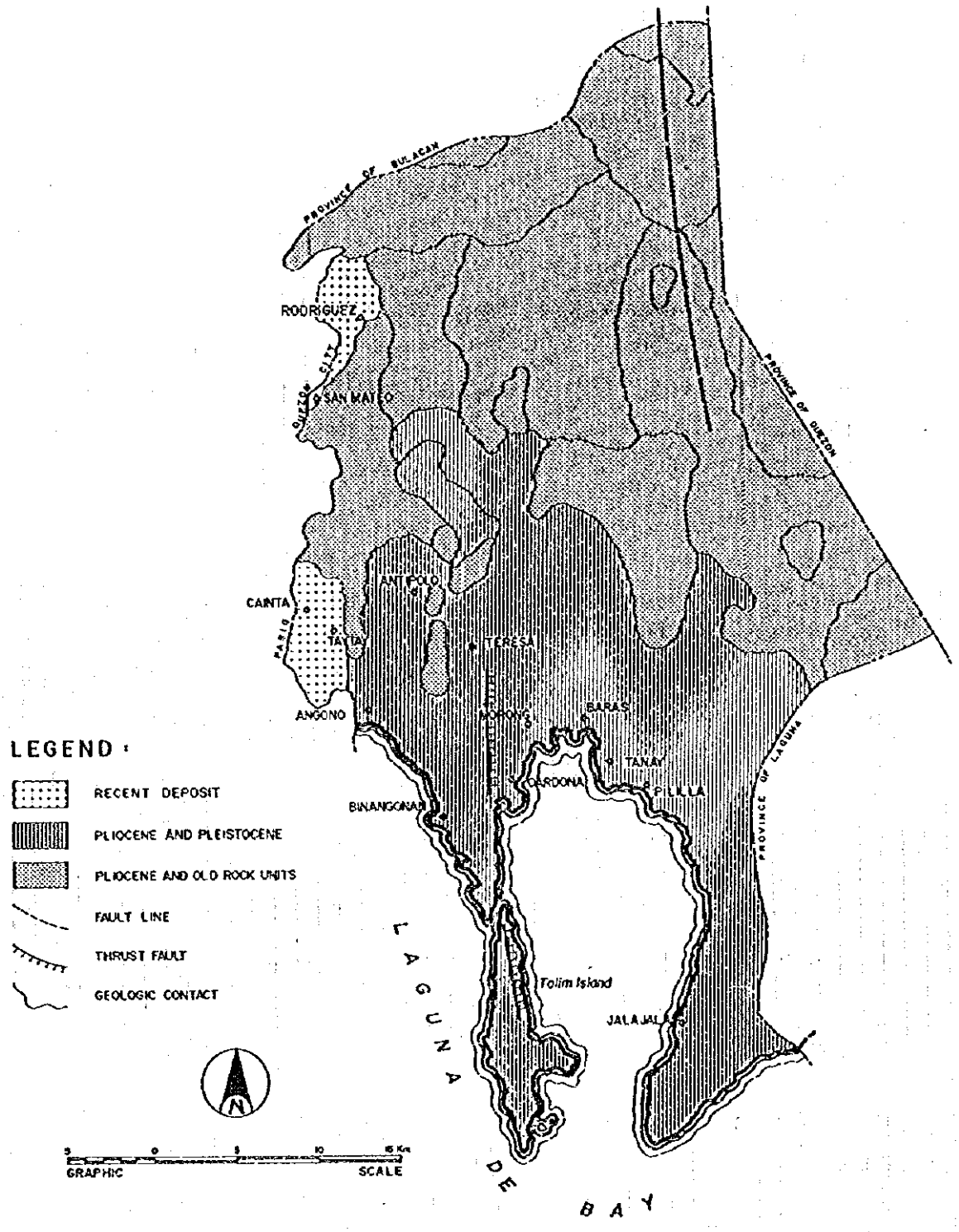


FIGURE 7.2.1
GEOLOGICAL MAP

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 exists Recent deposit 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 sole shallow well areas is limited, because some Recent formation is underlain by Pleistocene to 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 the area.

The potential areas with a high yield from deep aquifers and a problem with salt water intrusion are also presented based on NWRB's well database (geo-resistivity survey) and water quality examination results at 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 out-puts are included in 7.3, Supporting Report. Technical information on the wells by municipality is also shown in the same Report.

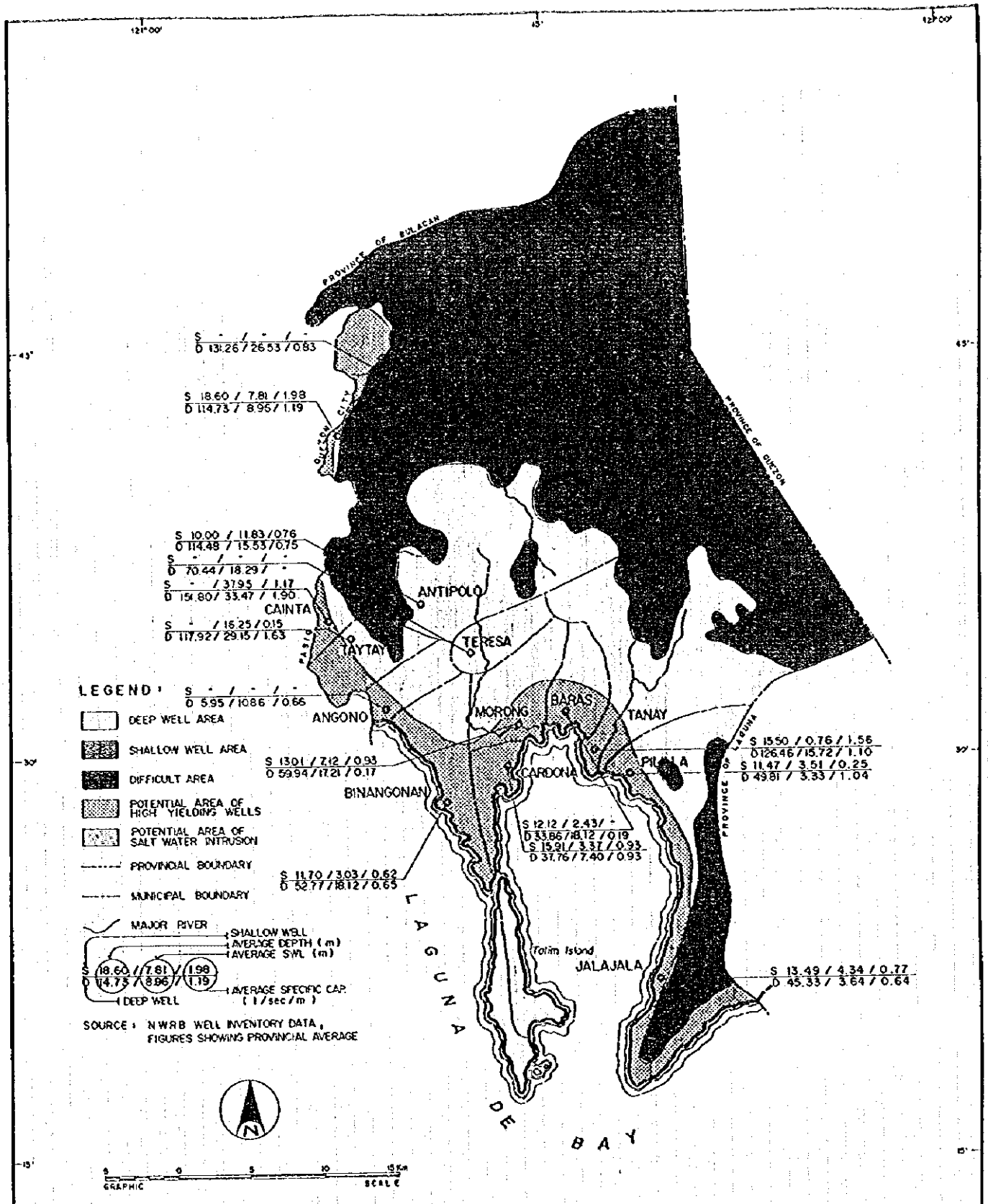
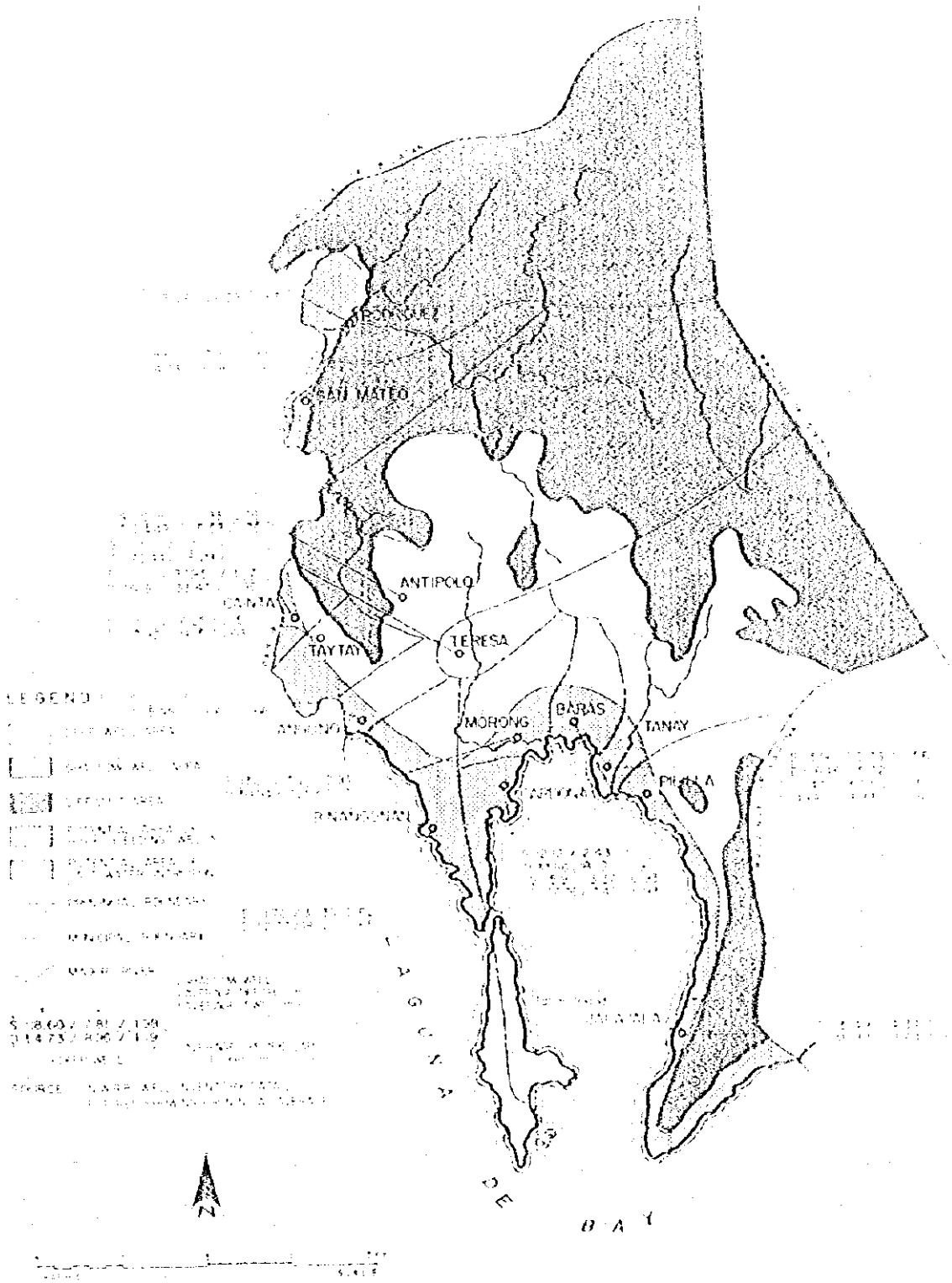


FIGURE 7.3.1

GROUNDWATER AVAILABILITY MAP



GROUNDWATER AVAILABILITY MAP

(1) Shallow well area

No sole shallow well area is observed in the province. Recent Alluvial deposits are limited in San Mateo, Rodriguez, Cainta and Tanay. In these areas, even deep wells with more than 100 mbgl are common. However, chances to tap shallow wells are high along the river terrace and fan deposits.

(2) Deep well area

The deep well area covers approximately 40% of the province. Recent deposits underlain by pyroclastics and volcanic debris are major supply of the groundwater in the area. Coastal areas along Laguna De Bay, part of Rodriguez and San Mateo contain high potential for deep well development. Average depth of existing wells is 82 mbgl with the average water table of 15.6 mbgl and specific capacity of 0.8 l/sec/m.

(3) Difficult area

About 60% of the provincial area is classified as the 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 being underlain by a complex mix of igneous and metamorphic rocks which are dense, massive, and impervious in soil character.

(4) Water quality of groundwater

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

1) Possible area for salt water intrusion

Although groundwater quality meets NSDW in general, deep wells located in coastal areas should be monitored in terms of saline water.

2) Calcium and Manganese problem area

Groundwater at some wells in Binangonan contains relatively high calcium. Water quality in San Mateo is also reported to have problems with higher contents than NWRB standards in terms of color, turbidity and manganese. Water treatment is required in the area for drinking purpose.

7.4 Spring Sources

Spring is a natural outlet of groundwater at the surface of the ground. It occurs when the water table intersects the ground surface through the contacts of the pervious and impervious rock formation and along fractures of consolidated rock units. Because of the mountain ranges and highlands covered by the Pleistocene and older rock units, complex faulting systems and existence of limestone rock between volcanic rocks, there is favorable environment for the development of spring.

A number of springs exists in the municipalities of Antipolo, Pililla, Rodriguez and Tanay. Limestone formation in the north eastern part may have a potential for spring development. Technical information on the spring by municipality is presented in Table 7.4.1, Supporting Report.

7.5 Surface Water Sources

The major rivers in the province include Marikina, Tanay, Morong and Jala-jala. Marikina river flows toward the southern boundary of the province and empties into Manila Bay, while the other rivers generally flow westward and empty into the Laguna Lake. Marikina river has a drainage area of 282sq.km, while others have less than 100sq.km. Currently, river water is used primarily for irrigation purposes. Minimum flow rate recorded was 0.111 cu.m/sec. No flow record is available from other rivers.

Water quality analysis of Marikina and Tanay rivers was conducted to determine general characteristics of surface water in the province. River water was found to be turbid with some color (refer to 7.5 Water Quality Analysis Result, Supporting Report and Table 7.5.1, Data Report). Based on the examination results, both rivers fall under classification A of the Water Quality Criteria for Fresh Water.

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 of the province.

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

Deep well sources 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, potential water sources and their specifications by well type for the municipalities are further tabulated as shown in Table 7.6.1, Supporting Report.

Some springs in Antipolo, Pililla, Rodriguez and Tanay may be used for rural water supply. 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/on-

going projects to be completed by 1995 are considered as part of base year service coverage. 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 (82%) is already exceeding the national sector target (71% in 2000) of the MTPDP, while that in rural area (59%) is far behind from 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 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 shall be focused on the rural water supply to catch up with the MTPDP target of 85%, while the urban water supply be maintained at the

present service level of 82%. Phase II targets are planned to increase both urban and rural water supply coverage to 93% and 95%, respectively as envisaged in the NSMP.

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		82	126,591	93	507,990
Rural Water Supply		85	72,714	95	86,045
Sanitation		Households Coverage (%)	Additional Households to be Served	Households Coverage (%)	Additional Households to be Served
Household Toilet		93	73,579	95	155,161
Urban	Flush	70	27,129	75	103,224
	Pour Flush	20	26,614	25	18,387
	VIP	10	1,890	0	0
Rural	Flush	10	0	10	70
	Pour Flush	70	15,641	90	33,480
	VIP	20	2,305	0	0
School Toilet		Coverage (%)	Additional Public School Students to be Served	Coverage (%)	Additional Public School Students to be Served
		50	47,231	70	103,581
Public Toilet		Coverage (%)	Additional Public Utilities with Sanitary Toilets	Coverage (%)	Additional Public Utilities with Sanitary Toilets
		100	10	100	11
Sewerage		Not Applicable		Coverage (%)	Population to be Served
				50	489,266
Solid Waste		Coverage (%)	Additional Households to be Served	Not Applicable	
		85	39,550		

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
Antipolo	Urban	196,303	152,571	0	8,017	160,588	82
	Rural	68,428	0	0	33,135	33,135	48
	Total	264,731	152,571	0	41,152	193,723	73
Baras	Urban	13,291	2,079	216	9,276	11,571	87
	Rural	6,391	5,183	0	1,113	6,296	99
	Total	19,682	7,262	216	10,389	17,867	91
Binangonan (Talim)	Urban	0	0	0	0	0	0
	Rural	23,453	0	143	16,973	17,116	73
	Total	23,453	0	143	16,973	17,116	73
Cardona	Urban	23,528	8,528	0	12,283	20,811	88
	Rural	10,668	0	0	8,791	8,791	82
	Total	34,196	8,528	0	21,074	29,602	87
Jala-jala	Urban	4,861	0	0	2,753	2,753	57
	Rural	12,040	0	194	6,951	7,145	59
	Total	16,901	0	194	9,704	9,898	59
Morong	Urban	34,361	12,572	77	12,453	25,102	73
	Rural	0	0	0	0	0	0
	Total	34,361	12,572	77	12,453	25,102	73
Pililla	Urban	35,092	6,816	170	20,632	27,618	79
	Rural	0	0	0	0	0	0
	Total	35,092	6,816	170	20,632	27,618	79
Rodriguez	Urban	70,606	20,945	0	38,606	59,551	84
	Rural	8,073	0	98	5,004	5,102	63
	Total	78,679	20,945	98	43,610	64,653	82
San Mateo	Urban	95,675	50,097	0	38,563	88,660	93
	Rural	723	0	0	38	38	5
	Total	96,398	50,097	0	38,601	88,698	92
Tanay	Urban	56,523	28,466	159	14,155	42,780	76
	Rural	10,339	0	0	5,022	5,022	49
	Total	66,862	28,466	159	19,177	47,802	71
Teresa	Urban	21,569	0	0	15,743	15,743	73
	Rural	0	0	0	0	0	0
	Total	21,569	0	0	15,743	15,743	73
PW4SP Study Area	Urban	551,809	282,074	622	172,481	455,177	82
	Rural	140,115	5,183	435	77,027	82,645	59
	Total	691,924	287,257	1,057	249,508	537,822	78

(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).

Table 8.2.3 Base Year Service Coverage of Household Toilets

Municipality	Area	1994		Households and Population Using Sanitary Toilets								
		Population	No. of HHs	Number of Households				Served Population	Coverage (%)			
				Flush	Pour Flush	VIP Latrine	Total		Flush	Pour Flush	VIP La-trine	Total
Antipolo	Urban	196,303	36,051	23,933	2,949	3,549	30,431	164,895	66	8	10	84
	Rural	68,428	13,080	0	3,932	2,237	6,169	32,161	0	30	17	47
	Total	264,731	49,131	23,933	6,881	5,786	36,600	195,901	49	14	12	74
Baras	Urban	13,291	2,518	308	1,569	371	2,248	11,829	12	62	15	89
	Rural	6,391	1,234	196	593	153	942	4,857	16	48	12	76
	Total	19,682	3,752	504	2,162	524	3,190	16,730	13	58	14	85
Binangonan (Talim)	Urban	0	0	0	0	0	0	0	0	0	0	0
	Rural	23,453	3,926	0	1,823	681	2,504	15,010	0	46	17	64
	Total	23,453	3,926	0	1,823	681	2,504	15,010	0	46	17	64
Cardona	Urban	23,528	4,525	1,131	834	1,539	3,504	18,117	25	18	34	77
	Rural	10,668	2,980	0	1,981	417	2,398	8,534	0	66	14	80
	Total	34,196	7,505	1,131	2,815	1,956	5,902	27,015	15	38	26	79
Jala-jala	Urban	4,861	917	0	219	202	421	2,236	0	24	22	46
	Rural	12,040	2,705	0	1,101	325	1,426	6,381	0	41	12	53
	Total	16,901	3,622	0	1,320	527	1,847	8,620	0	36	15	51
Morong	Urban	34,361	6,737	1,752	3,705	674	6,131	31,269	26	55	10	91
	Rural	0	0	0	0	0	0	0	0	0	0	0
	Total	34,361	6,737	1,752	3,705	674	6,131	31,269	26	55	10	91
Pililla	Urban	35,092	6,621	2,715	349	1,457	4,521	23,863	41	5	22	68
	Rural	0	0	0	0	0	0	0	0	0	0	0
	Total	35,092	6,621	2,715	349	1,457	4,521	23,863	41	5	22	68
Rodriguez	Urban	70,606	13,809	3,222	2,486	3,005	8,713	44,482	23	18	22	63
	Rural	8,073	1,676	0	616	609	1,225	5,893	0	37	36	73
	Total	78,679	15,485	3,222	3,102	3,614	9,938	50,355	21	20	23	64
San Mateo	Urban	95,675	19,109	7,858	907	1,975	10,740	53,578	41	5	10	56
	Rural	723	157	0	157	0	157	723	0	100	0	100
	Total	96,398	19,266	7,858	1,064	1,975	10,897	54,947	41	6	10	57
Tanay	Urban	56,523	11,114	4,297	1,729	2,465	8,491	42,957	39	16	22	76
	Rural	10,339	2,199	0	1,172	201	1,373	6,410	0	53	9	62
	Total	66,862	13,313	4,297	2,901	2,666	9,864	49,478	32	22	20	74
Teresa	Urban	21,569	4,148	0	3,401	373	3,774	19,628	0	82	9	91
	Rural	0	0	0	0	0	0	0	0	0	0	0
	Total	21,569	4,148	0	3,401	373	3,774	19,628	0	82	9	91
PW4SP Study Area	Urban	551,809	105,549	45,216	18,148	15,610	78,974	413,857	43	17	15	75
	Rural	140,115	27,957	196	11,375	4,623	16,194	81,267	1	41	17	58
	Total	691,924	133,506	45,412	29,523	20,233	95,168	491,266	34	22	15	71

The province has a base year service coverage of 71%. Urban area registers a high level of 75% that is almost on the same level as the national average coverage of 77%. Rural area however, has only 58% 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	43	1
• Pour-flush	17	42
• VIP latrine	15	17

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

Municipality	Public School Toilets			Public Toilets		
	1994 Total No. of Public School 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 (%)
Antipolo	44,724	14,150	32	1	1	100
Baras	3,070	1,400	46	1	1	100
Binangonan (Talim)	4,771	1,050	22	0	0	0
Cardona	5,311	2,100	40	1	1	100
Jala-jala	3,952	1,000	25	1	1	100
Morong	3,229	1,750	54	1	1	100
Pililla	7,546	2,650	35	1	1	100
Rodriguez	13,158	7,350	56	1	1	100
San Mateo	15,401	7,000	45	2	2	100
Tanay	14,343	4,850	34	2	1	50
Teresa	3,617	1,350	37	1	1	100
PW4SP Study Area	119,122	44,650	37	12	11	92

Note: PU - Public Utilities

Present service coverage is 37% 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 unsanitary 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).

Service coverage of existing public utilities is 92%. This is attributed by the fact that most of the public utilities (mostly public markets) are provided with at least one sanitary toilet unit.

In setting up the targets without national targets as of now, the indicator would be the existing level of service coverage. Accordingly, a 100% coverage both for Phase I and II was 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 was applied to urban population of municipalities with more than 10,000 urban 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 58% of the total households in the province relied on the municipal refuse collection using trucks or a 73% urban household coverage. These municipalities have a total of 27 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 House-holds Served*	Coverage of Households (%)	Coverage of Urban HHs (%)
Antipolo	49,131	36,051	30,447	62	84
Baras	3,752	2,518	1,870	50	74
Binangonan (Talim)	3,926	0	0	0	0
Cardona	7,505	4,525	4,215	56	93
Jala-jala	3,622	917	380	10	41
Morong	6,737	6,737	3,088	46	46
Pililla	6,621	6,621	2,388	36	36
Rodriguez	15,485	13,809	7,492	48	54
San Mateo	19,266	19,109	14,627	76	77
Tanay	13,313	11,114	10,063	76	91
Teresa	4,148	4,148	2,882	69	69
PW4SP Study Area	133,506	105,549	77,452	58	73

Note: * - Equivalent to total number of urban households served.

No national targets have yet been set. However, considering the present level of coverage, an 85% 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, and the future population projected by NSO at different administrative levels; region, province and municipality with breakdown to urban and rural areas.

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

(1) Review of past population development including 1990 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 1990 population distribution.

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

- The province recorded 5.8% of annual growth rate higher than that of the region at 3.1%, reflecting rapid urbanization and migration to the province as a part of Metro Manila area.
- Percentage of provincial population to the regional population increased from 9.1% in 1980 to 11.9% in 1990 (although urban population percentage decreased slightly, rural population percentage increased.)
- The future population may therefore show similar trend as experienced in the last census decade.

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 also within the range of the past population development (rapid increase of population).

However, municipal population distribution to urban and rural areas was adjusted corresponding to reclassification of some barangays as identified for the year 1990.

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
Antipolo	154,119	53,723	207,842	196,303	68,428	264,731	282,186	98,365	380,551	392,320	136,756	529,076
Baras	11,399	5,481	16,880	13,291	6,391	19,682	16,735	8,047	24,782	23,267	11,188	34,455
Binangonan (Talim)	0	18,761	18,761	0	23,453	23,453	0	28,565	28,565	0	39,714	39,714
Cardona	22,679	10,283	32,962	23,528	10,668	34,196	24,862	11,273	36,135	34,566	15,673	50,239
Jala-jala	4,693	11,625	16,318	4,861	12,040	16,901	5,123	12,691	17,814	7,123	17,643	24,766
Morong	32,165	0	32,165	34,361	0	34,361	37,940	0	37,940	52,747	0	52,747
Pililla	32,771	0	32,771	35,092	0	35,092	38,884	0	38,884	54,060	0	54,060
Rodriguez	60,192	6,882	67,074	70,606	8,073	78,679	89,702	10,256	99,958	124,712	14,259	138,971
San Mateo	81,693	617	82,310	95,675	723	96,398	121,263	916	122,179	168,591	1,273	169,864
Tanay	49,378	9,032	58,410	56,523	10,339	66,862	69,224	12,662	81,886	96,242	17,604	113,846
Teresa	20,645	0	20,645	21,569	0	21,569	23,034	0	23,034	32,023	0	32,023
PW4SP Study Area	469,734	116,404	586,138	551,809	140,115	691,924	708,953	182,775	891,728	985,651	254,110	1,239,761

8.3.2 School Enrollment Projection

From the 1994 total population of the Study Area, the number of children who would be enrolling in 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. For the study area, an increase in the participation rate in both private and public schools is foreseen by year 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. The participation rate for the year 2000 is assumed to be the same as the 1994 level. However, a slight increase of 5% from the 2000 rate is foreseen for year 2010 (details are referred to Supporting Report).

Table 8.3.2 shows the projected number of public school students by municipality, by target year. A total of 183,757 and 279,230 public school students is estimated to enroll for years 2000 and 2010, respectively.

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.

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

Municipalities	Number of Public School Students			Number of Public Utilities		
	1994	2000	2010	1994	2000	2010
Antipolo	44,724	82,462	128,336	1	2	2
Baras	3,070	4,508	6,268	1	2	3
Binangonan (Talim)	4,771	7,251	17,485	0	1	2
Cardona	5,311	5,782	7,780	1	2	2
Jala-jala	3,952	4,335	5,512	1	2	3
Morong	3,229	3,804	5,288	1	2	2
Pililla	7,546	8,901	11,106	1	1	2
Rodriguez	13,158	19,565	27,627	1	2	3
San Mateo	15,401	23,000	32,476	2	3	5
Tanay	14,343	20,137	31,108	2	3	6
Teresa	3,617	4,012	6,244	1	1	2
PW4SP Study Area	119,122	183,757	279,230	12	21	32

Nine (9) public markets/bus terminals are planned by year 2000, and another 11 facilities by year 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 its Projected Population for Sewerage

Urban areas with more than 10,000 population provided by Level III water supply systems in 2010 serve 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). 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 8.4.2 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 8.4.2 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/facilities

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 Level 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 year/s. 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 199,300 persons in the PW4SP area will be served by additional water supply services, of which 126,600 persons or 64% of them will be urban population and 72,700 persons or 36% will be rural population.

In the Phase II period, a total of 594,000 persons, of which 508,000 persons or 86% in urban area and 86,000 persons or 14% in rural area, will be further benefited by water supply services. This additional service coverage in urban area includes upgrade of service level for 173,000 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.

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
Antipolo	Urban	282,186	223,376	0	8,017	231,393	70,805	0	0	70,805	392,320	364,858	0	0	364,858	141,482	0	0	141,482
	Rural	98,365	0	0	83,610	83,610	0	0	50,475	50,475	136,756	0	0	129,918	129,918	0	0	46,308	46,308
	Total	380,551	223,376	0	91,627	315,003	70,805	0	50,475	121,280	529,076	364,858	0	129,918	494,776	141,482	0	46,308	187,790
Baras	Urban	16,735	4,231	216	9,276	13,723	2,152	0	0	2,152	23,267	21,638	0	0	21,638	17,407	0	0	17,407
	Rural	8,047	5,183	0	1,657	6,840	0	0	544	544	11,188	5,183	0	5,446	10,629	0	0	3,789	3,789
	Total	24,782	9,414	216	10,933	20,563	2,152	0	544	2,696	34,455	26,821	0	5,446	32,267	17,407	0	3,789	21,196
Binangonan (Talim)	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	28,565	0	143	24,137	24,280	0	0	7,164	7,164	39,714	0	143	37,585	37,728	0	0	13,448	13,448
	Total	28,565	0	143	24,137	24,280	0	0	7,164	7,164	39,714	0	143	37,585	37,728	0	0	13,448	13,448
Cardona	Urban	24,862	8,528	0	12,283	20,811	0	0	0	0	34,566	32,146	0	0	32,146	23,618	0	0	23,618
	Rural	11,273	0	0	9,582	9,582	0	0	791	791	15,673	0	0	14,889	14,889	0	0	5,307	5,307
	Total	36,135	8,528	0	21,865	30,393	0	0	791	791	50,239	32,146	0	14,889	47,035	23,618	0	5,307	28,925
Jala-jala	Urban	5,123	1,448	0	2,753	4,201	1,448	0	0	1,448	7,123	6,624	0	0	6,624	5,176	0	0	5,176
	Rural	12,691	0	194	10,593	10,787	0	0	3,642	3,642	17,643	0	194	16,567	16,761	0	0	5,974	5,974
	Total	17,814	1,448	194	13,346	14,988	1,448	0	3,642	5,090	24,766	6,624	194	16,567	23,385	5,176	0	5,974	11,150
Morong	Urban	37,940	18,581	77	12,453	31,111	6,009	0	0	6,009	52,747	49,055	0	0	49,055	30,474	0	0	30,474
	Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	37,940	18,581	77	12,453	31,111	6,009	0	0	6,009	52,747	49,055	0	0	49,055	30,474	0	0	30,474
Pililla	Urban	38,884	11,083	170	20,632	31,885	4,267	0	0	4,267	54,060	50,276	0	0	50,276	39,193	0	0	39,193
	Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	38,884	11,083	170	20,632	31,885	4,267	0	0	4,267	54,060	50,276	0	0	50,276	39,193	0	0	39,193
Rodriguez	Urban	89,702	34,950	0	38,606	73,556	14,005	0	0	14,005	124,712	115,982	0	0	115,982	81,032	0	0	81,032
	Rural	10,256	0	98	8,620	8,718	0	0	3,616	3,616	14,259	0	98	13,448	13,546	0	0	4,828	4,828
	Total	99,958	34,950	98	47,226	82,274	14,005	0	3,616	17,621	138,971	115,982	98	13,448	129,528	81,032	0	4,828	85,860
San Mateo	Urban	121,263	60,873	0	38,563	99,436	10,776	0	0	10,776	168,591	156,790	0	0	156,790	95,917	0	0	95,917
	Rural	916	0	0	779	779	0	0	741	741	1,273	0	0	1,209	1,209	0	0	430	430
	Total	122,179	60,873	0	39,342	100,215	10,776	0	741	11,517	169,864	156,790	0	1,209	157,999	95,917	0	430	96,347
Tanay	Urban	69,224	42,450	159	14,155	56,764	13,984	0	0	13,984	96,242	89,505	0	0	89,505	47,055	0	0	47,055
	Rural	12,662	0	0	10,763	10,763	0	0	5,741	5,741	17,604	0	0	16,724	16,724	0	0	5,961	5,961
	Total	81,886	42,450	159	24,918	67,527	13,984	0	5,741	19,725	113,846	89,505	0	16,724	106,229	47,055	0	5,961	53,016
Teresa	Urban	23,034	3,145	0	15,743	18,888	3,145	0	0	3,145	32,023	29,781	0	0	29,781	26,636	0	0	26,636
	Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	23,034	3,145	0	15,743	18,888	3,145	0	0	3,145	32,023	29,781	0	0	29,781	26,636	0	0	26,636
PW4SP Study Area	Urban	708,953	408,665	622	172,481	581,768	126,591	0	0	126,591	985,651	916,655	0	0	916,655	507,990	0	0	507,990
	Rural	182,775	5,183	435	149,741	155,359	0	0	72,714	72,714	256,110	5,183	435	235,786	241,404	0	0	86,045	86,045
	Total	891,728	413,848	1,057	322,222	737,127	126,591	0	72,714	199,305	1,239,761	921,838	435	235,786	1,158,059	507,990	0	86,045	594,035

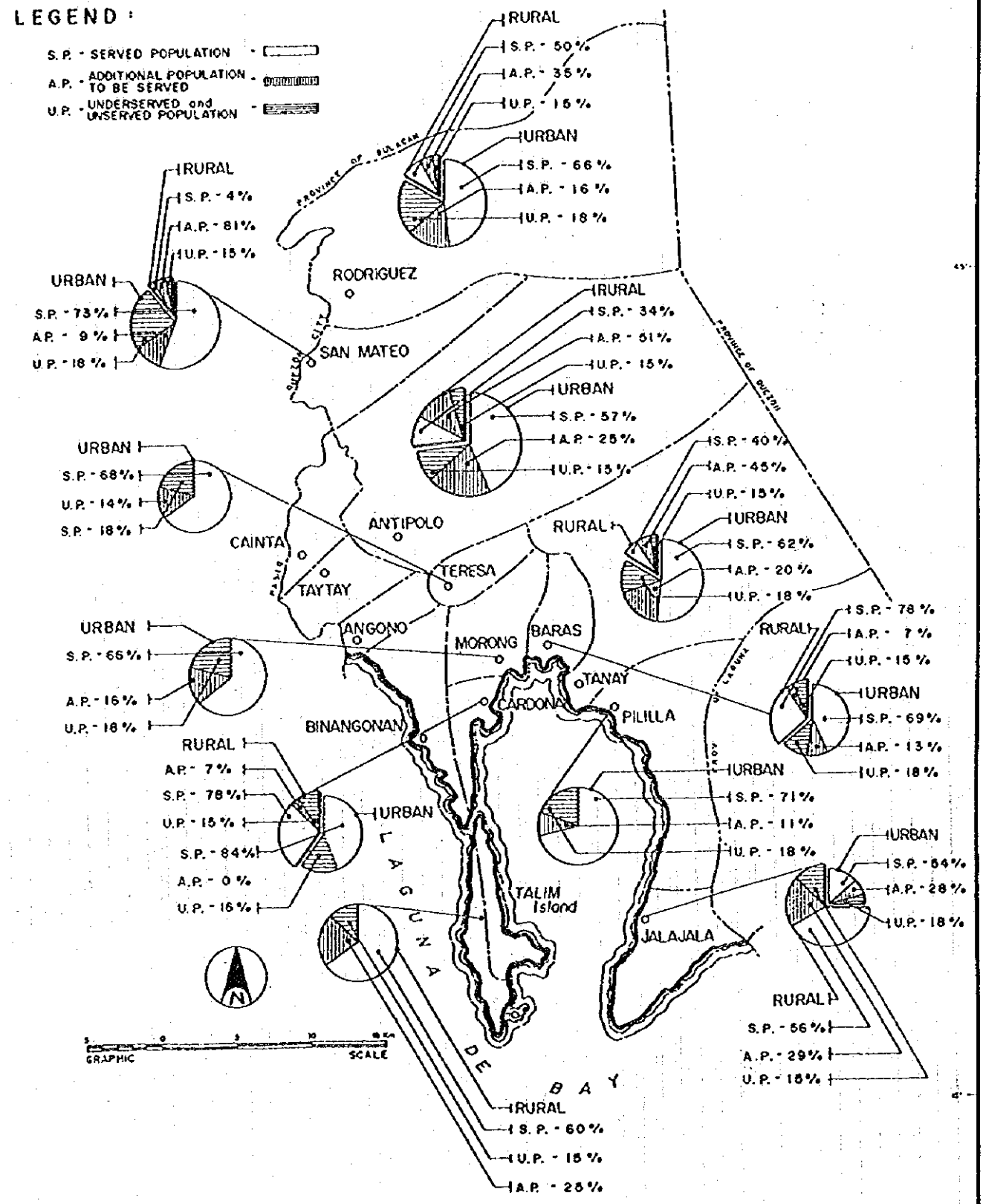


FIGURE 8.5.1
MAP SHOWING FUTURE WATER SUPPLY SERVICE COVERAGE BY 2000

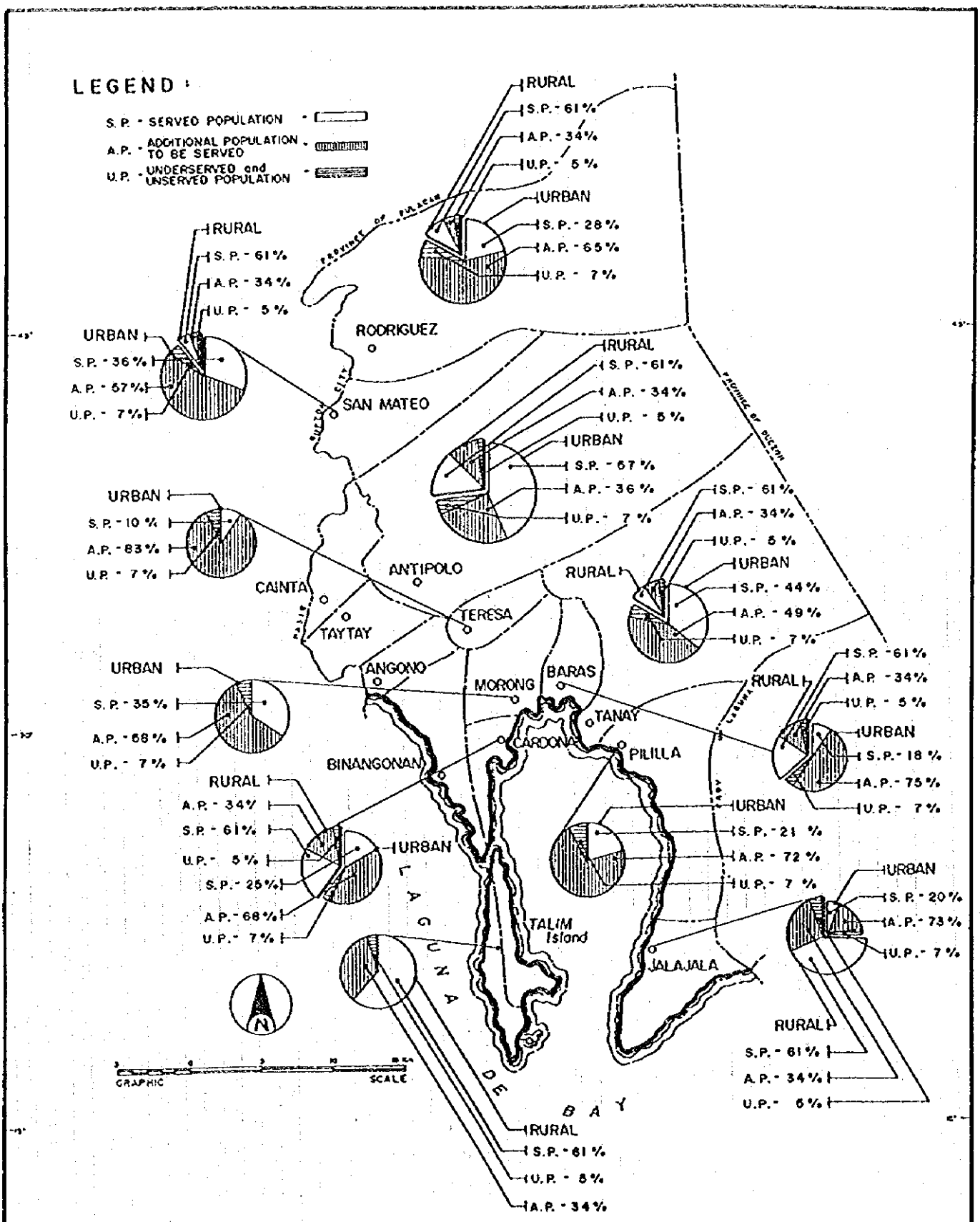


FIGURE 8.5.2

MAP SHOWING FUTURE WATER SUPPLY SERVICE COVERAGE BY 2010

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 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 161,850. The additional households to be served totaled to 73,579, of which 76% is urban households and 24% is rural. While at the end of Phase II, the projected number of served households is 294,443. The additional households to be served are 155,161. Of this, 78% is urban households and the remaining 22% is rural. Table 8.5.2 summarizes the 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.

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)								
		Total Households	No. of Served Households				Add'l. No. of Households to be Served				Total Households	No. of Served Households				Add'l. No. of Households to be Served			
			Flush	Pour Flush	VIP Latrine	Total	Flush	Pour Flush	VIP Latrine	Total		Flush	Pour Flush	VIP Latrine	Total	Flush	Pour Flush	VIP Latrine	Total
Antipolo	Urban	55,331	36,020	10,292	5,146	51,458	12,087	7,343	1,597	21,027	98,080	69,882	23,294	0	93,176	33,862	13,002	0	46,864
	Rural	20,074	0	14,935	3,734	18,669	0	11,003	1,497	12,500	34,189	0	32,480	0	32,480	0	17,545	0	17,545
	Total	75,405	36,020	25,227	8,880	70,127	12,087	18,346	3,094	33,527	132,269	69,882	55,774	0	125,656	33,862	30,547	0	64,409
Baras	Urban	3,099	783	1,811	288	2,882	475	242	0	717	5,817	4,145	1,382	0	5,527	3,362	0	0	3,362
	Rural	1,518	196	988	282	1,466	0	395	129	524	2,797	266	2,391	0	2,657	70	1,403	0	1,473
	Total	4,617	979	2,799	571	4,349	475	637	129	1,241	8,614	4,411	3,773	0	8,184	3,432	1,403	0	4,835
Binangonan (Talim)	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	5,011	0	3,728	932	4,660	0	1,905	251	2,156	9,929	0	9,432	0	9,432	0	5,704	0	5,704
	Total	5,011	0	3,728	932	4,660	0	1,905	251	2,156	9,929	0	9,432	0	9,432	0	5,704	0	5,704
Cardona	Urban	4,781	1,640	2,362	445	4,447	509	1,528	0	2,037	8,642	6,157	2,052	0	8,209	4,517	0	0	4,517
	Rural	2,127	0	1,582	396	1,978	0	0	0	0	3,918	0	3,722	0	3,722	0	2,140	0	2,140
	Total	6,908	1,640	3,944	840	6,424	509	1,528	0	2,037	12,560	6,157	5,774	0	11,931	4,517	2,140	0	6,657
Jala-jala	Urban	967	273	536	90	899	273	317	0	590	1,781	1,269	423	0	1,692	996	0	0	996
	Rural	2,350	0	1,748	437	2,185	0	647	112	759	4,411	0	4,190	0	4,190	0	2,442	0	2,442
	Total	3,317	273	2,284	527	3,084	273	964	112	1,349	6,192	1,269	4,613	0	5,882	996	2,442	0	3,438
Morong	Urban	7,439	3,643	2,583	692	6,918	1,891	0	18	1,909	13,187	9,396	3,132	0	12,528	5,753	549	0	6,302
	Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	7,439	3,643	2,583	692	6,918	1,891	0	18	1,909	13,187	9,396	3,132	0	12,528	5,753	549	0	6,302
Pililla	Urban	7,337	2,715	4,050	572	7,337	0	3,701	0	3,701	13,515	9,629	3,210	0	12,839	6,914	0	0	6,914
	Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	7,337	2,715	4,050	572	7,337	0	3,701	0	3,701	13,515	9,629	3,210	0	12,839	6,914	0	0	6,914
Rodriguez	Urban	17,250	6,721	7,717	1,604	16,042	3,499	5,231	0	8,730	31,178	22,214	7,405	0	29,619	15,493	0	0	15,493
	Rural	2,093	0	1,557	389	1,946	0	941	0	941	3,565	0	3,387	0	3,387	0	1,830	0	1,830
	Total	19,343	6,721	9,274	1,994	17,989	3,499	6,172	0	9,671	34,743	22,214	10,792	0	33,006	15,493	1,830	0	17,323
San Mateo	Urban	23,777	11,936	7,965	2,211	22,112	4,078	7,058	236	11,372	42,148	30,030	10,010	0	40,040	18,094	2,045	0	20,139
	Rural	195	0	145	36	181	0	0	36	36	318	0	302	0	302	0	157	0	157
	Total	23,972	11,936	8,110	2,248	22,294	4,078	7,058	273	11,409	42,466	30,030	10,312	0	40,342	18,094	2,202	0	20,296
Tanay	Urban	13,061	8,009	2,923	1,215	12,147	3,712	1,194	0	4,906	24,060	17,143	5,714	0	22,857	9,134	2,791	0	11,925
	Rural	2,584	0	1,922	481	2,403	0	750	280	1,030	4,401	0	4,181	0	4,181	0	2,259	0	2,259
	Total	15,645	8,009	4,845	1,695	14,549	3,712	1,944	280	5,936	28,461	17,143	9,895	0	27,038	9,134	5,050	0	14,184
Teresa	Urban	4,430	605	3,103	412	4,120	605	0	39	644	8,006	5,704	1,901	0	7,605	5,099	0	0	5,099
	Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	4,430	605	3,103	412	4,120	605	0	39	644	8,006	5,704	1,901	0	7,605	5,099	0	0	5,099
PWdSP Study Area	Urban	137,472	72,345	43,342	12,675	128,362	27,129	26,614	1,890	55,633	246,414	175,569	58,523	0	234,092	103,224	18,387	0	121,611
	Rural	35,952	196	26,605	6,687	33,488	0	15,641	2,305	17,946	63,528	266	60,085	0	60,351	70	33,480	0	33,550
	Total	173,424	72,541	69,947	19,362	161,850	27,129	42,255	4,195	73,579	309,942	175,835	118,608	0	294,443	103,294	51,867	0	155,161

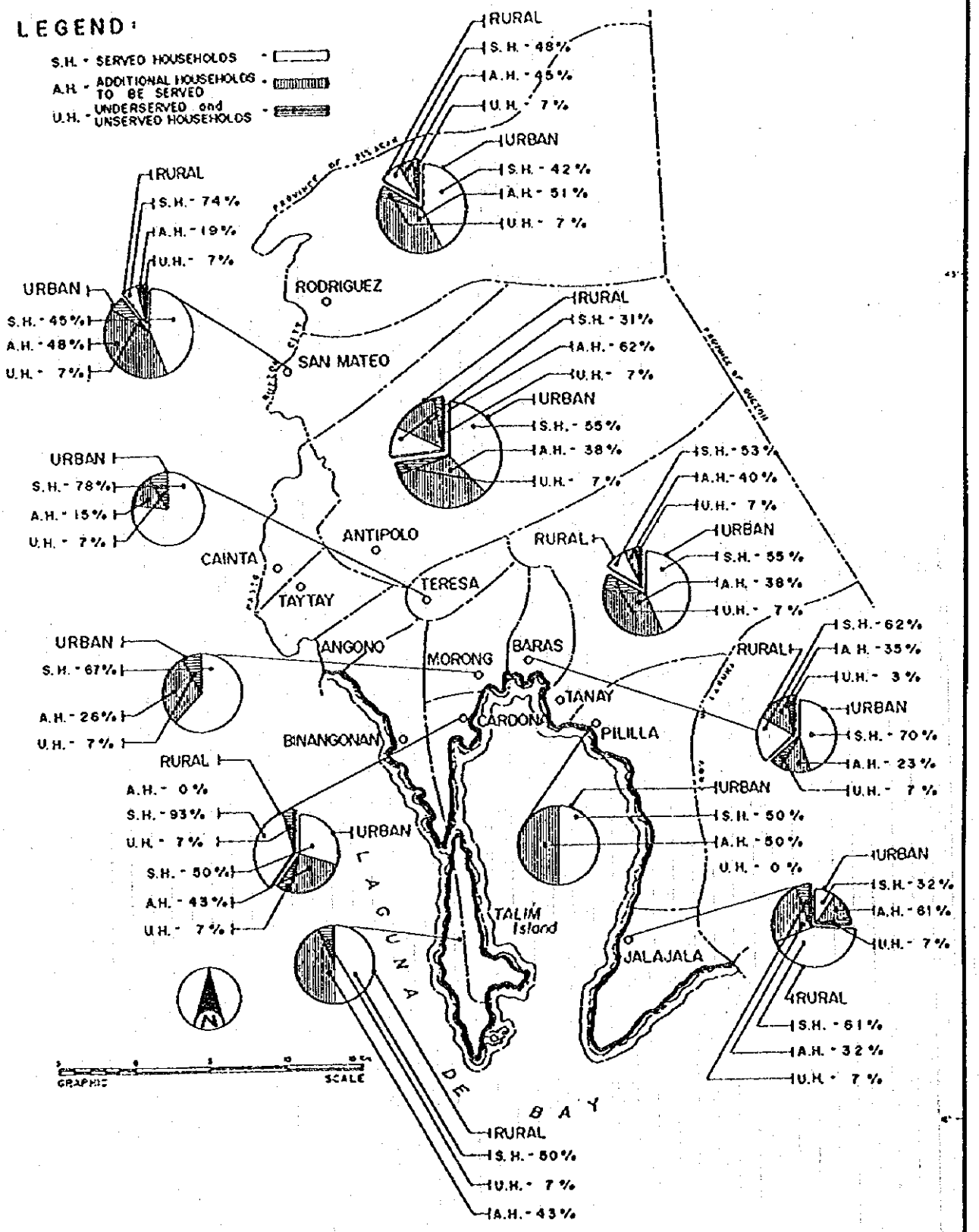


FIGURE 8.5.3

MAP SHOWING HOUSEHOLD TOILETS SERVICE COVERAGE BY 2000

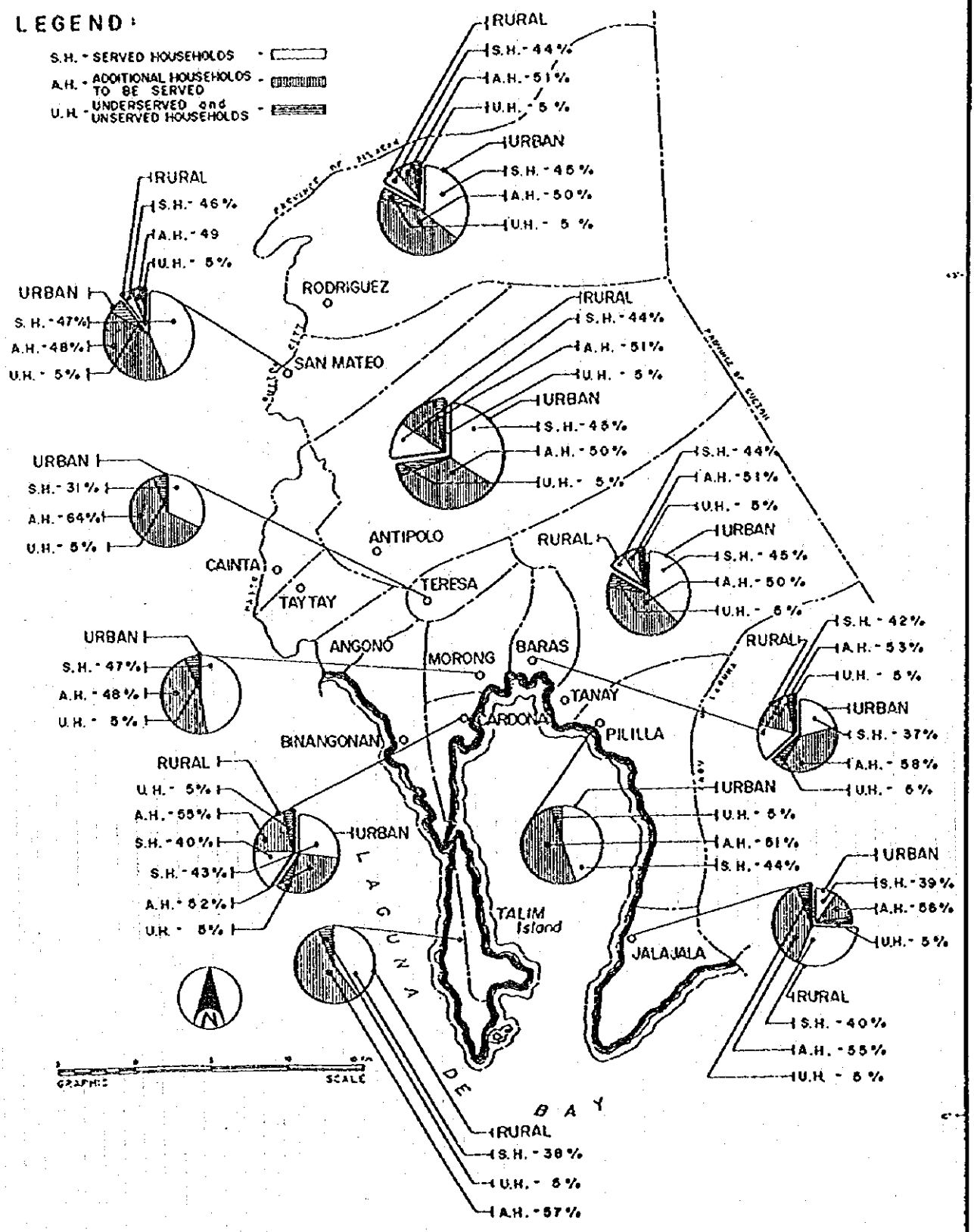


FIGURE 8.5.4

MAP SHOWING HOUSEHOLD TOILETS SERVICE COVERAGE BY 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 targets comparing with either that in base year or in Phase I (details are referred to Supporting Report). However, when the number of students to be served in target/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 91,881 of which 47,231 are additional students to be served. While at the end of Phase II period, the projected number of served students is 195,462 with an additional students to be served at 103,581. Table 8.5.3 summarizes the number of public school students to be served by target year.

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	Number of Public School Students to be Served	Add'l. No. of Public School Students to be Served	Total No. of Public School Students	Number of Public School Students to be Served	Add'l. No. of Public School Students to be Served
Antipolo	82,462	41,231	27,081	128,336	89,835	48,604
Baras	4,508	2,254	854	6,268	4,388	2,134
Binangonan (Talim)	7,251	3,626	2,576	17,485	12,240	8,614
Cardona	5,782	2,891	791	7,780	5,446	2,555
Jala-jala	4,335	2,168	1,168	5,512	3,858	1,690
Morong	3,804	1,902	152	5,288	3,702	1,800
Pililla	8,901	4,451	1,801	11,106	7,774	3,323
Rodriguez	19,565	9,783	2,433	27,627	19,339	9,556
San Mateo	23,000	11,500	4,500	32,476	22,733	11,233
Tanay	20,137	10,069	5,219	31,108	21,776	11,707
Teresa	4,012	2,006	656	6,244	4,371	2,365
PW4SP Study Area	183,757	91,881	47,231	279,230	195,462	103,581

(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, while 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 21. The additional public utilities to be served are 10. While at the end of Phase II period, the projected number of served public utilities is 32, of which 11 are additional public utilities to be served. Table 8.5.4 summarizes additional number of public utilities to be served by municipality by target year.

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.

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.

Table 8.5.4 Additional 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
Antipolo	Public Market	0	1	0	1
	Bus/Jeep Terminal	1	1	0	1
	Total	1	2	0	2
Baras	Public Market	1	2	0	2
	Bus/Jeep Terminal	0	0	1	1
	Total	1	2	1	3
Binangonan (Talim)	Public Market	1	1	0	1
	Bus/Jeep Terminal	0	0	1	1
	Total	1	1	1	2
Cardona	Public Market	1	2	0	2
	Bus/Jeep Terminal	0	0	0	0
	Total	1	2	0	2
Jala-jala	Public Market	1	2	0	2
	Bus/Jeep Terminal	0	0	1	1
	Total	1	2	1	3
Morong	Public Market	0	1	0	1
	Bus/Jeep Terminal	1	1	0	1
	Total	1	2	0	2
Pililla	Public Market	0	1	0	1
	Bus/Jeep Terminal	0	0	1	1
	Total	0	1	1	2
Rodriguez	Public Market	1	2	0	2
	Bus/Jeep Terminal	0	0	1	1
	Total	1	2	1	3
San Mateo	Public Market	0	2	1	3
	Bus/Jeep Terminal	1	1	1	2
	Total	1	3	2	5
Tanay	Public Market	0	1	2	3
	Bus/Jeep Terminal	2	2	1	3
	Total	2	3	3	6
Teresa	Public Market	0	1	0	1
	Bus/Jeep Terminal	0	0	1	1
	Total	0	1	1	2
PW4SP Study Area	Public Market	5	16	3	19
	Bus/Jeep Terminal	5	5	8	13
	Total	10	21	11	32

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
Antipolo	392,320	364,858	196,160
Baras	23,267	21,638	11,634
Cardona	34,566	32,146	17,283
Morong	52,747	49,055	26,374
Pililla	54,060	50,276	27,030
Rodriguez	124,712	115,982	62,356
San Mateo	168,591	156,790	84,296
Tanay	96,242	89,505	48,121
Teresa	32,023	29,781	16,012
PW4SP Study Area	978,528	910,031	489,264

Service coverage in Phase I is assumed to be 85% with reference to the current service coverage of 73%. 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
Antipolo	30,447	55,331	47,031	16,584
Baras	1,870	3,099	2,634	764
Binangonan (Talim)	0	0	0	0
Cardona	4,215	4,781	4,215	0
Jala-jala	380	967	822	442
Morong	3,088	7,439	6,323	3,235
Pililla	2,388	7,337	6,236	3,848
Rodriguez	7,492	17,250	14,663	7,171
San Mateo	14,627	23,777	20,210	5,583
Tanay	10,063	13,061	11,102	1,039
Teresa	2,882	4,430	3,766	884
PW4SP Study Area	77,452	137,472	117,002	39,550

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 number of wells with classification of deep and shallow wells. Deep wells are further subdivided in terms of three different standard depth 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, 1 unit each 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.

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 Number of Wells	No. of Additional Deep Wells	Number of House Connections	Number of Deep Wells				Number of Shallow Wells	Total Number of Wells
						40 m	80 m	120 m	Sub-total					40 m	80 m	120 m	Sub-total		
Antipolo	Expansion	7	13,883	0	0	0	0	549	549	138	687	13	35,371	0	0	618	618	154	772
Baras	Expansion	1	399	0	0	0	0	7	7	0	7	1	4,352	0	0	64	64	0	64
Binangonan (Talim)	N.A.	0	0	0	0	0	84	0	84	0	84	0	0	0	225	0	225	0	225
Cardona	Expansion	0	0	0	0	0	10	0	10	0	10	2	5,905	0	89	0	89	0	89
Jala-jala	New	1	273	0	0	0	45	0	45	0	45	1	1,294	0	100	0	100	0	100
Morong	New	1	1,178	0	0	0	0	0	0	0	0	3	7,619	0	0	0	0	0	0
Pililla	Expansion	1	805	0	0	0	0	0	0	0	0	2	9,798	0	0	0	0	0	0
Rodriguez	Expansion	1	2,693	0	0	0	34	0	34	15	49	6	20,258	0	57	0	57	24	81
San Mateo	Expansion	2	2,113	0	0	0	4	0	4	7	11	13	23,979	0	3	0	3	5	8
Tanay	Expansion	1	2,638	0	0	0	0	78	78	0	78	3	11,764	0	0	100	100	0	100
Teresa	New	1	605	0	0	0	0	0	0	0	0	3	6,659	0	0	0	0	0	0
PW4SP Study Area	New------- 3 Expansion - 7	16	24,587	0	0	0	177	634	811	160	971	47	126,999	0	474	782	1,256	183	1,439

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 Terminals	Flush	Pour Flush	VIP Latrine	Total	Public School Toilets	Flush	Pour Flush	VIP Latrine	Total	Public School Toilets	Public Markets	Bus Termi-nals	Flush	Pour Flush	VIP Latrine	Total	Public School Toilets
Antipolo	12,087	7,343	1,597	21,027	80	0	1	0	11,003	1,497	12,500	28	33,862	13,002	0	46,864	144	0	0	0	17,545	0	17,545	50
Baras	475	242	0	717	2	1	0	0	395	129	524	1	3,362	0	0	3,362	6	0	1	70	1,403	0	1,473	3
Binangonan (Talim)	0	0	0	0	0	1	0	0	1,905	251	2,156	10	0	0	0	0	0	0	1	0	5,704	0	5,704	34
Cardona	509	1,528	0	2,037	2	1	0	0	0	0	0	1	4,517	0	0	4,517	7	0	0	0	2,140	0	2,140	3
Jala-jala	273	517	0	590	1	1	0	0	647	112	759	4	996	0	0	996	2	0	1	0	2,442	0	2,442	5
Morong	1,891	0	18	1,909	0	0	1	0	0	0	0	1	5,753	549	0	6,302	7	0	0	0	0	0	0	0
Pililla	0	3,701	0	3,701	7	0	0	0	0	0	0	0	6,914	0	0	6,914	13	0	1	0	0	0	0	0
Rodriguez	3,499	5,231	0	8,730	9	1	0	0	941	0	941	1	15,493	0	0	15,493	34	0	1	0	1,830	0	1,830	4
San Mateo	4,078	7,058	236	11,372	18	0	1	0	0	36	36	0	18,094	2,045	0	20,139	45	1	1	0	157	0	157	0
Tanay	3,712	1,194	0	4,906	18	0	2	0	750	280	1,030	3	9,134	2,791	0	11,925	40	2	1	0	2,259	0	2,259	7
Teresa	605	0	39	644	3	0	0	0	0	0	0	0	5,099	0	0	5,099	9	0	1	0	0	0	0	0
PW4SP Study Area	27,129	26,614	1,890	55,633	140	5	5	0	15,641	2,305	17,946	49	103,224	18,387	0	121,611	307	3	8	70	33,480	0	33,550	106

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

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 971 Level I wells (811 deep and 160 shallow wells) shall be newly constructed and 10% of these deep wells shall be rehabilitated annually. Although there are huge requirements, only 1 unit each of truck-mounted percussion type drilling rig, portable mechanized rotary drilling rig and air compressor for well rehabilitation are available at DPWH-DEO in the province.

Therefore, a total of 18 sets of drilling equipment (2 sets of small size rotary type, 7 sets of medium size rotary type and 9 sets of medium size percussion type) together with 1 set of well rehabilitation equipment and 4 units of support vehicles 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.

(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 trucks is estimated for the urban area in Phase I. Eleven (11) 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
Antipolo	16,584	6,932	3
Baras	764	319	1
Binangonan (Talim)	NA	NA	NA
Cardona	0	0	0
Jala-jala	442	185	1
Morong	3,235	1,352	1
Pililla	3,848	1,608	1
Rodriguez	7,171	2,997	1
San Mateo	5,583	2,334	1
Tanay	1,039	434	1
Teresa	884	370	1
PW4SP Study Area	39,550	16,531	11

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 for implementing PW4SP.

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 study, 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 on-going 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 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 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 82%; 85%, 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 student coverage will rise to 70%. The provincial government will be the lead agency in the undertaking. It will tap local experts, enjoin active participation from the private sector and promote better coordination with three principal government agencies which will operate in the water supply and sanitation sector. These include the Department of Public Works and Highways (DPWH) which is responsible for providing water supply at the barangay

level, the Department of Interior and Local Government (DILG) which is responsible for general administration and institution and institutional building activities, and the Department of Health (DOH) which has overall responsibility for sanitation and all health related activities associated with water supply.

However, these agencies sometimes have overlapping functions.

(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 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.

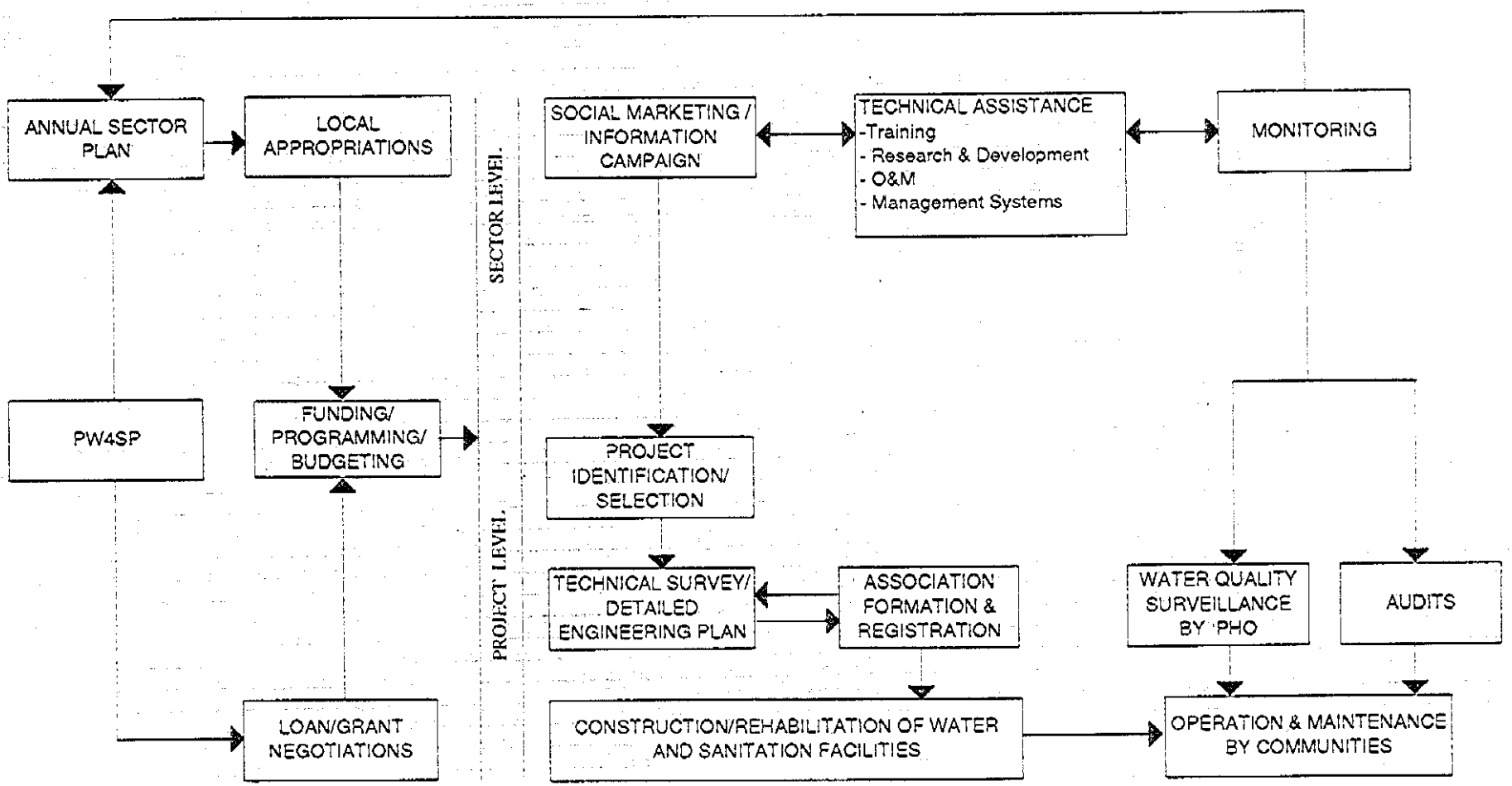
The Sector Level Implementation activities consist principally of three (3) broad areas: social marketing; technical assistance; and monitoring. Project selection follows on from a self-selection process. The identification of a responsible community-based association and technical studies, as needed, 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 toilet facility for every 50 students.

Figure 9.2.1 Sector Management Model



(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 LGUs. To the extent possible, the LGUs 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 and their willingness to pay; the current water, 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. However, construction of economical facilities shall be pursued not necessary 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 LGU 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 LGU 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) The province's fiscal management, in terms of capital funds generation capability, budget and disbursement, shall be improved. The assistance of legislative branch in the enactment of the proposed revenue-generating measures shall be sought. Financing through the private sector will also be encouraged.

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. It will be the policy of the provincial government to promote efficient water resource management. The targeted improvement in the standard of living of Rizalenos will be pursued in total consideration of the environment especially natural water resources. The sustainable development concept meeting the needs and aspirations of today's generation without jeopardizing the future generation to meet theirs will be applied in the implementation of the plan. Thus, specific measures will be developed and adopted to sustain efficient water resource management:
   (a) formulation and adoption of a viable water resource use policy;
   (b) rehabilitation efforts to water resources that have been degraded;
   (c) development and utilization of locally adaptable technologies for water resource conservation and water pollution control; and
   (d) better coordination among agencies involved in water related activities

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 LGU 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 LGUs shall likewise adopt a registration and franchising system for associations responsible for water supply facilities outside the WD franchise areas. 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 LGUs 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 these will invariably affect local financing mechanisms.

In the long-term, the Provincial Sector Trust Fund approach (Fig. 9.2.2) may be an additional mechanism for financing project-related activities. This Trust Fund can be the transition arrangement as the line departments gradually reduce their direct control over sector funds. The Trust Fund could also raise the LGUs 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 LGU. 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.

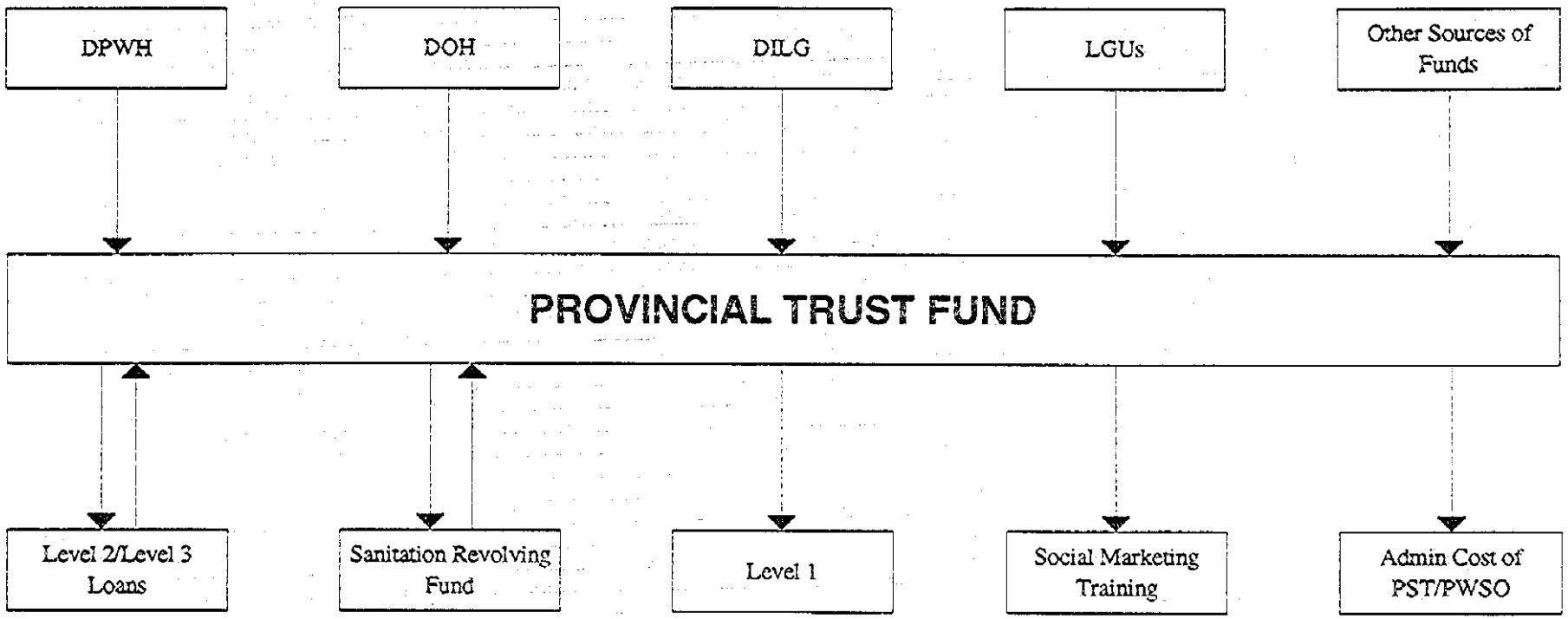
Upon agreement by the parties, the enabling local legislation establishing the Trust Fund and the sanitation revolving fund will have to be enacted.

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.

Figure 9.2.2 Flow of Funds



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 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 as follows:

(1) The Provincial Water Supply & Sanitation Coordinator (PWSC) will lead an interdisciplinary Provincial Sector Team. The PWSC 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 Provincial Assistant 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 which 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 methodologies 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 standards and technical specifications 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 LGU-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 Mayor. Staff to be 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 to 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 warranted, 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 Council (BC), through its Committee on Health, and the Rural Health Unit (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 focusing 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.