

(c) The Countryside Multi-Purpose Cooperative, Inc. conducts training and credit extension program.

Other NGOs operating in the province and has extended assistance in the sector include: Philippine-German Development Foundation; Rotary Club of Batanes; Sto. Domingo Women's Multi-Purpose Cooperative, Inc; and, Basco Rural Improvement Club.

5.6 Project Management Policies/Activities at the Local Level

(1) Project identification and priority setting

During the past seven years, project identification was normally done either in consultation with the barangay or the municipal government based on their needs assessment and within the framework of the PPDO. Considering the limited financial resources of the province, prioritization of projects is based on the level of need, number of beneficiaries, and on the degree of community participation and support.

(2) Project preparation and planning

Project proponents normally prepare the feasibility studies with technical assistance provided by the province. In the absence of a municipal engineering office, all detailed designs are done by the PEO for locally funded/implemented projects, while the district engineering office handles foreign and nationally funded projects after conducting on-site visitation and field validation.

(3) Community mobilization

The provincial government initiates community mobilization and carried out through the municipal mayors down to the barangay officials. An existing group is tapped or a new community organization is organized to subsequently manage the facilities to be constructed.

(4) Financing/budget allocation

Allocation of budgets is based on the identified priority programs of the government. There is no pre-set percentage distribution by sector or sub-sectors, as the case may be.

(5) Procurement of goods and services

The General Services Office (GSO) conducts all procurement of goods and services, especially when it comes to bulk buying as provided for in the LGC of 1991 and COA rules and regulations. The GSO also takes care of the preparation of bid documents. For big projects requiring consultancy services, it is conducted through public bidding and is likewise being handled by the GSO.

(6) Project implementation

For locally-funded projects, the PEOI supervises the construction. For foreign and nationally-funded projects, the DPWH supervises the construction. There is no drilling equipment in the province. Drilling is done manually and it is considered risky.

(7) Operation and maintenance

In Batanes, most of the water supply systems are operated and maintained by the municipalities except for two water systems which are operated and maintained by the barangay. Water quality testing is done periodically by the PHO but testing determines only the level of contamination. There is a lack of laboratory equipment to undertake a more sophisticated water testing.

(8) Cost recovery

Monthly dues are being imposed and collected by the LGUs based either on a flat rate or actual consumption as reflected on their water meters. The amount has been agreed upon by the LGUs and the consumers.

(9) Repairs and rehabilitation

Minor system repairs are being undertaken by the LGUs concerned with the technical assistance being provided by the PEO or DPWH, as the case may be. For major repairs, the provincial government, upon the request of the LGUs concerned, provides funding assistance. Funds may also come from the congressman's CDF. Major repairs are usually done by PEO. There are no locally available spare parts to undertake repairs. Purchases are usually done in Manila or in Laoag City.

(10) Linkage with national government agencies

The Province works closely with the Regional Development Council for endorsement of programs/projects requiring national or foreign funding.

5.7 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

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, through its Danish Trust Fund facilities, has actively supported the preparation of provincial master plans. In addition, its Institution Building through Decentralized Implementation of Community-Managed Water and Sanitation Projects, is assisting DILG-PMO in developing models and approaches for community-based water and sanitation in selected pilot areas. The project bears a strong poverty alleviation focus. UNDP is also in the final stages of a country project to assist GOP in strengthening the groundwater databank in the country through a US\$ 682,500 grant.

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

(2) Bilateral Agencies

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

The Overseas Economic Cooperation Fund (OECF) is financing the RWS IV Project through 1995. It provides a loan of up to Yen 5.08 B to counterpart funds of Pesos 400 M. It envisages 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\$ 14.65M grant. The project is implemented by the LGUs and the regional development council. Project components include: planning and monitoring information systems; infrastructure planning and rehabilitation; and institution building with an emphasis on community management based on experiences from other AIDAB-funded projects. The Project has been extended through 1997.

5.8 Current Community Development and Training Approaches

5.8.1 Community Development

The principal experience of the province on community mobilization for water and sanitation is with the "Regional Resource Management Program" of the Department of Environment and Natural Resources (DENR). This is a community-based rural development program geared towards the protection, development and management of the watershed and upland resources. As a participatory approach to rural development, the program uses community organizing and the training process as a major tool in achieving its objectives. The program aims at enhancing the capacity of target beneficiaries for sustained development, to generate livelihood and employment opportunities and to provide essential infrastructure facilities.

5.8.2 Human Resources Development and Training

No formal technical and managerial training programs were organized by the province. However, upon the implementation of projects, the provincial government requires the municipality or the barangay to assign one or two people to work with the construction team. This serves as their on-the-job training in preparation for the turn-over of the project/s. There are training activities organized by the province.

5.8.3 Sanitation/Hygiene Education

In cooperation with the rural health units, the Provincial Health Office implements a province-wide health and hygiene information and education program. This is normally being done through organized meetings and dialogues and/or individual household visitation. Health educational materials from the central DOH consisting of posters, streamers, comics and stickers are distributed. At the same time, DECS, through the formal educational system, assists in this health education campaign.

5.9 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 run 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

There is no formal scheme developed to monitor and evaluate sector programs and projects. These are usually done upon the request of the concerned LGUs (the municipality or the barangay). Monitoring and evaluation are being undertaken by the PPDO in collaboration with the PEO.

Chapter 6

***PAST FINANCIAL PERFORMANCE
IN WATER SUPPLY AND SANITATION***



6. PAST FINANCIAL PERFORMANCE IN WATER SUPPLY AND SANITATION

6.1 General

Locally funded programs and projects for the water supply and sanitation sector have been devolved from central government agencies to LGUs since 1992 according to the Local Government Code of 1991 and NEDA Board Resolution No. 4 (1994).

In order to clarify the flow and contents of funds to the sector under this transitional period and to apply for the planning of financial arrangements, this chapter sets forth: (1) past public investment to the sector by central government agencies and LGUs; (2) roles of the Internal Revenue Allotment (IRA) to the sector financing; (3) cost recovery and financial performances of waterworks/associations; and (4) affordability of users at present.

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, 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		1990-94				
Agency	Funds	Level I	Level II	Level III	Sewerage	Sanitation
DILG		180				
DPWH	Foreign Fund 1)	5,440				
	Local Fund 2)	6,926				
LWUA						
DOH						
Province	Provincial Government		650	4,450		450
Municipality	Municipal Government	100		160		25
Others 3)		300		4,970		

Sources: Each central agency and the provincial government

Notes:

- 1) The Second Island Provinces Rural Water Supply and Sanitation Project (SIPRWSSP) by ADB
- 2) Investment between 1990 and 1991; Locally funded projects were devolved to LGUs since 1992.
- 3) Countryside Development Fund (CDF) and DENR-SECAL.

Investments for Level I facilities from the local fund of DPWH amounted to P6,926 thousand during the years 1990 and 1991, covering 32 deep wells, 2 spring development and 20 rehabilitation works. DPWH had not provided any local funds to the sector since 1992. As for the foreign fund through DPWH (ADB's SIPRWSSP), P5,440 thousand was provided for water supply sector from 1990 to 1994, covering 2 deep wells and 14 spring development.

DILG released P 180 thousand for Level I Water Supply from 1990 to 1994. DOH provided no investments in the same period. The provincial government financed an amount of P5,550 thousand for the relevant sector in the period of 1990-1994. Also, CDF and other funds provided P 5,270 thousand for the sector.

According to "Philippines Water Supply Reform Study in 1993", P311 per capita was invested on water projects in Metro Manila, P200 per capita on projects in urban areas outside Metro Manila, and about P 30 benefiting the rural population during 1990-1991.

In the province, it was estimated that P 548 per capita was invested by only DPWH during the same period. Thus, the per capita investment in the province is much larger than the national average. In this regard, the national government had given priority to the sector investment of the province.

6.2.2 Sources of Local Funds

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 barangay (20%). Further, respective Internal Revenue Allotments (IRA) in different administrative levels are allotted 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 the province ranged from 0.2 to 0.4% of the national total IRA for all provinces between 1990 and 1994. On the other hand, the total IRA to all municipalities of the province was arranged with 0.1 - 0.2% to the national total IRA for nationwide municipalities (refer to Table 6.2.1, Supporting Report).

For the provincial government, the IRA has been the most important financial source of the total revenue as experienced, with 90% of the total revenue of the provincial government

Table 6.2.2 Past Internal Revenue Allotment to the Province of Batanes in 1990-94

Unit: Pesos

		1990	1991	1992	1993	1994
National	I National Total of IRA					
	(a) IRA to all provinces	2,031,174,331	2,697,481,707	4,571,136,402	8,445,600,000	11,498,994,198
	(b) IRA to all municipalities *	3,054,601,475	4,046,837,742	7,127,522,550	12,484,800,000	16,325,288,074
Province	II IRA to Batanes Province					
	(1) Total: (2) + (3)	5,309,189	8,005,229	26,928,072	43,917,386	65,440,620
	(2) Provincial Government	2,860,319	4,933,703	16,476,179	27,496,153	43,090,554
	Percentage against (a)	(0.14)	(0.18)	(0.36)	(0.33)	(0.37)
	(3) Municipalities	2,448,870	3,071,526	10,451,893	16,421,233	22,350,066
	Percentage against (b)	(0.08)	(0.08)	(0.15)	(0.13)	(0.14)
	III Total Income of the Provincial Government	8,013,369	8,169,253	19,257,512	29,561,924	45,108,903
Percentage of IRA	(35.69)	(60.39)	(85.56)	(93.01)	(95.53)	
Province	IV Total Income of Municipalities	n. a.	6,436,384	11,763,643	17,568,809	n. a.
	Percentage of IRA		(47.72)	(88.85)	(93.47)	
Municipality	V IRA to Municipalities **					
	Total	2,448,870 (100.0)	3,071,526 (100.0)	10,451,893 (100.0)	16,421,233 (100.0)	22,350,066 (100.0)
	1. Basco	518,336 (21.2)	701,385 (22.8)	2,608,152 (19.2)	3,165,894 (19.3)	4,469,847 (20.0)
	2. Itbayat	559,138 (22.8)	734,297 (23.9)	2,154,077 (20.6)	3,500,490 (21.3)	4,595,159 (20.6)
	3. Ivana	324,660 (13.3)	368,602 (12.0)	1,496,060 (14.3)	2,310,118 (14.1)	3,155,161 (14.1)
	4. Mahatao	347,795 (14.2)	403,695 (13.1)	1,535,753 (14.7)	2,392,172 (14.6)	3,270,040 (14.6)
	5. Sabtang	367,780 (15.0)	483,941 (15.8)	1,718,827 (16.4)	2,700,574 (16.4)	3,625,438 (16.2)
	6. Uyugan	331,161 (13.5)	379,606 (12.4)	1,539,024 (14.7)	2,351,985 (14.3)	3,234,421 (14.5)

Sources: -

(1) Department of Budget and Management, (2) Bureau of Local Government Finance (DOF) and (3) Provincial Annual Report

Notes:

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

during 1992 and 1993. The expenditures of the provincial government for the relevant sector in 1994 were reported at P 2,006 thousand, about 4.7% of the IRA.

As for municipality, distribution share to each municipality in the province was within a certain range between 1990 and 1994. Municipalities, which had the share of more than 20% of the provincial total in 1994, were Basco and Ibayat.

6.3 Cost Recovery

In general, the capital cost for Level I systems is free to the community, while operation and maintenance is the responsibility of the associations. As for Level II systems, the capital cost is shouldered by the RWSA through a loan or grants. Water charges collected by each association cover cost of operation and maintenance, and loan amortization. However, there are some associations that the water charges in Level I and Level II systems are free to beneficiaries.

For Level III system, municipal waterworks bears the capital cost through grant or loans with concessional terms of interest rate. The cost of amortizing the loan and operation and maintenance of the system is recovered through monthly water bills. Details of financial performance with cost recovery are discussed in section 6.5.

Regarding sanitation sector, construction of the superstructure and the depository of household toilets 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. The estimated cost of flush type toilet facility is 7 times higher than the average monthly family income in the province. Therefore, subsidy from LGUs may be necessary.

Table 6.4.1 Affordability in Water and Sanitation Services

Income/Level of Services	Amount (Pesos)	% to Monthly Income	Affordable Range (%) 5)
Average Monthly Income 1)	4,680	100.0	-
Average Level III: Monthly Water Bill 2)	21	0.4	5.0 or less
Average Level II: Monthly Water Bill 3)	5 - 10 (or free)	0.1 - 0.2	2.0 - 3.0
Mo. Level I Expenditures 3)	- ditto -	- ditto -	1.0 or less
Private Toilet Construction Cost - Flush Type Toilet 4)	34,900	-	-

Notes:

- 1) 1988 Family Income and Expenditures Survey, NSO
(The average provincial figure is inflated to 1994 prices)
- 2) Data from PSPT. It is assumed that 20 cu.m will be consumed per family
- 3) Common figures in the province
- 4) Current prices by JICA Study Team
- 5) Based on the experiences mainly from LWUA, DPWH and DILG

6.5 Past Financial Performance of Municipal Waterworks and RWSAs/BWSAs

There are 5 municipal waterworks systems and 1 Level III system being managed by the RWSA. Table 6.5.1 shows financial indicators of the waterworks in 1995. The waterworks seems to be financially sound under the status that the revenue fully exceeded the cost for operation and maintenance. These water systems were constructed by the respective municipal governments.

Table 6.5.1 Financial Indicators of Municipal Waterworks System

Municipal Waterworks System	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/mo.	Pesos/mo.	Pesos/mo.	Percent (%)
Basco	1,065	4	1.11	22	17,920	26,000	95
Mahatao	247	102	1.00	24	2,100	6,390	85
Ivana	249	5	0.70	15	1,500	3,300	90
Uyugan	46	3	0.90	15	2,000	3,000	90
Sabtang		119	10/connectn	10	1,500	3,000	95
Chanarian (RWSA)		35	5/connectn	15	500	235	95

Source: PSPT

Note: Flat rate for all system is 10 pesos per month for flat rate consumers.

Most of the facilities managed by RWSAs and BWSAs were constructed under grant conditions by DPWH 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. The information from the LWUA on the registration of Level II systems revealed that there are 3 RWSAs in the province, to which a total of P 191 thousand was invested for the construction of facilities by DPWH.

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Chapter 7

WATER SOURCE DEVELOPMENT



7. WATER SOURCE DEVELOPMENT

7.1 General

The study on water source development covers the entire province to come up with a "Groundwater Availability Map" which identifies the area with available potable water sources. The study gives an emphasis on groundwater sources rather than surface water considering the better quality and economy of utilizing groundwater for domestic water supply.

The study has two major components: (1) interpretation of existing geological and groundwater conditions, (2) preparation of Groundwater Availability Map to show groundwater potential areas under three categories. Standard well specifications by municipality were also established as reference for the future requirement of the water supply sub-sector.

The major data used in the study were obtained from concerned agencies (NAMRIA, BMGS, NWRB, LWUA, DPWH and PPDO) and supplemented by the information gathered through questionnaires. Among the information, the Geologic Map published then BMGS, the Water Resource Investigation Report and the Well Inventory Database of NWRB were essential for the analysis of geological characteristics, projection of high yielding area and possible area with saline water intrusion, and classification of groundwater potential areas, respectively.

The Groundwater Availability Map may be used for provincial level master plan at present. However, updating the map is a requisite to gain more information on prevailing groundwater conditions using the questionnaires prepared for the study. An annual review and updating of the database will enable the LGUs to implement water source development on a project site basis.

The database on existing groundwater sources and their conditions is summarized in Table 7.1.1 (Well data from each municipality are presented in Table 7.1.1, Water Source Information, Data Report). It shows that there are 51 shallow wells, 47 deep wells and 16 developed springs existing in the province. About 96% of these water sources are public facilities. Of the total wells, 34% remains functional at present.

Table 7.1.1 Existing Groundwater Sources in the Province

Description	Shallow Well	Deep Well	Spring	Total
1. Number of water sources	51	47	16	114
2. Profile of different sources	45%	41%	14%	100%
3. Owned by Government Agency	46	47	16	109
4. Privately owned	5	0	0	5
5. Sources with quality problem	-	-	-	-
6. Non-functional wells	30	35	-	65
7. Undeveloped springs	-	-	0	0
8. Untapped springs	-	-	0	0

7.2 Geology

The rock units in the province are classified into three (3) main groups based on the ages of rock formations. These are, from the oldest to youngest, the Pliocene and Older Rocks, the Pliocene to Pleistocene Rocks and the Recent Deposits. The grouping of the rocks is related to their potential as groundwater sources. The younger rocks are considered the most important to groundwater because of their high porosity and permeability relative to the older rocks. The distribution of these rock groups is shown in Figure 7.2.1, Geological Map of the Province.

(1) Pliocene and older rocks

No rock older than the Pliocene in age occurs in the province.

(2) Pliocene and Pleistocene rocks

The islands comprising the province are underlain by Pliocene to Quaternary rocks. In the islands of Batan and Sabtang, the non-active volcanic cones of Iraya, Matarem and Alapad mountains are made-up of andesite lava with pyroclastic deposits in the footslopes. Raised limestone, on the other hand, chiefly occupies the islands of Itbayat and Ivujos. The smaller islands, such as, Diogo and Dequey, and the islets are either volcanic mounds or uplifted reef limestone.

(3) Recent deposits

The Recent deposits found in the province are limited in the low lands of Basco. These are mainly unconsolidated clay, silt sand and gravel confined in river channels. However, the extent and thickness of the deposit are not significant to be considered as a geologic unit.

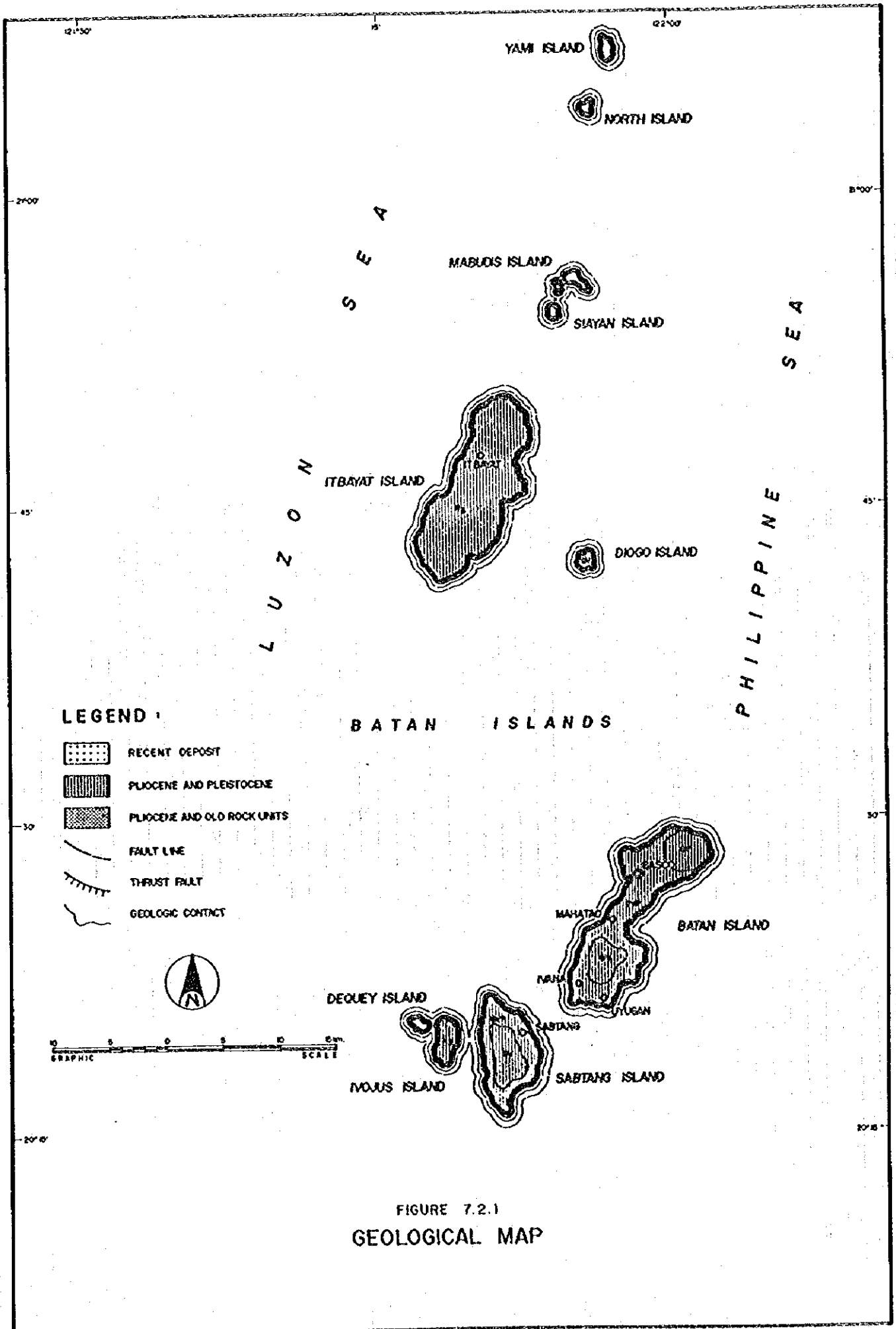
7.3 Groundwater Sources

7.3.1 Classification of Groundwater Sources

For planning purposes, the province is divided into the following groundwater categories:

(1) Shallow well areas

These are areas having water bearing rock formations extending not more than 20m in depth from the ground surface. Shallow well areas are usually located in alluvial and coastal plains where Recent unconsolidated materials overlie impervious rocks at shallow depth. The extent of completely shallow well area is limited, because most of the Recent



formations are thick or deposited on the Late Pliocene to Pleistocene rocks that usually have multiple aquifers located at greater depths.

(2) Deep well areas

In deep well areas, the aquifers are located more than 20m from the ground level. These areas could be found in portions underlain by the Pliocene to Pleistocene and Recent formations. Most of these areas have more than one aquifer occurring at various depths. Areas where shallow and deep wells could be developed are categorized as deep well areas.

(3) Difficult areas

These are areas not suitable for well. The areas under this category are largely consist of rock formations older than Pliocene in age. The groundwater availability in the aforementioned rocks is very low and is usually confined in the opened rock fractures. Springs are the common sources of water supply in these areas.

In addition to the above classification, areas potential to have high yielding aquifers and with saline water intrusion problem are also presented based on NWRB's geo-resistivity survey and results of water quality examination of some wells.

7.3.2 Groundwater Availability in the Province

The Groundwater Availability Map presented in Figure 7.3.1 shows the distribution of the three groundwater categories in the province. It also depicts areas potential for high yielding wells and with saline water intrusion. The well information, such as depth, static water level, and specific capacity given in the figure are averages of limited data available in each municipality that were taken as reference. The major databases used in the preparation of the map were obtained from BMGS and NWRB. The methodology and procedure with respective outputs are discussed in Section 7.3, Supporting Report. Technical well information in each municipality is also presented in Table 7.6.1 of the same report.

As mentioned above, the interpretation of existing groundwater condition is based on limited data. The well parameters (depth, static water level and specific capacity) indicated in the map are anticipated to vary within a specific municipality, since the ground characteristics change with depth and direction. Particularly, the specific capacities of wells are very variable, which depend on aquifer characteristics, well type and design, and method of construction. Most of the wells in the inventory of NWRB are driven wells, which have limited intake sections that

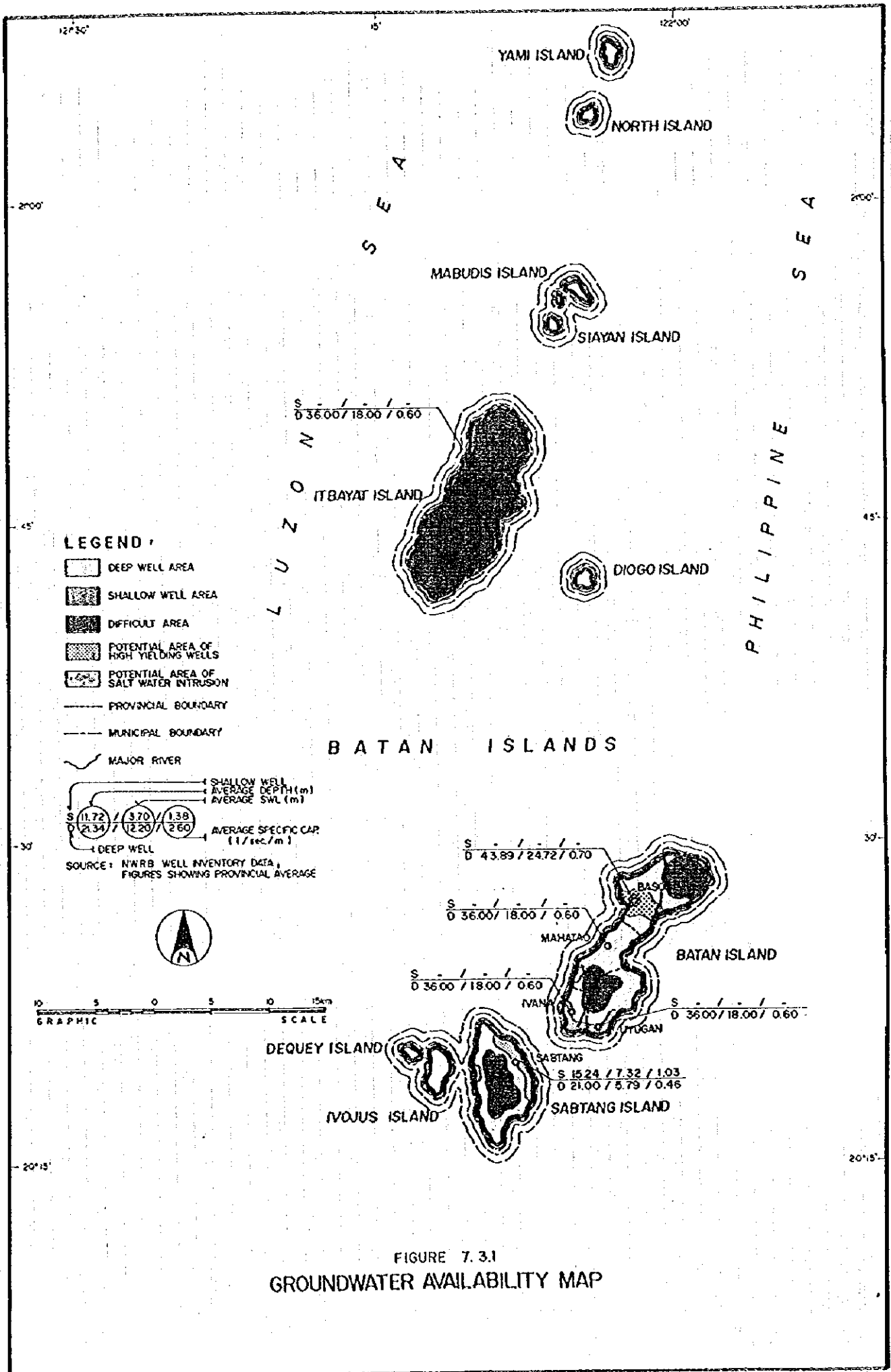


FIGURE 7.3.1
GROUNDWATER AVAILABILITY MAP

- LEGEND:**
- DEEP WELL ZONE
 - SHALLOW WELL ZONE
 - DRYNESS AREA
 - POTENTIAL AREA OF DEEP WELL DEVELOPMENT
 - POTENTIAL AREA OF SHALLOW WELL DEVELOPMENT
 - MUNICIPAL BOUNDARY
 - PROVINCIAL BOUNDARY
 - MAJOR RIVER

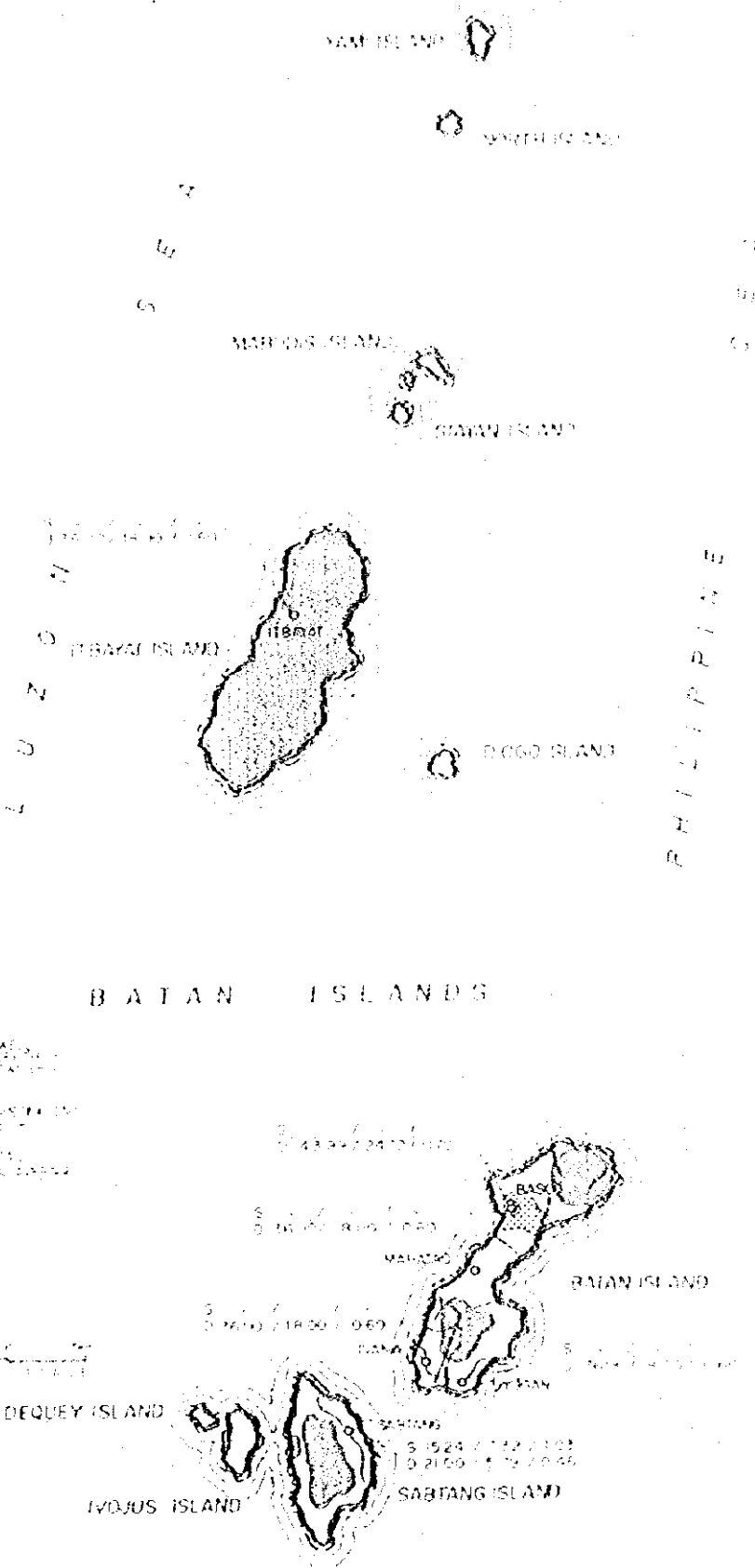


FIGURE 1
GROUNDWATER AVAILABILITY MAP



are usually not properly set in the most permeable layers. Thus, majority of these wells have low specific capacities. Bored and gravel packed wells are expected to have higher specific capacities than wells constructed using conventional methods.

(1) Shallow well areas

Since the Recent deposits in the province are not extensive nor thick to yield substantial water, no shallow well area is considered in Batanes. The shallow wells reported in the province tap the aquifers in the pyroclastic deposits or limestone. Based on the NWRB well information, the shallow wells in Batan island have average depth of 15.75m (12.10 to 19.80m). These wells have average static water level of 11.31 mbgl (3.66 to 17.30 mbgl). A well in Sabtang with recorded specific capacity of 1.03 l/sec/m of drawdown can be expected in other shallow wells.

(2) Deep well areas

The deep well areas comprise about 35% of the province. These areas are located in the pyroclastic plains and sloping grounds around the volcanic cones in Batan and Sabtang islands. Moreover, the existing deep wells in the province have an average depth of 35.18m (20.73 to 45.70m) with average static water level of 15.57 mbgl (5.79 to 28.10 mbgl) and average specific capacity of 0.58 l/sec/m of drawdown (0.36 to 1.04 l/sec/m).

(3) Difficult areas

The portions occupied by volcanic flows in Batan and Sabtang are considered as difficult areas. These areas are basically andesitic flows that are characteristically impervious. The island of Itbayat is wholly considered difficult for well development. Although there are existing wells in the island, the possibility of sea water intrusion is very high in the limestone that comprised its groundworks. Approximately 65% of the total provincial land domain is considered as difficult area.

(4) Water quality of groundwater

The groundwater in the province is generally potable except in areas intruded by saline water. The geo-resistivity survey of NWRB shows that saline water has encroached the central portion of Basco and parts of the coasts of Sabtang, Ivana and Uyugan. This is possibly due to the over withdrawal of groundwater, since the deduced areas are located in densely inhabited portions. Since the islands in Batanes have limited catchment area, sea water intrusion is very likely to take place.

The areas possibly affected with saline water are indicated in the Groundwater Availability Map.

7.4 Spring Sources

Spring is a natural outlet of groundwater at the ground surface. It occurs when water table intersects the ground surface, usually along the contacts of pervious and impervious rock formations and through rock fractures. Because of the intense fracturing, particularly older formations, and the presence of large solution openings in limestone, secondary permeability is induced to the rocks that favors spring development.

For this study, springs are categorized into developed, undeveloped and untapped springs. A developed spring is utilized and must have sanitary protection, otherwise it is classified as undeveloped spring, which is considered as unsafe water source. An untapped spring, as the name implies, is unutilized and flowing in its natural state.

Based on the inventory of water sources, there are 16 springs that mainly serve the province. Most of these springs are effusing through the rock fissures of the volcanic flows with discharges ranging from 0.90 to 10.12 l/sec. Furthermore, no undeveloped and untapped (for Level II system) springs were reported during the conduct of the study. The technical information on spring sources in each municipality is presented in Table 7.4.1, Supporting Report.

7.5 Surface Water Source

The rivers in the province are characteristically short with few tributaries. These rivers flow radially from the peak of promontories to the Luzon Sea or Philippine Sea. In the island of Itbayat, some streams are discharging into the limestone sinkholes. Considering the size of the islands in Batanes, the largest of which is Batan that measures approximately 4 km abreast, the rivers in the province have relatively narrow catchment area. Despite the abundant rainfall, the amounts of sustainable flow of the rivers are considered small, particularly during dry months. Thus, most of the river discharges are mainly dependent from surface runoffs and are not promising sources of water supply.

During the study, sampling at small streams from spring sources was carried-out, since no major river system exists in the province as source of water supply. The baseflows of the rivers in the province come from springs. The results of water quality analysis of Miaga

stream in Basco and Makalebkeb stream in Mahatao showed that these sources met the criteria of National Drinking Water Standard (refer to 7.5 Water Quality Analysis Results, Supporting Report). The water quality of these surface water somewhat reflects the physical and chemical characteristics of the spring sources in Batan and Sabtang considering the similarity of geological attributes.

7.6 Future Development Potential of Water Sources

Based on the study of existing water sources, groundwater is considered safe and more economical source for future water supply requirements of the province.

Shallow wells are the most economical water source for Level I service. Considering the existing shallow wells in the province, the good aquifers occur between 8 and 20 mbgl. One disadvantage of shallow wells is the lowering of water level during dry spell that consequently reduces the discharges of the wells. Another disadvantage is the usual high susceptibility of shallow aquifers to direct infiltration of surface pollutants.

In general, deep wells have better water quality and invariable yields when developed with appropriate technology. This is because of aquifers' relatively deeper location that makes them less susceptible to surface contaminants. The usual confinement of deep aquifers resulted in rise of water level above the aquifers. Lowering of water level does not affect the saturated thickness, therefore, deep well discharges remain constant. In the pyroclastics, potential aquifers for deep wells apparently occur from 21 to 45 mbgl.

The fresh groundwater in the province is limited in amount. This is because of the relatively low recharge considering the small catchment area of the islands. The geo-resistivity survey of NWRB showed that saline water was mapped-out along the coast of Basco, Ivana, Uyugan and Sabtang. In Basco, saline water has encroached into the central portion of the municipality. The island of Itbayat has very limited fresh groundwater considering the low groundwater recharge in the area and the susceptibility of the limestone to sea water intrusion. Under the aforesaid conditions, pumping water greater than the amount of infiltration will result in tremendous lowering of the water table. This will consequently deteriorate the quality of water in the wells as saline water moves up. In this regard, the sustainable yield of groundwater must be fully investigated.

The unfavorable geological and morphological conditions limit the occurrence of substantial groundwater sources for wells. Considering these conditions, springs could be supplemental/alternative sources of water supply for the province. Prior to spring development, a detailed study should be conducted to determine the effect of seasonal fluctuation of discharge.



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 (1995) 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. Reference base figures for the study of framework are the 1990 Census of Population and Housing and the statistical data of the province and information from relevant agencies. Provincial population by target year is projected referring to the manner of declining growth rates of regional population projected by NSO, while the base year population (1995) is estimated in application of the 1980-1990 growth rate by municipality (broken down to urban and rural areas). The 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 is 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 1995 and expected by planned/on-going projects scheduled to be completed by the end of 1995 as shown in Table 8.2.2 (details are referred to Supporting Report).

The base year service coverage in urban area (92%) and rural area (90%) is exceeding the MTPDP sector target (71% and 85%, respectively). The high service coverage both in urban and rural areas have been achieved mainly by utilization of spring sources for Level III and II system.

Considering the existing conditions, water supply sector targets were determined by urban and rural area. Phase I development shall be focused on the furtherance of service coverage as high as 95% both in urban and rural areas, while Phase II targets are planned to increase service coverage up to 98%.

Table 8.2.1 Provincial Sector Targets

Sub-Sectors	Phase I (1996-2000)		Phase II (2001-2010)	
	Population Coverage (%)	Additional Population to be Served	Population Coverage (%)	Additional Population to be Served
Water Supply				
Urban Water Supply	95	732	98	1,317
Rural Water Supply	95	1,604	98	1,873
Sanitation	Households Coverage (%)	Additional Households to be Served	Households Coverage (%)	Additional Households to be Served
Household Toilets	98	589	98	1,698
Urban	Flush	230	50	665
	Pour Flush	26	50	0
	VIP	8	0	0
Rural	Flush	95	10	79
	Pour Flush	213	90	954
	VIP	17	0	0
School Toilet	Coverage (%)	Additional Public School Students to be Served	Coverage (%)	Additional Public School Students to be Served
	90	695	95	669
Public Toilet	Coverage (%)	Additional Public Utilities with Sanitary Toilets	Coverage (%)	Additional Public Utilities with Sanitary Toilets
	100	3	100	3
Sewerage	Not Applicable		Coverage (%)	Population to be Served
			50	2,879
Solid Waste	Coverage (%)	Additional Households to be Served	Not Applicable	
	50	148		

Table 8.2.2 Base Year Service Coverage of Water Supply

Municipality	Type	Population 1995	Population Served by 1995 Facilities				
			Level III	Level II	Level I	Total	% Coverage
Basco (Capital)	Urban	4,651	4,316	0	158	4,474	96
	Rural	1,985	1,664	187	108	1,959	99
	Total	6,636	5,980	187	266	6,433	97
Itbayat	Urban	0	0	0	0	0	0
	Rural	3,787	0	3,315	0	3,315	88
	Total	3,787	0	3,315	0	3,315	88
Ivana	Urban	0	0	0	0	0	0
	Rural	1,317	1,215	25	33	1,273	97
	Total	1,317	1,215	25	33	1,273	97
Mahatao	Urban	424	353	0	0	353	83
	Rural	1,498	1,299	50	99	1,448	97
	Total	1,922	1,652	50	99	1,801	94
Sabtang	Urban	953	595	0	114	709	74
	Rural	975	0	375	115	490	50
	Total	1,928	595	375	229	1,199	62
Uyugan	Urban	0	0	0	0	0	0
	Rural	1,238	1,205	25	8	1,238	100
	Total	1,238	1,205	25	8	1,238	100
Provincial Total	Urban	6,028	5,264	0	272	5,536	92
	Rural	10,800	5,383	3,977	363	9,723	90
	Total	16,828	10,647	3,977	635	15,259	91

(2) Sanitation

1) Household toilets

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

The province has a base year service coverage of 95%, which is well above the current national average coverage of 77%. Urban area registers a high level of 96% that is beyond the national target of 93% set by the MTPDP, while rural area has 94%. By type of sanitary toilet facility, the existing percentage composition to total households is as follows:

Type	Urban (%)	Rural (%)
Flush	2	0
Pour-flush	94	96
VIP latrine	4	4

To lessen the gap of the service coverage between 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 98%. For Phase II, the same level (98%) as Phase I is adopted addressing only population increase.

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 Schools Toilets			Public Toilets		
	1995 Total No. of Public Schools Students	Std. No. of Public School Students that can be Served by Base Year (1995) Sanitary Toilets	Coverage (%)	Number of PU in 1995	Number of PU with Sanitary Toilets in Base Year (1995)	Coverage (%)
Basco (Capital)	1,685	1,685	100	2	2	100
Iibayat	1,009	450	45	1	1	100
Ivana	302	302	100	1	1	100
Mahatao	405	405	100	0	0	0
Sabtang	349	349	100	0	0	0
Uyugan	295	295	100	0	0	0
Provincial Total	4,045	3,486	86	4	4	100

Note: PU - Public Utilities

Table 8.2.3 Base Year Service Coverage of Household Toilets

Municipality	Area	Households and Population Using Sanitary Toilets										
		1995		No. of HHs	Number of Households			Served Population	Coverage (%)			
		Population	Flush		Pour Flush	VIP Latrine	Total		Flush	Pour Flush	VIP Latrine	Total
Basco (Capital)	Urban	4,651	14	847	13	874	4,558	2	95	1	98	
	Rural	1,985	5	339	35	379	1,925	1	86	9	97	
	Total	6,636	19	1,186	48	1,253	6,483	1	92	4	98	
Itbayat	Urban	0	0	0	0	0	0	0	0	0	0	
	Rural	3,787	0	659	10	669	3,408	0	89	1	90	
	Total	3,787	0	659	10	669	3,408	0	89	1	90	
Ivana	Urban	0	0	0	0	0	0	0	0	0	0	
	Rural	1,317	4	246	5	255	1,277	2	94	2	97	
	Total	1,317	4	246	5	255	1,277	2	94	2	97	
Mahatao	Urban	424	5	76	0	81	420	6	93	0	99	
	Rural	1,498	0	294	0	294	1,423	0	95	0	95	
	Total	1,922	5	370	0	375	1,843	1	95	0	96	
Santang	Urban	953	0	131	31	162	820	0	70	16	86	
	Rural	975	0	146	16	162	858	0	79	9	88	
	Total	1,928	0	277	47	324	1,678	0	74	13	87	
Uyugan	Urban	0	0	0	0	0	0	0	0	0	0	
	Rural	1,238	0	248	2	250	1,226	0	98	1	99	
	Total	1,238	0	248	2	250	1,226	0	98	1	99	
Provincial Total	Urban	6,028	19	1,054	44	1,117	5,798	2	91	4	96	
	Rural	10,800	9	1,992	68	2,009	10,117	0	90	3	94	
	Total	16,828	28	2,986	112	3,126	15,915	1	90	3	95	

Base year service coverage is 86% applying the standard number of public school students to be served by one (1) unit of toilet facility. The high level is due to a large number of newly constructed school buildings with sanitary toilets.

In the absence of national targets for school toilets, the existing level of service coverage is the base in setting up the targets. It is expected that all new construction of school buildings will entail sanitary toilets enabling the coverage to increase on a high level. For Phase I and II, 90% and 95% are set, respectively.

3) Public toilets

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

All existing public utilities (limited to public markets and bus/jeepney terminals) have at least one (1) sanitary toilet or a 100% service coverage. In setting up the targets without national targets as of now, the indicator would be the existing level of coverage. Accordingly, a 100% coverage for Phase I and Phase II is assumed.

(3) Sewerage

Given the non-existence of sewerage systems in any municipality at the present time, this plan does not consider the service during Phase I. For Phase II, a target of 50% coverage 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 1995 on the number of households served by the municipal refuse collection revealed that the current practice is only in Basco and covers both urban and rural area. The base year service coverage is shown in Table 8.2.5.

Only 37% of the total households in the province relied on municipal refuse collection using trucks. The urban barangays in Basco have a 100% service coverage, while the rest of the urban barangays has no municipal service at all. Basco has 2 units of collection truck.

Table 8.2.5 Base Year Service Coverage of Municipal Solid Waste System in 1995

Municipality	Total No. of Households	No. of Urban Households	No. of Household Served *	Coverage of Households (%)	Coverage of Urban HHs (%)
Basco (Capital)	1,283	891	1,216	95	136
Iibayat	742	0	0	0	0
Ivana	262	0	0	0	0
Mahatao	390	82	0	0	0
Sabtang	373	188	0	0	0
Uyugan	252	0	0	0	0
Provincial Total	3,302	1,161	1,216	37	105

* Covers some rural barangays / households

No national targets have yet been set. However, considering the present level of coverage, a 50% 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 1995 as a planning base year.

The NSO projection at provincial and municipal levels was not available by the time of study. The future population was therefore projected in the following manner (details are included in Supporting Report). Reference information/data used for the study are:

- Population census data of 1980 and 1990 on different administrative levels,
- Annual population growth rates for future regional population projected by NSO, and
- The 1992 Philippine Yearbook.

The past population development at different administrative levels was first reviewed to come up with the demographic characteristics of the region and province. Through review of NSO regional population projection and the 1992 Philippine Yearbook, the behavior of population development through the future was analyzed. Referring to these demographic studies, population projection of the province by target year was carried out in assumption of declining annual growth rates employing a simple compounded formula $(1+r)^n$. Present population in 1995 was also estimated in the same manner. Major study processes and their results are presented as follows:

- (1) Review of past population development in the province and population distribution in 1990 to urban and rural areas.

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

- The province recorded 2.2% of average annual growth rate, almost the same as the regional rate at 2.0%, as a conservative growth; and
- Percentage of provincial population to the regional population remained unchanged at 0.6% from 1980 to 1990, but urban population percentage slightly decreased.

- (2) Review of the NSO regional population projection in view of annual growth rates (base year 1990) and the demographic conditions presented in the 1992 Philippine Yearbook.

Annual growth rates of regional population projected by NSO were analyzed using simplified formula. The conservative growth rates were calculated reflecting demographic characteristics of moderate decline of fertility and mortality described in the 1992 Philippine Yearbook. Future behaviors of provincial population are assumed to follow more or less the same as those of regional ones, unless specific development takes place in the province.

- (3) Estimation of present provincial population (1995) applying 1980-1990 average annual growth rate of respective municipalities (further broken down to urban and rural areas) assuming that the behaviors of past population development prevailed up to the present.

- (4) Projection of provincial population by target year:

- The manner of discount in annual growth rates of regional population for the target years was applied for provincial population projection.
- Population in 2000 was projected from the base year 1995 applying the annual growth rate of 1.84 (17.4% discount of the growth rate of the province observed during last census decade, 1980-1990).
- Population in 2010 with the base year of 2000 was projected applying the annual growth rate of 1.25 (31.9% discount of the growth rate of province adopted from 1996 to 2000).
- Present profile of population distribution both in urban and rural areas is assumed to prevail through the future.

Population by target year and the year 1995 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			1995			2000			2010		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Basco (Capital)	3,823	1,906	5,729	4,651	1,985	6,636	5,090	2,173	7,263	5,757	2,458	8,215
Ibayat	0	3,448	3,448	0	3,787	3,787	0	4,144	4,144	0	4,687	4,687
Ivana	0	1,190	1,190	0	1,317	1,317	0	1,441	1,441	0	1,630	1,630
Mahatao	373	1,351	1,724	424	1,498	1,922	464	1,639	2,103	525	1,854	2,379
Sabtang	862	875	1,737	953	975	1,928	1,043	1,067	2,110	1,180	1,207	2,387
Uyugan	0	1,198	1,198	0	1,238	1,238	0	1,355	1,355	0	1,533	1,533
Provincial Total	5,058	9,968	15,026	6,028	10,800	16,828	6,597	11,819	18,416	7,462	13,369	20,831

8.3.2 School Enrollment Projection

From the 1995 total population of the province, 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 province, 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. A slight increase of 4% from the 1995 is foreseen in 2000 and a mere 1% from the 2000 rate in 2010 (details are referred to Table 8.3.6, Supporting Report).

Table 8.3.2 shows the projected number of public school students by municipality, by target year. A total of 4,614 and 5,074 public school students is estimated to enroll in 2000 and 2010, respectively.

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		
	1995	2000	2010	1995	2000	2010
Basco (Capital)	1,685	1,842	2,016	2	3	3
Ibayat	1,009	1,076	1,190	1	2	2
Ivana	302	333	364	1	2	2
Mahatao	405	477	528	0	0	1
Sabtang	349	509	563	0	0	1
Uyugan	295	377	413	0	0	1
Provincial Total	4,015	4,614	5,074	4	7	10

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.

Three (3) public markets/bus terminals are planned to be constructed by 2000, and another 3 by 2010. Refer to Table 8.3.2 for the total 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. The urban area of the capital town of Basco is considered in the planning, although its projected population is less than 10,000.

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

The number of urban households in 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 NSMP 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 assumed based on the study results of water sources in Chapter 7 and presented in Table 8.4.1.

Table 8.4.1 Groundwater Productivity

Municipality	Specific Capacity (liter/sec./m)	Well Depth (meter)	Groundwater Productivity per Deep Well (cu. m/16 hr)
Basco (Capital)	1.50	50	864
Ibayat	0.00	0	0
Ivana	0.00	0	0
Mahatao	1.50	50	864
Sabtang	1.50	50	864
Uyugan	0.00	0	0

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 given lower priority for 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 set forth 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 favorable 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 - 40 m	N.A.	30 m
41 - 60 m	N.A.	50 m
61 - 80 m	N.A.	70 m

For Level II systems, only untapped springs suitable for water supply purpose are considered. Identified untapped springs are presented in Table 7.4.1, Supporting Report.

4) Number of systems/facilities

Number of Level I wells is estimated based on the service level standard; while, 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 using 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 sewer 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 (Levels 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 was given priority during Phase I period for rural water supply. At the time of this plan preparation, one (1) untapped spring has been identified.

(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 2,300 persons in the province will be served by additional water supply services, of which 700 persons or 30% of the total will be urban population and 1,600 persons or 70% will be rural population.

In the Phase II period, a total of 3,200 persons, of which 1,300 persons or 41% in urban area and 1,900 persons or 59% in rural area, will be further benefited by water supply services. This additional service coverage in urban area includes upgrade of service level for 270 persons served by Level I facilities in 1995.

8.5.2 Sanitation

(1) Household toilets

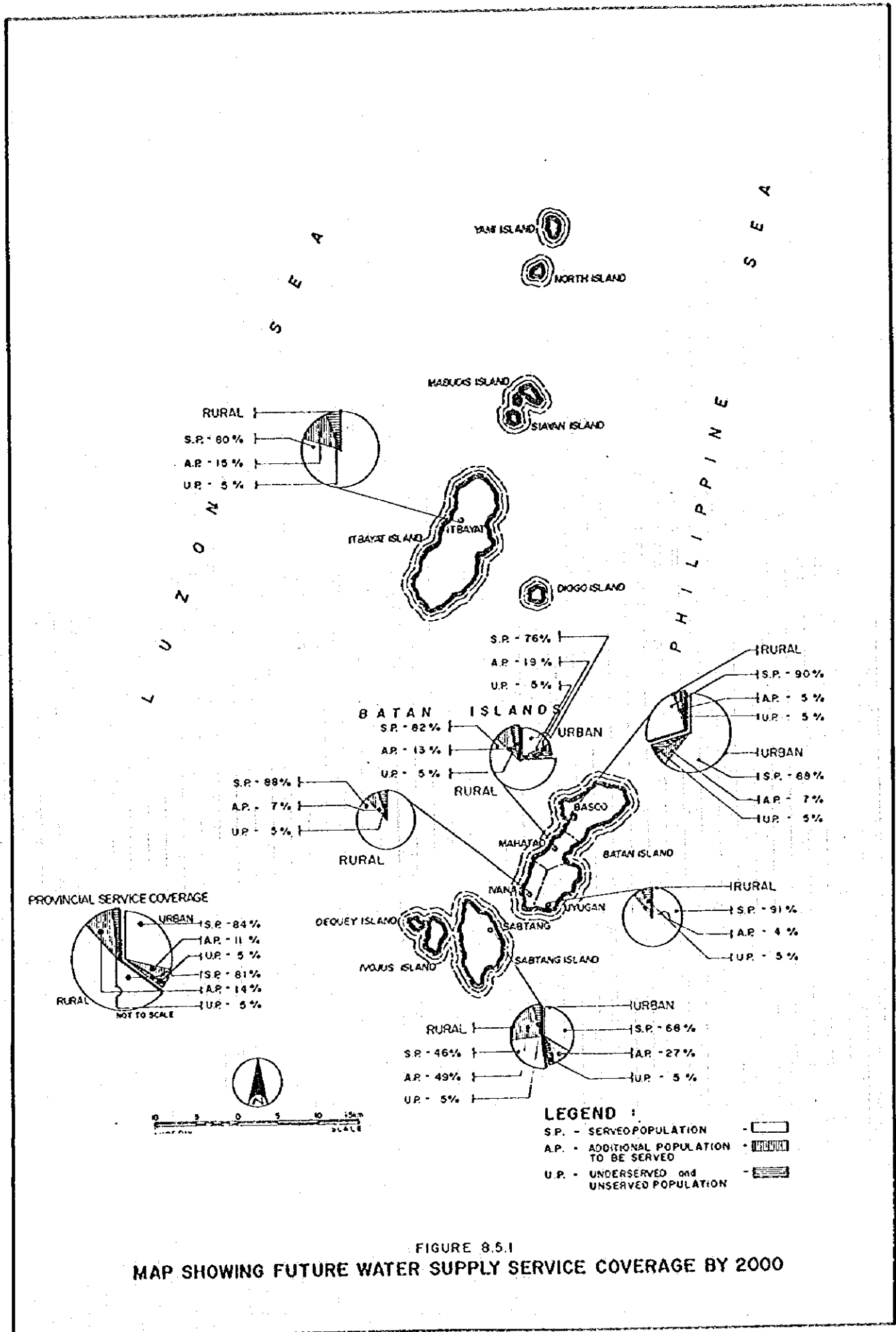
The service coverage (number of households to be served) by different types of sanitary facility is estimated by urban and rural area by municipality for the years 2000 and 2010.

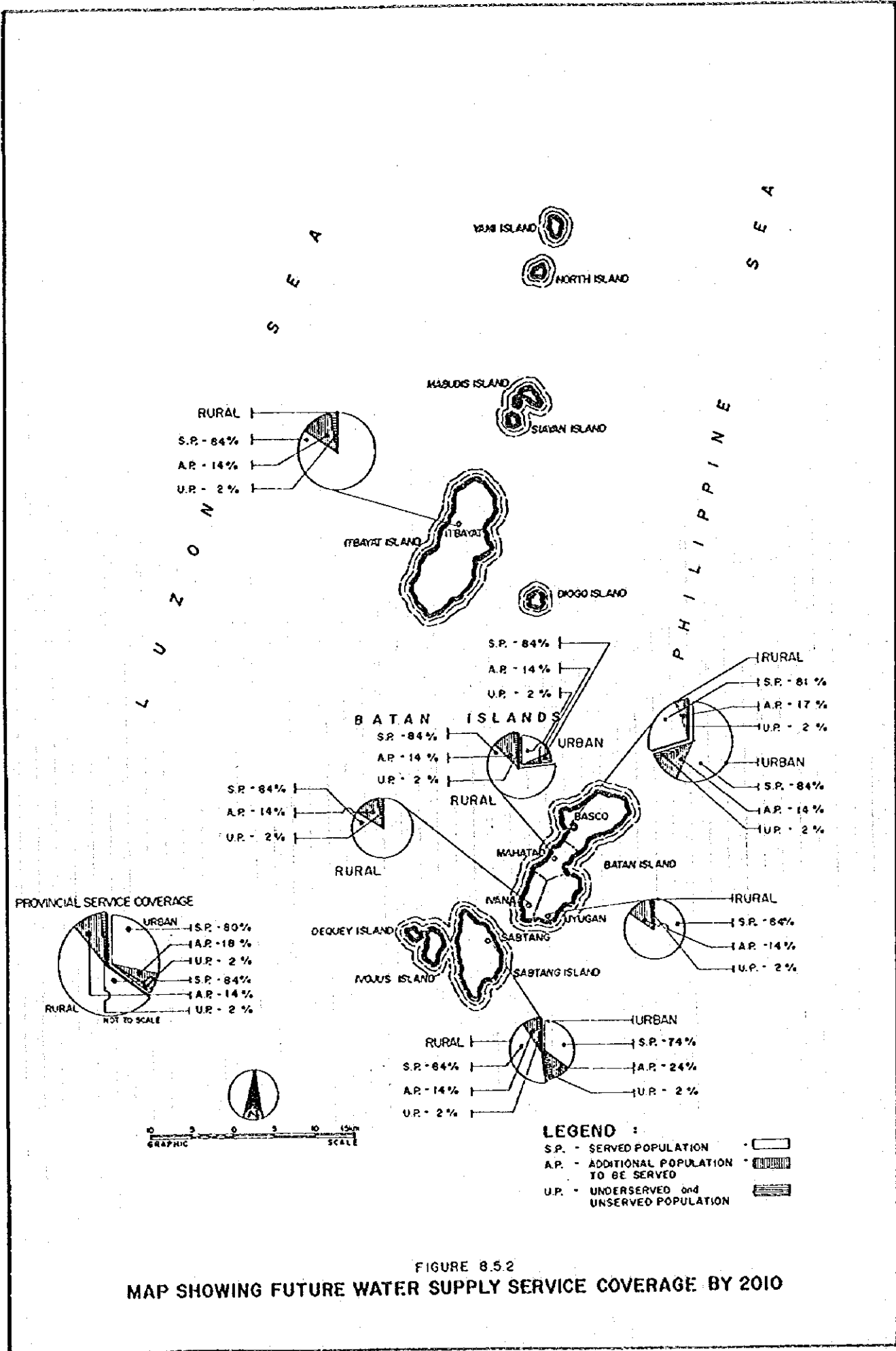
The future service coverage and additional households to be served are estimated to meet the provincial targets using the number of household served in the base year and the number of households in target years.

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

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	Level III	Level II	Level I		Level III	Level II	Level I	Level III	Level II	Level I	Level III	Level II	Level I	Total		
Basco (Capital)	Urban	5,090	4,678	0	158	4,836	362	0	0	362	5,757	5,642	0	0	5,642	964	0	0	964		
	Rural	2,173	1,664	187	213	2,064	0	0	105	105	2,453	1,664	187	558	2,409	0	0	345	345		
	Total	7,263	6,342	187	371	6,900	362	0	105	467	8,215	7,306	187	558	8,051	964	0	345	1,309		
Itbayat	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Rural	4,144	0	3,315	622	3,937	0	0	622	622	4,687	0	3,315	1,278	4,593	0	0	656	656		
	Total	4,144	0	3,315	622	3,937	0	0	622	622	4,687	0	3,315	1,278	4,593	0	0	656	656		
Ivuna	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Rural	1,441	1,215	25	129	1,369	0	0	96	96	1,630	1,215	25	357	1,597	0	0	228	228		
	Total	1,441	1,215	25	129	1,369	0	0	96	96	1,630	1,215	25	357	1,597	0	0	228	228		
Mahatno	Urban	464	441	0	0	441	88	0	88	525	515	0	0	0	515	74	0	0	74		
	Rural	1,639	1,299	258	0	1,557	0	208	0	208	1,854	1,299	258	260	1,817	0	0	260	260		
	Total	2,103	1,740	258	0	1,998	88	208	0	296	2,379	1,814	258	260	2,332	74	0	260	334		
Sabtang	Urban	1,043	877	0	114	991	282	0	282	1,180	1,156	0	0	1,156	279	0	0	279	279		
	Rural	1,067	0	375	639	1,014	0	0	524	524	1,207	0	375	808	1,183	0	0	169	169		
	Total	2,110	877	375	753	2,005	282	0	806	2,387	1,156	375	808	2,339	279	0	0	169	448		
Uyugan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Rural	1,355	1,205	25	57	1,287	0	0	49	49	1,533	1,205	25	272	1,502	0	0	215	215		
	Total	1,355	1,205	25	57	1,287	0	0	49	49	1,533	1,205	25	272	1,502	0	0	215	215		
Provincial Total	Urban	6,597	5,996	0	272	6,268	732	0	732	7,462	7,313	0	0	7,313	1,317	0	0	1,317	1,317		
	Rural	11,819	5,383	4,185	1,660	11,229	0	208	1,396	1,604	13,369	5,383	4,185	3,533	13,101	0	0	1,873	1,873		
	Total	18,416	11,379	4,185	1,932	17,496	732	208	1,396	2,356	20,831	12,696	4,185	3,533	20,414	1,317	0	1,873	3,190		





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 is to be utilized during Phase I period. For Phase II, 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 3,538. The additional households to be served totaled to 589, of which 45% is urban households and 55% is rural households. While at the end of Phase II period, the number of served households is 5,105 with additional households to be served are 1,698. 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.

The future service coverage and additional number of students to be served are estimated using the number of students served in the base year, the number of 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

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

Municipality	Area	Phase I (2000)										Phase II (2010)										
		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	Total	Flush	Pour Flush	VIP Latrine	Total	Flush		Pour Flush	VIP Latrine	Total	Flush	Pour Flush	VIP Latrine	Total			
Basco (Capital)	Urban	979	192	748	19	959	178	0	6	184	1,439	705	705	0	1,410	513	0	0	513			
	Rural	426	33	376	8	417	28	37	65	615	60	543	0	603	27	167	0	0	194			
	Total	1,405	225	1,124	27	1,376	206	37	6	249	2,054	765	1,248	0	2,013	540	167	0	707			
Ibayat	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Rural	813	0	781	16	797	0	122	6	128	1,172	0	1,149	0	1,149	0	368	0	368			
	Total	813	0	781	16	797	0	122	6	128	1,172	0	1,149	0	1,149	0	368	0	368			
Ivana	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Rural	288	23	253	6	282	19	7	1	27	408	40	360	0	400	17	107	0	124			
	Total	288	23	253	6	282	19	7	1	27	408	40	360	0	400	17	107	0	124			
Mahatno	Urban	89	17	68	2	87	12	0	2	14	131	64	64	0	128	47	0	0	47			
	Rural	334	26	294	7	327	26	0	7	33	464	45	410	0	455	19	116	0	135			
	Total	423	43	362	9	414	38	0	9	47	595	109	474	0	583	66	116	0	182			
Sabang	Urban	205	40	157	4	201	40	26	0	66	295	145	144	0	289	105	0	0	105			
	Rural	201	0	193	4	197	0	47	0	47	302	0	296	0	296	0	103	0	103			
	Total	406	40	350	8	398	40	73	0	113	597	145	440	0	585	105	103	0	208			
Uyugan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Rural	277	22	244	5	271	22	0	3	25	383	38	337	0	375	16	93	0	109			
	Total	277	22	244	5	271	22	0	3	25	383	38	337	0	375	16	93	0	109			
Provincial Total	Urban	1,273	249	973	25	1,247	230	26	8	264	1,865	914	913	0	1,827	665	0	0	665			
	Rural	2,339	104	2,141	46	2,291	95	213	17	325	3,344	183	3,095	0	3,278	79	954	0	1,033			
	Total	3,612	353	3,114	71	3,538	325	239	25	589	5,209	1,097	4,008	0	5,105	744	954	0	1,698			

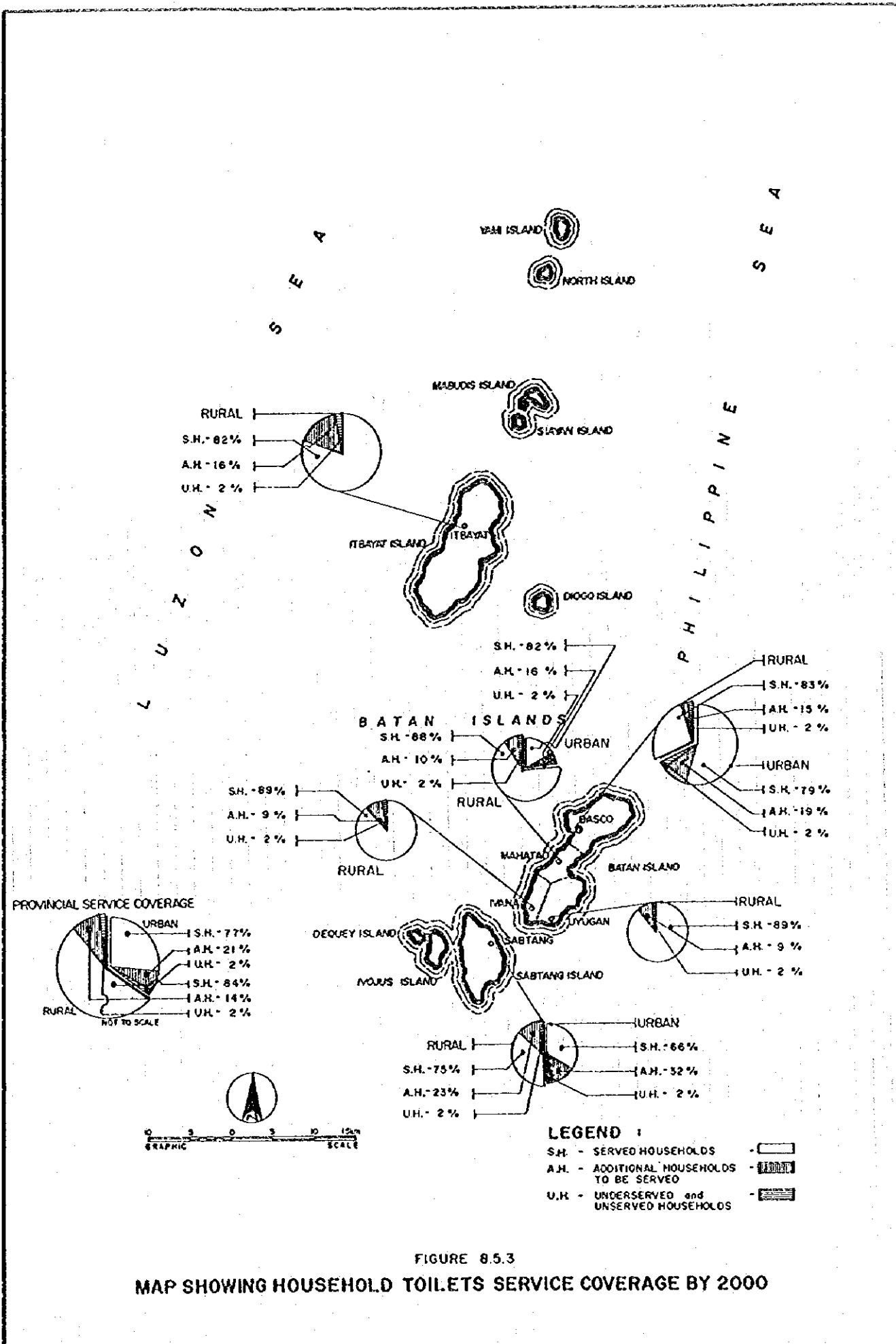


FIGURE 8.5.3
MAP SHOWING HOUSEHOLD TOILETS SERVICE COVERAGE BY 2000

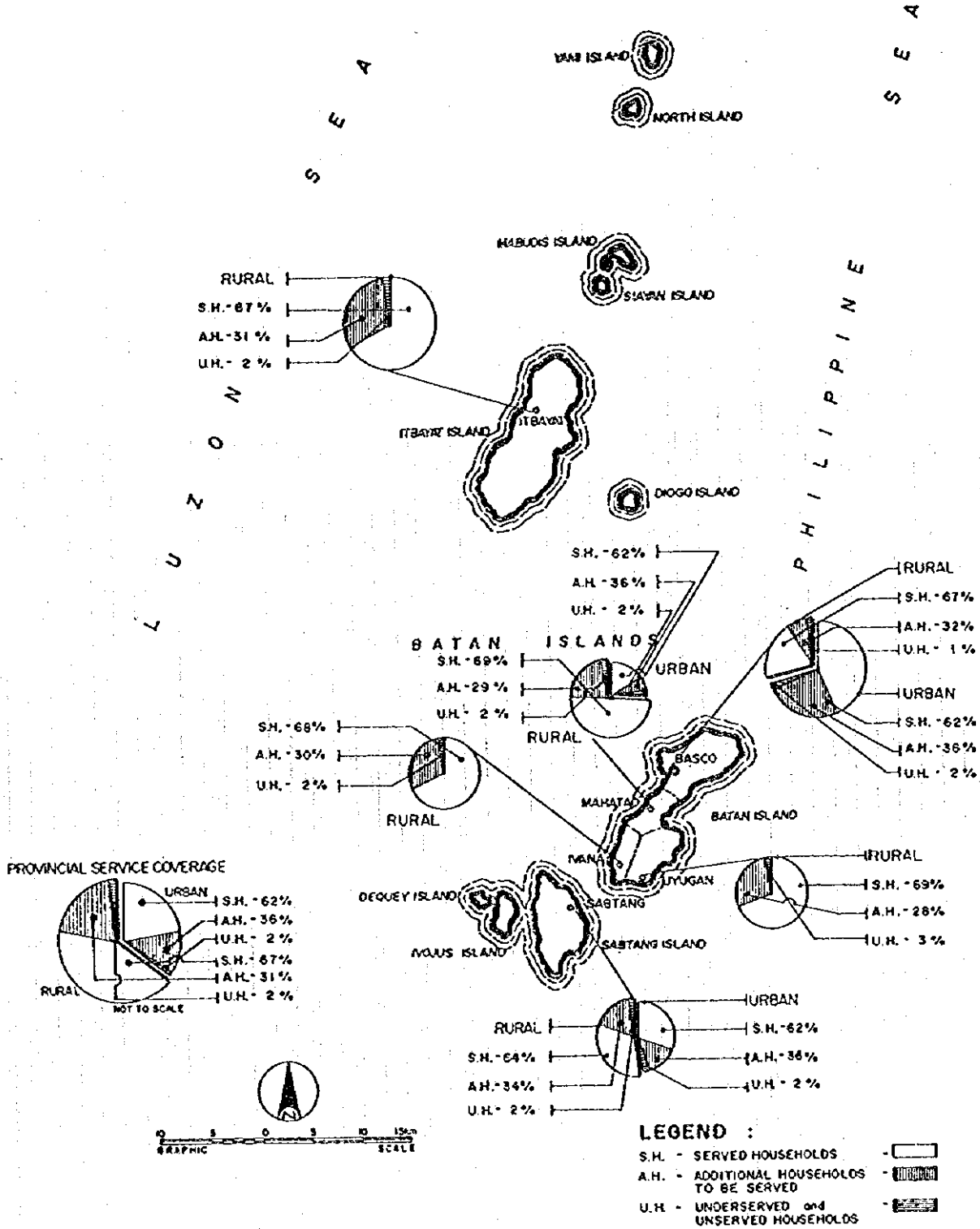


FIGURE 8.5.4
 MAP SHOWING HOUSEHOLD TOILETS SERVICE COVERAGE BY 2010

served in target/s is less than or equal to the base year, no additional number of households 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 4,152. The additional students to be served totaled to 695. While at the end of Phase II period, the projected number of served students is 4,821. The additional students to be served are 669. 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	Std. No. of Public School Students to be Served	Add'l No. of Public School Students to be Served	Total No. of Public School Students	Std. No. of Public School Students to be Served	Add'l No. of Public School Students to be Served
Basco (Capital)	1,842	1,658	0	2,016	1,915	257
Iibayat	1,076	968	518	1,190	1,131	163
Ivana	333	300	0	364	346	46
Mahatao	477	429	24	528	502	73
Sabtang	509	458	109	563	535	77
Uyugan	377	339	44	413	392	53
Provincial Total	4,614	4,152	695	5,074	4,821	669

(3) Public toilets

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

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

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

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

The number of served public utilities at the end of Phase I period is 7. The additional public utilities to be served are 3. While at the end of Phase II period, the number of served public utilities is 10 with an additional public utilities to be served at 3. Table 8.5.4 summarizes the additional number of public utilities to be served by municipality by target year.

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)	
		Additional No. of Public Utilities with Sanitary Toilets	Number of Public Utilities with Sanitary Toilets	Additional No. of Public Utilities with Sanitary Toilets	Number of Public Utilities with Sanitary Toilets
Basco (Capital)	Public Market	0	1	0	1
	Bus/Jeep Terminal	1	2	0	2
	Total	1	3	0	3
Itbayat	Public Market	1	1	0	1
	Bus/Jeep Terminal	0	1	0	1
	Total	1	2	0	2
Ivana	Public Market	1	1	0	1
	Bus/Jeep Terminal	0	1	0	1
	Total	1	2	0	2
Mahatao	Public Market	0	0	1	1
	Bus/Jeep Terminal	0	0	0	0
	Total	0	0	1	1
Sabtang	Public Market	0	0	1	1
	Bus/Jeep Terminal	0	0	0	0
	Total	0	0	1	1
Uyugan	Public Market	0	0	1	1
	Bus/Jeep Terminal	0	0	0	0
	Total	0	0	1	1
Provincial Total	Public Market	2	3	3	6
	Bus/Jeep Terminal	1	4	0	4
	Total	3	7	3	10

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 system.

Only Basco with an urban population of 5,757 is considered. The population to be served is 2,879 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.

Service coverage in Phase I is assumed to be 50% with reference to the current base year service coverage of 37%. Additional service coverage in Phase I is calculated as a shortfall of target coverage in Phase I comparing with existing service coverage. Table 8.5.5 presents additional service coverage for Phase I in the urban area.

Table 8.5.5 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	Phase I Coverage (2000)		
		No. of Urban Households	Urban Household Coverage	Add'l. No. of Urban Households to be Served
Basco (Capital)	1,216	979	1,216	0
Itbayat	0	0	0	0
Ivana	0	0	0	0
Mahatao	0	89	45	45
Sabtang	0	205	103	103
Uyugan	0	0	0	0
Provincial Total	1,216	1,273	1,364	148

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.

Table 8.6.1 Water Supply Facilities Required by Target Year

Municipality	Phase II (2010) Requirements																					
	Urban Water Supply (Level III)							Rural Water Supply (Level I)														
	Urban Water Supply (Level III)			Rural Water Supply (Level I)				Urban Water Supply (Level III)			Rural Water Supply (Level I)											
	Mode of Project	No. of Additional Deep Wells	No. of House Connections	No. of System	No. of Communal Faucets	Number of Deep Wells		Number of Sources		No. of Additional Deep Wells	No. of House Connections	Number of Deep Wells		Number of Sources		Total No. of Facility	Number of Sources		Total No. of Facility			
					30 m	50 m	70 m	Sub-total	Shallow Wells	Spring					30 m	50 m	70 m	Sub-total	Shallow Wells	Spring		
Basco (Capital)	Expansion	1	70	0	0	0	1	0	1	0	0	0	0	0	0	5	0	5	0	0	0	5
Ibavat	N.A.	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	9
Ivana	New	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3
Maharao	Expansion	1	17	1	20	0	0	0	0	0	0	0	0	0	1	19	0	4	0	0	0	4
Sabang	Expansion	1	55	0	0	0	7	0	7	0	0	0	0	0	1	70	0	2	0	2	0	2
Uyugan	N.A.	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3
Provincial Total	New/Expansion	3	142	1	20	0	8	0	8	0	10	18	3	350	0	11	0	11	0	15	0	26

Table 8.6.2 Sanitation Facilities Required by Target Year

Municipality	Phase I (2000) Requirements																									
	Urban Sanitation							Rural Sanitation																		
	Urban Sanitation			Rural Sanitation				Urban Sanitation			Rural Sanitation															
	Number of Household Toilets	Number of Public School Toilets	Number of House Connections	No. of Public Toilets	Public Markets	Bus Terminal	Four Flush	VIP Latrine	Total	Number of Household Toilets	Number of Public School Toilets	Number of House Connections	No. of Public Toilets	Public Markets	Bus Terminal	Four Flush	VIP Latrine	Total	Number of Household Toilets	Number of Public School Toilets	Number of House Connections	No. of Public Toilets	Public Markets	Bus Terminal	Four Flush	VIP Latrine
Basco (Capital)	178	0	6	184	0	1	28	37	0	65	0	513	0	0	0	27	167	0	194	1						
Ibavat	0	0	0	0	1	0	0	122	6	128	2	0	0	0	0	0	368	0	368	1						
Ivana	0	0	0	0	1	0	19	7	1	27	0	0	0	0	0	17	107	0	124	0						
Maharao	12	0	2	14	0	0	26	0	7	33	0	47	0	0	1	0	19	116	0	135	0					
Sabang	40	26	0	66	0	0	0	47	0	47	0	105	0	0	1	0	103	0	103	0						
Uyugan	0	0	0	0	0	0	22	0	3	25	0	0	0	0	1	0	16	93	0	109	0					
Provincial Total	230	26	8	264	0	2	95	213	17	325	2	665	0	0	3	0	79	944	0	1,033	2					

Rural water supply:

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

(2) Rehabilitation

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

(3) Equipment

Logistic support:

For rural water supply development, 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.

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 18 Level I facilities (8 deep wells and 10 spring sources) shall be newly constructed and 10% of these deep wells shall be rehabilitated annually. Although there are physical requirements, no drilling rig and well rehabilitation equipment is available at both DPWH-DEO and the province.

Therefore, a total of 1 set of percussion type drilling rig together with 1 set of well rehabilitation equipment, 1 unit of support vehicle for well rehabilitation and 1 unit of

service truck for deep well construction 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. The number of additional units of truck is 2 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 Trucks Required
Basco (Capital)	0	0	0
Ibayat	0	0	0
Ivana	0	0	0
Mahatao	45	19	1
Sabtang	103	43	1
Uyugan	0	0	0
Provincial Total	148	62	2

8.7 Identification of Priority Projects for Medium-Term Development Plan

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

Specific projects shall be selected subject to detailed studies and rather not discussed in provincial master plan. In addition, pertinent information to identify priority projects is not available both at provincial and municipal level during this PW4SP preparation, except some WDs for future expansion work.

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

The first level of priority should be given to projects with positive feasibility studies and identified funding. Next level of priority would be given to 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 sub-sectors to maximize the effects and benefits through simultaneous implementation of water supply and sanitation projects. On a municipal level priority, synthetic evaluation of sector components for concerned municipalities (which is studied in the financial arrangements, Chapter 11) may be used for implementation arrangements.



Chapter 9

SECTOR MANAGEMENT PLAN



9. SECTOR MANAGEMENT PLAN

9.1 General

In order to effectively manage the water and sanitation sector, the provincial and municipal governments will have to make some adjustments in their current structures and policies. This Chapter proposes the mechanisms, processes and structures needed in the medium-term to achieve the coverage targets with sustainability. Not all recommendations can be laid out with the same level of detail at this time as some are dependent on further policy guidelines being formulated at the national level. These include, for example: the 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 will adopt a two-phased plan which seeks to dramatically improve the provision of water supply and sanitation. In the medium-term (1996-2000) plan, the province seeks to increase water supply coverage in both urban and rural areas to 95%. On the sanitation aspect, household toilets will be made available to 98% of the total population; 90% of students in public schools will have adequate sanitary toilet facilities; 100% of public utilities will have sanitary toilets; and 50% of the urban population will be covered by solid waste collection facilities. For its long-term (2001-2010) plan, the province will pursue a program to increase water supply coverage in both urban and rural areas by 98%. For the sanitation sub-sector, the province will sustain a 98% toilet coverage for individual household toilets; public school toilets will rise up to 95%; public utilities will sustain a 100% sanitary toilet coverage; while sewerage will cover 50% of the urban population.

(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 sanitary toilet facility for every 50 students.

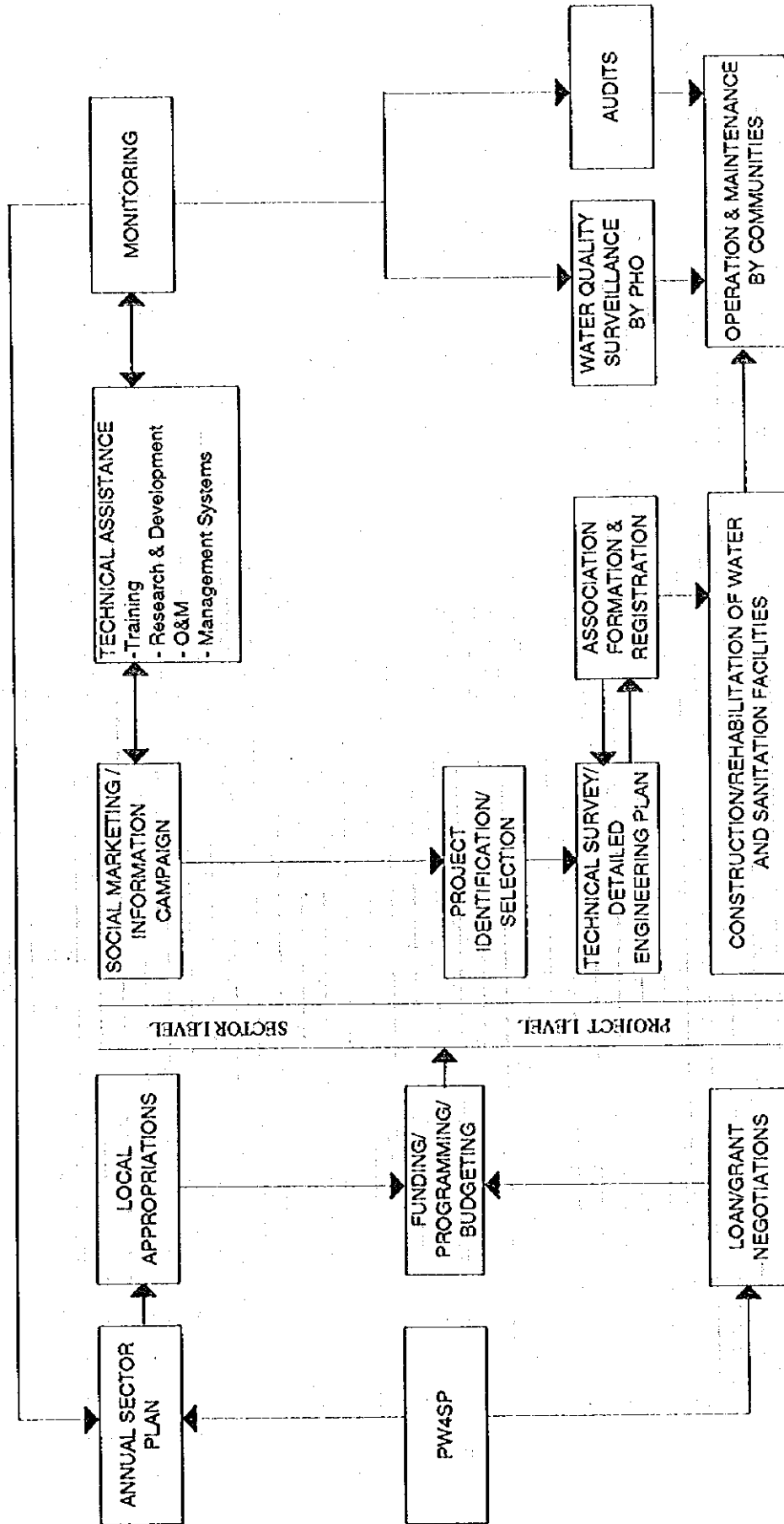
(4) Operating policies

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

The key policy statements include the following:

- 1) Sustainability shall be promoted through increased community responsibility for management of facilities. Unless potential users demonstrate initiative and commitment (beyond making the request for assistance) to maintain the systems, no

Figure 9.2.1 Sector Management Model



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 necessarily insisting on low-cost. Phased upward integration and future upgrading of systems and facilities shall also be promoted utilizing to the extent possible previously constructed facilities. In urban centers, a range of technologies may be adopted for wastewater collection and treatment, as well as for drainage.
- 4) An integrated approach to the provision of potable water supply, sanitation and hygiene education shall be promoted. All projects to be developed by the 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. An environmentally-responsive management approach to resource use shall be pursued.
- 10) Disaster Response and Emergency Coordination: The LGU shall formulate, as part of its contingency plans, a program to address emergency conditions. The program shall include maintenance of stocks of chlorine, organization and training of local communities on restoration of water supplies and provision of emergency sanitary facilities. The LGU should coordinate closely and regularly with the local officials of the Regional Disaster Coordinating Council (RDCC).

(5) Regulatory policies

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

- 1) Water allocation and water rights policies (conflict resolution) which 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 resolving 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 government allotment and sub-allotment systems of central government agencies.

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.

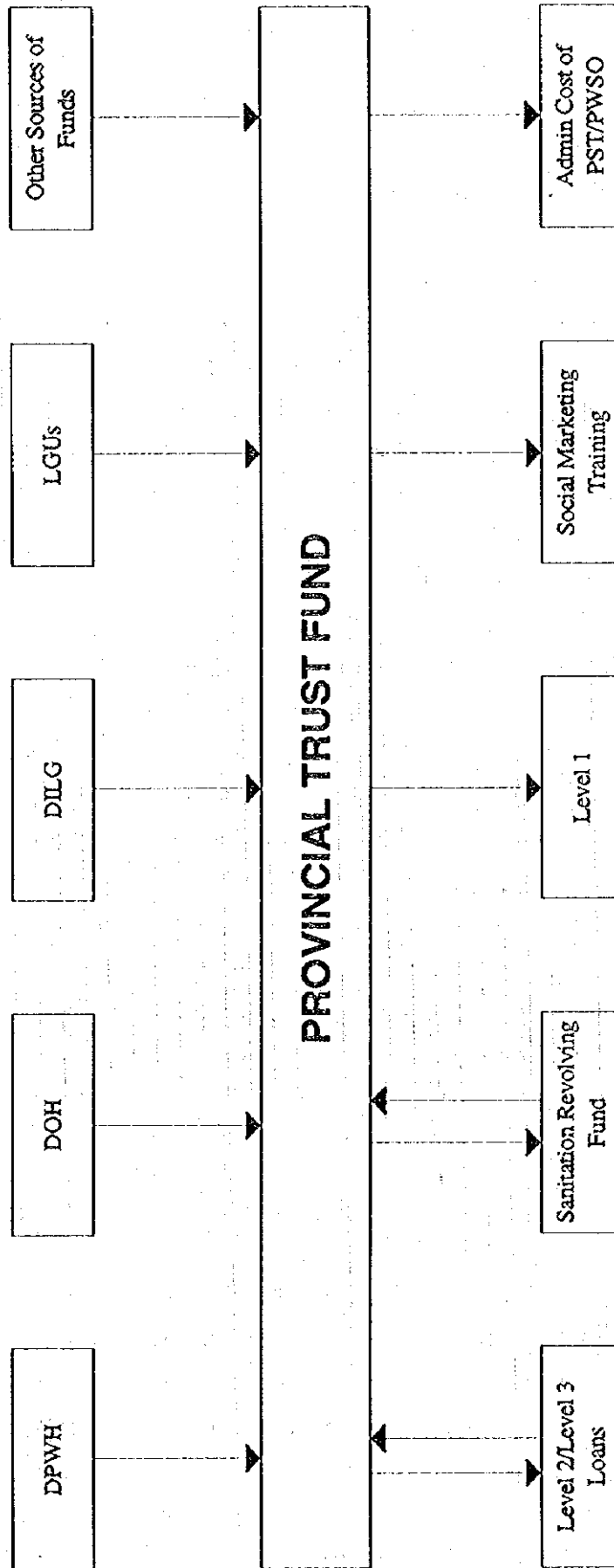
In the medium-term, the primary source of funds are envisaged to be provincial & local taxes & allocation from the IRA 20% Development Fund. Also, in the medium-term, it is envisaged that national & external funds will, although diminishing, continue to be channeled through local offices of central agencies.

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.

Figure 9.2.2 Flow of Funds



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

9.3 Institutional Arrangements

In the medium-term, a full-time Provincial Sector Team (PST) for coordination and institution-building shall be set up. The LGU should ensure that adequate logistics and incentives are provided. This Team may be supplemented by staff detailed full-time from national and local agencies, as needed. In the long term, the core group from the Team will form a new Provincial Water Supply and Sanitation Office (PWSO). The PWSO will continue to promote, assist and monitor all water supply and sanitation services in cooperation with the municipalities. The DILG-PMO shall continue to provide technical and managerial assistance in the formative years of the PST/PWSO.

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

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

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

The Governor will 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. The PWSC will

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

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

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

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

- 1) Identify initial areas and develop implementation arrangements for launching the project in the various municipalities.
- 2) Conduct regular dialogue and disseminate information among local leaders on water, sanitation and health issues.
- 3) Assist municipalities in overseeing the organization (or accreditation) of associations 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 (WSSSE) will be responsible for all the technical aspects of the project including feasibility studies, design, construction, operation and maintenance. The WSSSE 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 in controlling drinking water quality.
- (5) The Monitoring Specialist (MS) will be responsible for ensuring that the status of sector projects and outputs are properly reported and fed back to management. His/her task will include frequent contact with the municipalities to ensure that all project activities are demand-driven and sustainable. The MS will report to the PWSC and liaise closely with the PPDO who has the responsibility for monitoring all development activities and needs in the province. Specific duties include:
- 1) Draft all project reports and documents including the quarterly and annual Sector Report.
 - 2) Maintain the Registry of associations responsible for water and sanitation in their respective communities.
 - 3) Coordinate and develop indicators for monitoring and evaluating the achievement of project objectives.
 - 4) Monitor actual costs for typical water supply and sanitation systems.
- (6) At the municipal level, a Municipal Sector Liaison (MSL) will be appointed by the respective mayors. Staff appointed may be the municipal development coordinator, the municipal engineer, the municipal health officer or any other qualified staff selected by the mayor. The role of the MSL will be very critical at all stages of sector and project management. The MSL should ensure that the activities guided by PST/PWSO are implemented at the barangay level, particularly information dissemination about funding opportunities. The MSL receives all requests for water and sanitation facilities including the commitment of the barangays to provide counterpart funds or labor for the projects. The MSL also programs the municipal funds (from municipal IRA allocation or other sources) to provide counterpart support or 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.

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

9.4 Project Management Arrangements

(1) Level I

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

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

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

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

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

- 3) **Technology and Technical Design Standards:** The former Rural Waterworks Development Corporation (whose functions were absorbed by LWUA) and the DPWH have developed a simplified procedure for conducting the initial data gathering. The formats, which are appended (Table 9.4.1 Supporting Report), may be adopted and used by the LGUs. If necessary, these forms can be revised to suit the specific needs of the barangay or municipality.
- 4) **Bidding of works and procurement of services and materials** should follow provision of PD 1594 and other appropriate government policies and practices. Where possible, major capital procurement shall be sourced within the province.

- 5) **Construction and Drilling:** Drillers and civil work contractors will be needed for any major rural water supply and sanitation undertaking. Construction inspection shall be done with the municipal sector liaison.
- 6) **Right of Way Acquisition:** Deed of Donation (or written permits to grant use of land) for proposed facility sites should be executed in favor of the municipal government/barangay prior to project approval.
- 7) **Major rehabilitation work, beyond the capacity of the associations, shall be referred to the municipality for action.** Clear definition of "major rehabilitation work" is needed. All costs incident to the rehabilitation shall be to the account of the association O&M reserve fund. The municipality supported by PST/PWSO will assist, if needed, the association in securing soft loans, if the reserve funds are inadequate.
- 8) **Operation & Maintenance will generally be the responsibility of the association.** To support the caretakers, a franchising system for major O&M activities may be instituted by the municipality (through a private firm, a major water district in the area or any other competent group). Mechanics and plumbers can organize well-equipped "mobile service centers" which visits all the facilities monthly to check-up facilities and provide technical advice on behalf of the LGUs.

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

- 9) **Water Rate Setting:** Fees and rates shall be established and approved by the community prior to construction. The fees shall be sufficient to cover all monthly operation, maintenance and administration costs, as well as to establish a reserve fund.
- 10) **Fees Collection and Funds Management:** The association shall collect monthly fees. All funds of the association shall be deposited in a bank to be selected by the association.

(2) **Level II**

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

- 2) **Organization:** The RWSA model may be followed by the participating communities. Again, flexibility will be followed and alternative models for managing the system may be considered.
- 3) **Technology and Technical Design Standards:** Technical standards have been in use by LWUA for RWSAs and by DPWH for Level II systems. (See Table 9.4.2 with annexes, Supporting Report). As these are considered as national standards, they will be adopted by the LGUs.
- 4) **Bidding of works and procurement of services and materials** should follow provision of PD 1594 and all other applicable national and local legislation on bidding and award of contracts using public funds. LWUA uses standard formats and procedures for this process, which may be adopted by the LGUs.
- 5) **Construction** would usually be done by a contractor. Inspection would be undertaken by the RWSA; by the cooperative or the private developer; or by the LGUs depending on the institutional arrangement adopted.
- 6) **Right of Way Acquisition.** The association shall negotiate for the purchase of land on which facilities will be constructed. Should negotiations fail, the government may exercise the power of eminent domain to secure needed land.
- 7) **Operation & maintenance and rehabilitation** will be the responsibility of the association. It shall ensure that adequate tools and spare parts are available. It shall employ needed staff and caretakers.
- 8) **Water Rate Setting:** All fees shall be subject to public hearing and approval by the appropriate regulatory authority.
- 9) **Fees Collection and Funds Management:** Same policies for Level I shall apply. However, fee computation shall include provision for debt service and possibly a higher reserve requirement.

(3) Level III

- 1) **Project Selection:** Most Level III systems are to be initiated by the municipal governments. In principle, all communities, including rural areas, may request Level III services, provided that they are willing and able to take on the financial and managerial obligations for higher service levels. The point is that service level selection are community decisions.
- 2) **Organization:** There are several viable Level III models which may be adopted: the Water District Concept; an LGUs-managed system; a cooperative-run system; or a privately-owned and managed system. The LWUA-water district concept was briefly described in the preceding chapters. For detailed information, the LGUs should

contact and coordinate with LWUA. The second option for the LGUs is to maintain operational control over the utility. Current experiences, however, revealed many difficulties because of numerous government controls and restrictions. The private sector may be a viable option using the BOT mechanism or even as a longer term investment for private entrepreneurs for larger systems.

- 3) **Technology and Technical Design Specifications:** Regardless of the institutional model adopted, the technical design standards to be enforced should be uniform. Technical standards used by the water districts and LWUA will be adopted and enforced by the LGUs.
- 4) **Bidding of works and procurement of services and materials** shall follow the provision of PD 1594 and all other applicable national and local legislation on bidding and award of contracts using public funds. LWUA uses standard formats and procedures for this process, which may be adopted by the LGUs.
- 5) **Construction** would usually be done by a contractor. Inspection would be undertaken by the water district; by the cooperative or the private developer; or by the LGUs depending on the institutional arrangement adopted.
- 6) **Right of Way Acquisition:** The waterworks will have to negotiate for the purchase of land on which facilities will be constructed. Should negotiations fail, the government may exercise the power of eminent domain to secure needed lands.
- 7) **Operation & maintenance and rehabilitation** will be the responsibility of the waterworks. It shall ensure that adequate tools and spare parts are available. It shall employ needed staff and caretakers
- 8) **Water Rate Setting:** All rates are subject to public hearings and approval by the appropriate regulatory authority.
- 9) The waterworks shall establish a formal billing and collection system. In addition, business practice systems shall be adopted. The LWUA has established a comprehensive commercial practice system, which may be adopted by the organization.

9.5 Community Development Models

Policy: The LGU views community development and involvement principally as regular multisectoral activities, not project-related activities. This implies the need for the LGU to establish an institutional mechanism at the provincial and municipal levels to enhance trust and confidence of communities to the LGU and its ability and motivation for provision of vital services. Community management of the systems is a vital element for sustainability of the facilities. Communities are viewed not merely as beneficiaries but as decision makers for

critical aspects of local projects. Communities will be encouraged to collectively take stock of their resources and constraints and agree on a development program.

The LGU will review the roles and responsibilities of central and local governments, NGOs, the private sector and communities themselves. It shall assess community participation activities and related institutional arrangements of past community projects and constantly look into creative ways to promote and enable local participation.

The LGU shall promote the participation of NGOs to catalyze the involvement of women, youth, people's voluntary organizations (PVOs) and other segments of the community in project decision-making and management. It will focus on the role of women in the context of the design of institutional arrangements at all service levels. The review shall include: brief overview of women's socio-economic situation and their role in water and sanitation services; analysis of relevant NGOs, women's groups and private agencies that support community; and assessment of support action for women's participation essential for project sustainability.

For specific sector projects, the LGU will adopt a three-phase community involvement model. The model will outline the decision and action points, for which community inputs will be sought. These inputs are categorized according to the Pre-Construction Phase, the Construction Phase and the Post-Construction Phase.

Responsibilities: At the municipal level, the Municipal Sector Liaison will play a leading role in ensuring involvement of the beneficiaries at all phases of the project. The Community Development and Training Specialist of the municipality trained by PST/PWSO will provide technical assistance and advice.

One of the key activities in the PW4SP preparation is the formulation of viable models to promote community development in the projects. Each one model for Level I, II and III service was formulated based on socio-economic profiles, service needs and experience in selected communities. It is important to have a clear sequence (a strategy) to enable the communities to participate in the project through all the process.

Three sites were selected based on a set criteria which includes: needs, health situation, source availability, accessibility, potentials for replication, etc. The sites selected for the province are outlined in the table below; full write-up of the case is included in 9.5 Supporting Report.

Table 9.5.1 Summary of Community Development Study Sites

Model Study Site	Proposed Service Level	Urban or Rural	Potential Service Area		Potential Water Source	Sanitation Issues
			Population	Households		
Sitio Tukon, Bgy.Chanarian, Basco	I	R	130	25	Deep Well	Yes
Municipality of Sabtang	II	R	1,112	350	Deep Well	No
Municipality of Mahatao	III	R	1,922	350	Spring	No

(1) For Level I facilities, community involvement and participation shall be promoted in the following manner.

1) Pre-Construction Phase

- (a) Dissemination of information
- (b) Establishment (or selection) of barangay or purok association and of the working relationships with other agencies
- (c) Election of officials
- (d) Assistance for the selection of potential water sources
- (e) Agreement on O&M arrangements
- (f) Computation and approval of water charges
- (g) Preparation of work/plan
- (h) Agreement to proceed the project
- (i) Assistance for the selection of contractor/s
- (j) Securing right-of-way (deed of donation or permit to use) for facility sites

2) Construction Phase

- (a) Provision of labor counterpart
- (b) Provision of materials
- (c) Dissemination of information
- (d) Inspection and feedback of the project activities
- (e) Provision of access to the contractor/s

3) Post-Construction Phase

- (a) Payment/collection of fees; fund-raising activities
- (b) Getting water samples regularly for quality testing
- (c) Preventive maintenance
- (d) Minor repair and parts replacement
- (e) Dissemination of health and hygiene information

- (f) Auditing of finances
- (g) Attendance in community meetings
- (h) Provision of adequate source protection, including maintenance of drainage to protect well site from contamination
- (i) Formulation of future improvement plans
- (j) Approval of major capital or rehabilitation budgets
- (k) Collection and provision of information as requested by the RHU or MSL
- (l) Preparation/maintenance of the barangay or site maps

(2) For Level II facilities

1) Pre-Construction Phase

- (a) Establishment of barangay or purok arrangements and working relationships with other agencies
- (b) Identification and selection of potential water sources
- (c) Identification of the location of communal faucets
- (d) Agreement to proceed the project
- (e) Dissemination of information
- (f) Election of officials
- (g) Agreement on O&M arrangements
- (h) Computation and approval of water charges
- (i) Preparation of work plan
- (j) Securing right-of-way (deed of donation or permit to use) for facility sites
- (k) Selection of local contractor/s

2) Construction Phase

- (a) Provision of labor counterpart
- (b) Provision of materials
- (c) Dissemination of information
- (d) Inspection and feedback of the project activities
- (e) Provision of access to contractor/s

3) Post-Construction Phase

- (a) Payment/collection of fees; fund-raising activities
- (b) Getting water samples regularly for quality testing
- (c) Formulation of improvement plans
- (d) Preventive maintenance including cleaning of storage tank/s
- (e) Dissemination of health and hygiene information

- (f) Preparation/maintenance of the barangay maps
- (g) Auditing of finances
- (h) Attendance in community meetings
- (i) Source protection measures
- (j) Approval of major capital or rehabilitation budgets
- (k) Minor repairs and parts replacement including leak repairs
- (l) Collection and provision of information as requested by the RHU or MSL
- (m) Safe disposal of wastewater

(3) For Level III facilities

1) Pre-Construction Phase

- a) Attend public hearings and briefings on formation of institutional arrangements (WD, cooperative, etc.) for the proposed improvement project
- b) Dissemination of information
- c) Assistance in securing right-of-way (deed of donation or sale or permit to use) for facility sites

2) Construction Phase

- (a) Dissemination of information; road traffic control, etc
- (b) Feedback on construction progress
- (c) Provision of access to contractor/s
- (d) Installation of in-house plumbing and sanitation facilities

3) Post-Construction Phase

- (a) On-time payment of water bills
- (b) Prompt reporting of leaks and illegal connections
- (c) Conservation of water
- (d) Dissemination of health and hygiene information
- (e) Attendance in further public consultation meetings
- (f) Assistance in campaigns for new service connections
- (g) Safe disposal of wastewater

9.6 Human Resources Development and Training

Policy: The training is a planned strategy to strengthen individual competencies to meet appropriate standards of excellence to achieve the goals of the program. It is a planned process of helping and enabling other people acquire attitudes, skills and knowledge by themselves. The objectives of training are individual competence, organizational

effectiveness and efficiency, and national development. Training helps ensure the availability of qualified and able manpower, the shortage of which is considered as one of the major obstacles to improvements in the water supply and sanitation sector.

In planning and implementing training activities, trainers must keep in mind that there are two processes simultaneously taking place - skill/knowledge acquisition and attitude formation. To illustrate the process, a brief exercise may be conducted during the session to show the two simultaneously occurring processes - those related to task and/or subject on one hand, and those related to attitude formation on the other.

(1) The effective application of teaching and learning principles is vital to achieve optimal learning. Trainers must bear in mind the following principles:

- 1) **Perceived Purpose:** Participants should recognize why a particular topic is being discussed or presented, i.e., the relevance. This is the first element which should be established and agreed upon in any training activity.
- 2) **Graduated Sequence:** The subject matter should be presented in a logical sequence which can be followed by the trainees.
- 3) **Knowledge of Results:** At every point during a training activity, participants must know how well they are performing, i.e., feedback.
- 4) **Appropriate Practice:** If the objective of a training effort is to develop specific skills, there must be opportunities to practice and demonstrate these within the training activity.
- 5) **Individual Differentiation:** Attention must be paid to the fact that every person learns at a different pace.

(2) The Training Process

- 1) **Needs Assessment:** The first step is to determine the problem to which a training solution will be able to make an impact. A careful analysis is necessary because the training should address and focus on precisely those deficiencies in knowledge, attitudes or skills that hinder reaching certain goals. However, one must bear in mind that not all problems or deficiencies can be solved by training alone. In most cases, complementing interventions will be needed.
- 2) **Setting Learning Objectives:** In the second step, the learning objectives need to be set. Training designers shall present these objectives in behavioral terms, i.e, what should a participant be able to do at the end of the training period (not what the

session will accomplish). It is necessary to formulate them with care because they also serve as criteria for evaluation at the end of the training process.

- 3) **Methods and Techniques:** Different methods of training are appropriate for different types of learning; the methodology should be appropriate with the set learning objectives. Participatory methods, like group exercises, group discussions, role plays etc. are most effective in attitude formation. The choice of methodology is mainly based on the learning principles and objectives. Human factors, resources available (time, facilities) and the subject area will also affect the choice.
- 4) **Evaluation of Training:** Training evaluation assesses whether a course was adequately designed and implemented to meet the set objectives. There are four levels of evaluation presented. Each level focuses on a specific area and involves a specific set of standards and evaluation tools.

(3) **The Training Design:** Training design is more than simply putting up a schedule. It is a plan of action to be followed by a trainer in implementing his activities. It consists of:

- 1) **Rationale:** Why set up a training program in the first place, and why would people have an interest in it?
- 2) **Learning objectives:** Workshops should aim to develop a strong understanding of concepts like: participatory development, demand, etc. An ability to analyze and apply participatory development in their local setting or to articulate water supply and sanitation demand and supply concepts are key capacity building objectives. Methods should be more participative and consultative, i.e., allowing planners to interpret the principles with an awareness of their local conditions.
- 3) **Assumptions about the participants' background;** define who would best benefit from the program - the target audience.
- 4) **Curriculum:** Determine what the potential trainees need to know before they participate in the program, decide on the training methods and materials, draw up session plans and sequence the sessions logically.
- 5) **Evaluation:** Decide how the program itself and the participants are evaluated
- 6) **Administrative aspects:** The budget for the program, the total costs, possible costs to the trainees. Also important are things like housing (for the program itself, for facilitators and trainees), registration of trainees, logistics, etc.

Responsibilities: Needs Assessments will be conducted as the basis for the design of the courses. Participants will be selected based on their tasks and responsibilities. The PST/PWSO will establish and maintain a reference library and information/ documentation

center which will include training materials and equipment to service needs of the municipalities. The DILG, in coordination with the International Training Network (ITN) - Philippines and other agencies and NGOs, will provide inputs to these training activities.

The LGU role entails not only to run courses but also to ensure that training programs take place and are effective. As an alternative, training activities may be contracted out to well-functioning water districts. NMYC training centers have been established; NMYC can be tapped to provide testing and skill certification for caretakers. NMYC regularly conducts plumbing and pipefitting courses and the national trades certification system. Finally, there are technical and vocational schools who may be tapped to provide technical training and to award diplomas and certificates to those who undergo their programs. These schools however, do not have at this time, any special courses for water and sanitation caretakers. A program can be set up with these institutions.

External training assistance must be viewed as participation within this process. Its purpose is to guide and motivate (not replace) local trainers. Local trainers need to go through the process of, e.g., designing courses or developing materials, etc. Many learning opportunities are missed when non-local experts replace local trainers in doing need assessments, course designs, materials development, etc.

1) For staff operating Level I systems

- (a) Preparatory orientation training activities will be organized leading to the formation of associations. These community-level orientation activities will consist of briefings about the health situation, the relationship between health, water supply and sanitation. The LGU program for water and sanitation improvement will be presented, including policies and procedures for accessing technical and financial support.
- (b) Technical training of caretakers will consist of: water source protection (for deep wells, shallow wells, spring boxes and surface water intake structures); water quality protection; operation and maintenance of hardware (pumps, pipes), including simple replacements of parts; plumbing and pipefitting.
- (c) Management training will include: fee setting, bookkeeping and funds management, preparation of improvement plans and monitoring and reporting requirements. Detailed policies of the LGU will be discussed.
- (d) Current training activities and materials for the BWSAs by the DILG will be reviewed and adopted by the municipalities. UNICEF is assisting DILG in updating these materials.

2) For staff operating Level II systems

- (a) Preparatory orientation and training activities will be organized leading to the formation of associations. These community-level orientation activities will consist of briefings about the health situation, the relationship between health, water supply and sanitation. The LGU program for water and sanitation improvement will be presented, including policies and procedures for accessing technical and financial support.
- (b) Training of technicians and operators will generally consist of: water source protection (for deep wells, spring boxes and surface water intake structures); water quality protection; water storage; chlorination; operation and maintenance of hardware (pumps, pipes), including simple replacements of parts; plumbing and pipefitting. Pump operation and electrical controls will be a major focus of this program; metering will be presented.
- (c) Management training will generally include: organization aspects, operations policy formulation, water rate computation, preparation of bills, bookkeeping and funds management, preparation of improvement plans and monitoring and reporting requirements. Detailed policies of the LGU will be discussed.
- (d) Training activities for the RWSAs prepared by LWUA will be reviewed and adopted by the municipalities.

3) For staff operating Level III systems

- (a) Technical training of engineers, technicians and operators will generally consist of: water resources conservation and protection (for deep wells, spring boxes and surface water intake structures); water quality protection; hydraulics; transmission lines; water storage; treatment and chlorination; construction inspection; and operation and maintenance of facilities. Implementation of a metering program will also be discussed. Methodologies for feasibility analysis for system expansion will be presented.
- (b) Policy and management training will include the full commercial practices system including budgeting and cost controls, bookkeeping and accounting, procurement, maintenance of stock inventories, rate formulation and capital budgeting. The policy formulation process and the various areas of policy for utility operation will be presented in detail. Long-range planning, financial analysis and review, and monitoring with reporting requirements will be discussed.

(c) The DPWH, LWUA and MWSS have developed a comprehensive set of programs and materials for both technical and management training. Inputs from these three agencies and also from local water districts should be sought.

4) Training of PST/PWSO staff and municipal liaison staff: Based on the task descriptions presented, the following training programs will be required. At least one program is conducted annually for each of the workshops and courses. The programs will explain the basic concepts and procedures. Succeeding programs will review the adopted policies and procedures and lay the bases for improving operations at the provincial and municipal levels. Municipal sector liaison staff will participate in these programs. They should be organized by the PST/PWSO; except for the Provincial Coordinators' Workshop which is best handled nationally by DILG to provide a wider base for sharing of experience among the PWSC. In addition, DILG will provide basic guidelines for the design and implementation of the workshops and courses.

(a) The Provincial Coordinators' Workshop will be an annual activity intended to facilitate the exchange of experience among the coordinators. New national policies, opportunities and constraints will be discussed. Case studies will be presented. Sector management & technical experts will be invited to speak on current issues and trends. This will be organized by the DILG.

(b) The Community Development Course is intended for trainers, community development specialists and municipal liaison staff. The scope of the course will include: Social marketing & public information programs, community organizing skills, training skills (needs assessment, design, implementation & monitoring).

(c) The Technical Course seeks to acquaint technical staff at the provincial and municipal levels on the physical aspects of the sector. Its scope will generally include: water resources, overview of water supply systems (source, transmission, treatment, storage, distribution), drilling and source development, water quality protection, feasibility study and design procedures and standards, and operation and maintenance.

(d) The Project Monitoring Seminar will provide an overview of the monitoring functions and the sector reporting requirements. The process of sector monitoring and updating the PW4SP will be presented in detail. Project monitoring procedures will also be discussed.

(4) Health and Hygiene Education

- 1) **Policy:** The LGUs shall establish hygiene education programs through appropriate methods and channels referring to on-going national program. These shall include immediate short-run programs: information campaigns; as well as long-term value formation interventions, possibly through the formal school system. If the LGUs are to attain the full economic benefits of improved water and sanitation services, household behavior and hygiene need to be addressed. Three approaches will be used:
 - (a) **Community-based Approach:** Direct house-to-house campaigns can be implemented through the Rural Health Units, as part of their current functions. Meetings by house "clusters" to discuss relevant health issues can also be organized. This will also be done through direct person-to-person contact with PHO staff, the municipal health staff, midwives, sanitarians and the barangay health volunteers. Special presentations can also be done during the regular meetings of community-based socio-civic clubs. Various flip charts and IEC (Information, Education and Communication) materials are already available.
 - (b) **School-based Approach:** Students are the main targets of this approach, either directly or through their teachers. Special focus activities, such as Water and Sanitation Week or Nutrition Week can be introduced with programs or convocations to make the student aware of the issues and solutions. Posters, flip charts, and other audio-visual materials will be required.
 - (c) **Media-based Approach:** This approach utilizes radio and print media to introduce and reinforce health messages. Many NGOs and the Philippine Information Agency (in coordination with the DOH) have developed interesting and attractive materials.
- 2) **Responsibility:** The community development and training specialists at both provincial and municipal levels will be responsible for the health and hygiene education function. The CDTSSs will formulate an action plan and implementation will be done by the municipal liaison staff and other local officials. At the barangay level, its implementation will involve the close coordination among the midwives, the barangay health workers and the Committee on Health of the barangay council. Materials for this efforts have been previously developed and can be found with the various PHOs and RHUs. UNICEF has provided strong support in the preparation of these materials.
- 3) A continuous health and hygiene education program will be launched by the LGU. Simple and clear messages and approaches will have to be defined. These messages may include the following: relationship among health, water supply and sanitation; sector opportunities and services available at the rural health units. The relevance of these, or other messages will have to be determined by the municipal sector liaison.

Chapter 10

***COST ESTIMATES FOR
FUTURE SECTOR DEVELOPMENT***



10. COST ESTIMATES FOR FUTURE SECTOR DEVELOPMENT

10.1 General

The total investment cost required in the two phases was studied for implementation of the future requirements identified in Chapter 8 and Chapter 9. The investment cost is defined to include direct cost for construction/rehabilitation of required facilities and sector management, as well as physical and price contingencies. Cost requirements for the equipment and vehicle are discussed as a reference to the LGUs. In addition, recurrent cost is estimated for the operation and maintenance of facilities.

Conditions and assumptions to come up with investment cost were established covering all sub-sector components referring to the National Sector Master Plan and current standards of relevant sector agencies (DPWH, DOH and LWUA). Of the total investment cost required, only construction cost for sector components by municipality was included in this Chapter. The total investment cost is presented in Chapter 11 as a total requirement of the province.

With regard to construction cost, unit construction cost per person/household/facility was first prepared under contract-out basis for respective sub-sector component facilities at 1995 price level (refer to Supporting Report).

Recurrent cost was also included in this Chapter taking into account regular operation, spare parts and equipment replacement for sector components concerned.

10.2 Assumptions for Cost Estimates

(1) Unit Construction Cost

Unit construction cost per person (household or facility) of each sector component was prepared based on the current standard unit cost of relevant sector agencies and typical standards developed for this PW4SP as contract-out basis at 1995 price level. Referred cost data are urban water supply of LWUA, rural water supply of DPWH and sanitation of DOH. For price adjustment of construction materials, the NSO price index of 1994 to 1995 was referred to.

Unit construction cost consists of, in general, direct cost (mobilization/demobilization, material and labor), indirect cost (profit and VAT of contractor) and government expense

(detailed engineering, institutional development and water quality analysis-when deemed necessary).

Freight cost of construction materials excluding indigenous materials, i.e., sand and gravel, was counted for sanitation and rural water supply in consideration of the distance from Manila. The cost is estimated at fixed percentage (12%) based on the standard practice being adopted by sector agencies.

Table 10.2.1 shows a summary of unit construction cost and their descriptions are given below (details are referred to Supporting Report).

Urban water supply:

- Unit cost for three different sizes of Level III system covering served population of 5,000, 10,000 and 15,000.

Rural water supply:

- Unit cost for four types of Level I wells (shallow well at 18m in depth and deep wells at 30, 50 and 70m in depth).
- Unit cost for Level II system to cover 600 served population.

Sanitation:

- Household toilet:
Unit cost for three types of sanitary toilets (flush, pour-flush and VIP) to cover one served household in urban or rural areas. Cost of flush toilet includes costs for demolition, water closet, water line and a superstructure made of durable construction materials.
- Public school toilet:
Unit cost for one facility with 5 toilet bowls to cover 250 served students.
- Public toilet:
Unit cost for one facility with 6 toilet bowls.
- Well disinfection:
 - unit disinfection cost per well based on DOH standard cost.
 - to be applied to all existing and new wells once a year.

Table 10.2.1 Unit Cost of Facilities by Type and Service Level

Description	Urban Water Supply (Level III)										Rural Water Supply (Level II)					Sanitation				
	New System			Expansion			Level II	Deep Well			Spring Dev.	Household Toilet			Public Toilet		Disinfection of Level-I Wells	Urban Sewerage		
	5,000 Population	10,000 Population	15,000 Population	5,000 Population	10,000 Population	15,000 Population		50 m	70m	Shallow Wells		Flush	Poor Flush	VIP Latrine	School Toilet	Public Toilet				
	20,018,250	30418750	45,443,750	18,456,250	28,793,750	43,818,750	120,871	178,006	238,303	25,079	121,348	13,300	8,400	302,461	523,182	70	N.A.			
Unit Construction Cost per Facility (Pesos)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.			
Service Coverage	1,000 Households	2,000	3,000	1,000	2,000	3,000	15	15	15	15	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.			
Unit Cost	4,000 Pesos/Person	3,000	3,000	3,700	2,900	2,900	N.A.	N.A.	N.A.	1,500	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	7,300			
Rehabilitation Cost of Level I Deep Well (Pesos/Well)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	34,900	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.			

Table 10.2.2 Unit Cost of Equipment and Vehicle

Name of Equipment	Unit Cost (Peso 1,000)
Truck-mounted rotary drilling rig	17,370
Truck-mounted percussion drilling rig	10,280
Well rehabilitation equipment	138
Service truck with crane	1,175
Support vehicle (Pick-up with winch)	500
Refuse collection truck	1,380

Urban Sewerage:

- Unit cost per served population. Preliminary estimates derived from the Philippine National Urban Sewerage and Sanitation Strategy and Feasibility Studies report.

(2) Unit Cost of Equipment

Unit cost of equipment shown in Table 10.2.2 was prepared as reference information based on the standard unit cost and recent procurement experience of the relevant sector agencies (details are referred to Supporting Report).

(3) Sector Management Cost

Sector management cost consists of:

- engineering studies (F/S, D/D and construction supervision) for water supply, public toilet and school toilet facilities.
- community development and training including health & hygiene education and logistic support.

Cost of engineering studies was estimated based on the fixed percentages to the total construction cost; 9% for F/S and D/D and 4% for construction supervision.

Community development and training with logistic support was also estimated on the same manner; 12% of respective construction costs for rural water supply and sanitation, and 3% of construction cost for urban water supply.

(4) Recurrent Cost

Recurrent cost was estimated for water supply and sanitation (school and public toilets) facilities to cover the regular operating cost and the cost for spare parts and equipment replacement based on the following cost assumptions, while household toilet is assumed to be maintained by the owner.

Regular operating cost normally includes salaries of operation staff, electricity, fuel and chemicals. Due to the nature of this cost, it is only applied to urban water supply (Level III system). As a typical unit cost being applied to existing PW4SPs referring to LWUA data, 365 Pesos/household/year was employed.

Cost for spare parts and equipment replacement was considered by different service level as described below.

Level III system:

- Mechanical and electrical equipment has normally a life cycle of 8 to 12 years and is considered in depreciation cost, i.e., 10% per annum. Assuming that the equipment cost comprise 10% of construction cost, annual depreciation will be 1% of the construction cost.
- Accordingly, cost of spare parts was assumed to be 10% of the equipment cost or equivalent to 1% of the construction cost.
- As a whole, 2% of the construction cost was applied for the cost of spare parts and equipment replacement.

Level II system:

- Operation and maintenance (O&M) cost of Level II system utilizing spring sources includes repair/replacement of pipelines and communal faucets and salaries of maintenance staff.
- A unit cost of 100 Pesos/household/year was assumed for cost estimates.

Level I system:

- O&M cost of Level I facility simply includes spare parts of handpump and caretaker.
- A unit cost of 50 Pesos/household/year was assumed for cost estimates.

School and public toilets:

- O&M cost includes the salaries of maintenance staff, cost of pumping sludge from septic tanks (periodically) and rehabilitation cost (for depreciation).
- For cost estimates, 5% of the construction cost was applied per facility per year.

Management cost:

- Management cost of water supply, sewerage and sanitation sector is part of the cost required for public services of LGUs mainly consisting of salaries of officers and workers and normally included in the annual budget of each LGU. The rest of management cost, such as equipment for information processing and dissemination was considered as part of logistic support under the sector management cost. Owing to the nature of this cost item, the management cost pertaining to salaries of

officers/workers depends largely on the population size and institutional set-up of each LGU.

- Management cost was not estimated in this PW4SP considering the above mentioned reasons.

10.3 Cost of Required Facilities and Equipment

10.3.1 Cost of Required Facilities

The construction cost of required facilities as public investment of LGUs was summarized in Table 10.3.1 by sub-sector by municipality for target years. In this regard, the construction cost of household toilets is limited to the procurement and distribution of toilet bowl for pour-flush toilets as being implemented by DOH under the FW4SP (refer to over-all construction cost requirements, Supporting Report).

During the medium-term development period, a total of 7.3 million Pesos will be required for construction of required facilities. Of the requirements, 40% or 2.9 million Pesos and 37% or 2.7 million Pesos will be necessary for rural water supply and urban water supply, respectively, while only 10% or 0.7 million Pesos will be for rural sanitation.

10.3.2 Cost of Required Equipment and Vehicle

The procurement cost of required equipment was estimated as shown in Table 10.3.2 (details are referred to Supporting Report).

Table 10.3.2 Cost of Equipment and Vehicle

Name of Equipment	Unit Cost (Peso 1,000)	Quantity (set)	Cost (Peso 1,000)
Truck-mounted percussion drilling rig	10,280	1	10,280
Well rehabilitation equipment	138	1	138
Service truck with crane	1,175	1	1,175
Support vehicle (Pick-up with winch)	500	1	500
Refuse collection truck	1,380	2	2,760
Total Equipment Cost			14,853

Table 10.3.1 Construction Cost of Required Facilities by Municipality

Unit: 1,000 Pesos

Municipalities	Phase I (2000) Requirements						Phase II (2010) Requirements						Grand Total		
	Urban Area			Rural Area			Urban Area			Rural Area					
	Water Supply	Sanitation	Sub-total	Water Supply	Sanitation	Sub-total	Water Supply	Sanitation	Sub-total	Water Supply	Sanitation	Sub-total			
Bawean (Capital)	1,339	323	1,662	181	20	201	1,863	3,567	0	21,017	24,584	907	402	1,309	25,893
Itbavat	0	323	323	971	694	1,665	1,988	0	0	0	0	1,092	201	1,293	1,293
Iwasa	0	323	323	121	4	125	448	0	0	0	0	364	59	423	423
Mahaleo	326	0	326	208	0	208	534	274	323	0	597	726	63	789	1,366
Sabiang	1,043	14	1,057	1,270	26	1,296	2,353	1,032	323	0	1,355	363	56	419	1,774
Uvogan	0	0	0	121	0	121	121	0	323	0	323	364	51	415	738
Provincial Total	2,708	983	3,691	2,872	744	3,616	7,307	4,873	969	21,017	26,859	3,816	832	4,648	31,507

10.4 Recurrent Cost

Recurrent cost is estimated at 1995 price level as a provincial total of each sub-sector covering existing facilities and additional facilities to be constructed during the medium-term development as shown in Table 10.4.1.

In the year 2000, the recurrent cost will increase to 1.9 million Pesos/year from 1.7 million Pesos/year in 1995, which is equivalent to 12% increase from the base year corresponding to the implementation of the medium-term development.

Table 10.4.1 Recurrent Cost

Unit: 1,000 Pesos

Sector Component	Item	Base Year Existing Facilities	1996	1997	1998	1999	2000	Total (1996-2000)
Urban Water Supply	Operating Cost	747	747	757	772	787	797	3,860
	Spare Parts/Equipment	618	618	629	645	661	672	3,225
Rural Water Supply	Level II	80	82	84	84	84	84	418
	Level I	6	8	11	14	17	20	70
Sanitation	Public School Toilets	195	198	204	210	216	222	1,050
	Public Toilets	60	65	75	85	95	105	425
Provincial Total		1,706	1,718	1,760	1,810	1,860	1,900	9,048

Note: Recurrent cost of each year includes that of base year existing facilities.

Chapter 11

FINANCIAL ARRANGEMENTS

