Chapter 6

PAST FINANCIAL PERFORMANCE IN WATER SUPPLY AND SANITATION

6. PAST FINANCIAL PERFOMANCE IN WATER SUPPLY AND SANITATION

6.1 General

Based on the Local Government Code of 1991 and NEDA Board Resolution No. 4 (1994), the locally funded programs and projects for the water supply and sanitation sector have been devolved from the central government agencies to the LGUs since 1992. However, the central government still retains its role of providing support to LGUs in the form of technical, institutional capacity building and limited financial assistance.

The financial arrangements which have been adopted and implemented, since the sector's devolution to the LGUs, by the province with a special attention to the subject sector are reviewed and discussed in this chapter. The past experience served as the basis to formulate for appropriate financial arrangements for the medium term development. The essential study components are: (1) LGUs' past financial performance; (2) past public investment and present plans; (3) LGUs' present financing sources and management participation in the sector, (4) existing practices by the LGUs on cost recovery and (5) affordability by users.

6.2 LGU's Past Financial Performance

The provincial government's past financial performance for the period covering the years 1995 to 1999 was investigated. Actual financial data were obtained for the years 1995 to 1998, while the financial figures in 1999 are only budgetary estimates. Likewise, the municipalities' past financial performance in the same period (1995 to 1998) is presented in the Supporting Report.

6.2.1 Sources and Uses of Funds

(1) Sources of Funds in the Province

The sources of income of the LGU are Internal Revenue Allotments (IRA), local tax revenues, non-tax revenues such as grants, aids and subsidies, as shown below. At the present time, IRA is a major financial source of the LGUs.

(a) IRA – LGU's share in the national internal revenue taxes is based on the collection of the 3rd fiscal year preceding the current fiscal year and is shown as follows: 1st year of effectivity of the LGC of 1991 - 30% (1992), 2nd year (1993) - 35% and on the 3rd year (1994) and thereafter is 40% of the gross national internal revenue collections.

A standard formula, which considers parameters such as population (50%), land area (25%), and equal sharing (25%) is used to determine the LGU share in the IRA. Provided, however, that in the 1st year LGUs were, in addition to the 30% IRA which included the cost of devolved functions for essential public services, entitled to receive the amount equivalent to the cost of devolved personnel services.

(b) Tax Revenues – mainly consist of real property tax, accounting for an average of 1.19% of the total income of the province.

(c) Grants, Aids and Subsidies – the province have not reported having received technical assistance grants from ADB and other multi-lateral financial institutions.

(d) Other Income – there are no economic enterprises, but receives minimal income from various fees and charges on some services which include tax on delivery trucks, occupation tax, amusement tax, sand and gravel tax, mining claims, and secretary's fee.

Based on 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 the LGUs nationwide, specifically to the administrative units of (1) province (23%); (2) city (23%); (3) municipality (34%), and barangay (20%). Further, respective IRAs in different administrative levels are allotted to all administrative units concerned.

Table 6.2.1 presents the income and expenditures of Biliran during the period 1995-1998. Local tax revenues, which were 1.19% of the total income of the province, consist of real property tax, business taxes and licenses, and miscellaneous taxes such as transfer tax and franchise tax. IRA's annual average share to total income was 93.50%, which indicates that the province has historically been dependent on IRA with its low tax and non-tax revenue collections.

The provincial government has no economic enterprises, but it receives municipal income, not on a regular basis from the following: fees and charges from small-scale mining and sand and gravel operations. It manages a provincial hospital subsidizing for their operations, since hospital fees being charged are very low.

In order to mobilize fund sourcing, the 1987 Constitution and the 1991 Local Government Code granted the Provincial Government to have its initiative to create new revenue sources. These LGU financing options are discussed in Section 6.4 and in the Supporting Report.

Table 6.2.1 Income and Expenditures, 1995 - 1999

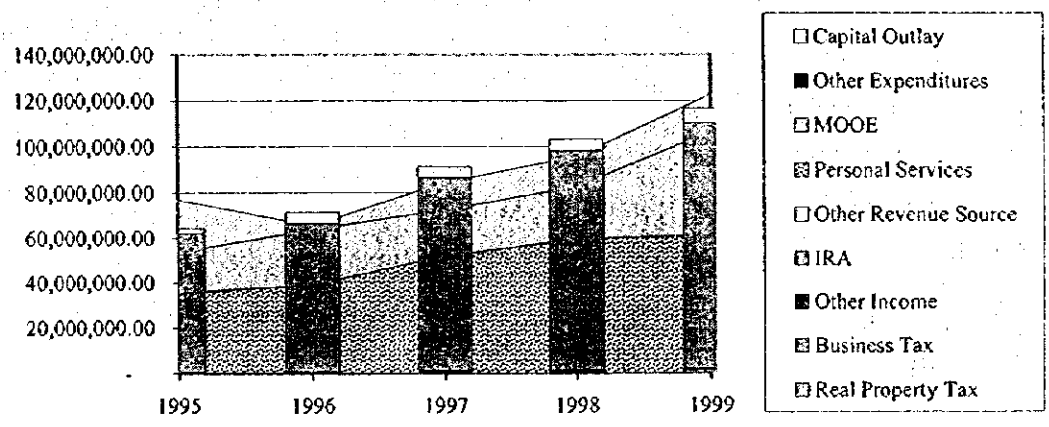
Unit: Pesos

PARTICULARS	1995	1996	1997	1998	1999
RECEIPTS					
Tax Revenue 1/					
Real Property Tax	458,662.20	538,550.42	935,241.37	888,480.68	1,270,000.00
Business Tax	175,406.83	106,502.55	153,929.30	191,356.88	160,000.00
Others 2/	0	127,971.00	62,146.00	62,271.75	190,000.00
IRA	61,412,604.55	65,734,358.78	85,194,783.37	96,942,592	108,350,591
Other Revenue Source	2,438,197.68	4,782,275.33	4,846,167.24	4,961,676.18	6,665,060.00
Sub-Total	64,484,871.26	71,289,658.08	91,192,267.28	103,046,377	116,035,651.00
EXPENDITURES					
Personal Services	35,505,618.97	38,850,086.03	52,084,029.76	59,199,985.54	61,410,584.31
MOOE	18,186,169.61	24,875,393.98	20,422,889.18	23,187,367.78	44,929,781.66
Others	4,103.72	66,307.20	3,800.00	169,388.03	0
Sub-Total	53,695,892.30	63,791,787.21	72,510,718.94	82,556,741.35	106,340,365.97
NET OPERATING INCOME	10,788,978.41	7,479,599.09	18,681,545.97	20,489,636.14	10,295,285.03
Add: Borrowings	15,000,000.00	0	0	0	0
Less: Capital Outlay	23,137,866.44	1,723,389.66	11,991,792.22	12,981,349.73	16,278,615.75
NET INCOME	2,651,112.52	5,774,481.21	6,689,756.12	7,508,286.41	(5,983,330.72)

Source: Provincial Accountant's Office

Note: 1/ Includes Tax Revenues (Real Property Tax, Transfer Tax, Franchise Tax, Tax on Peddlers, Occupation, Immigration Tax, Mining Tax, Sand and Gravel Tax, Community Tax, Amusement Tax, Miscellaneous, etc)
2/ Includes Secretary's Fees, and other charges.

Figure 6.2.1
Income & Expenditure of Biliran, 1995-1999



(2) Uses of Funds in the Province

Actual expenditures of the provincial government during the period from 1995 to 1998 show that personnel expenses were a major component with an average of 55.13% to the total revenue, as a result of devolution. Maintenance and operating expenses of the province was 29.47%. In addition, the province has a capital outlay with an average share of 14.8% to the total revenue. The funds for the water supply sector were part of the capital outlays of the province.

From 1995 to 1998, the province had an average of ₱ 13.15 million net operating income from operations. For 1999, the province has likewise projected a net operating income of ₱10.29 million. After deducting capital outlay, the province projects a net loss of ₱5.98 million (or -5.12% of the total revenues).

6.2.2 Availability of Funds

As previously noted, the IRA comprises 93.50% of the total income of the province, which is tapped to finance most of its expenditures including capital outlays and even non-office expenses (incidental). According to the Provincial Treasurer's Office, the amount of IRA that will be received by the province is known in advance before the end of the preceding year. Thus, for budgeting purposes, the province just uses the actual amount of IRA it received in the preceding year as its estimate of IRA for the budget year. In the case where the IRA received is larger than that of the preceding year, the province prepares a supplemental budget.

Table 6.2.2 presents the historical IRA of the provincial government and its municipalities between 1995 and budget year 1999. As shown, the average IRA of the province was 0.48% of the provincial IRA nationwide in the period 1995-1998 and budget year 1999. Likewise, the total amount of IRA allotted to all its municipalities in the years 1995-1999 was 0.31% in average. The IRA percentage of each municipality to total municipal IRA nationwide is presented in Table 6.2.2, Supporting Report.

Based on the past financial performance of the province, IRA has been a major source of funds. At first, 20% Development Fund (DF) and 5% Calamity Fund are deducted from the total amount of provincial IRA. Then, the remaining portion of the IRA is combined with other income sources. Contractual and statutory items, which are covered by R.A. 324 (b) are deducted from the pooled income (75% IRA + all other income) before other appropriations are made.

Based on the income statement of the province, available funds of the province are mainly spent to cover personnel salaries, benefits, the MOOE and capital expenditures. The provincial government's combined income from IRA and its tax, and non-tax revenues are just sufficient to cover operating, capital and non-office expenses. Thus, there is little surplus income that can be tapped for additional capital expenditures.

Table 6.2.2 Internal Revenue Allotment to the Provinces, 1995 – 1999

Unit: Pesos

		1995	1996	1997	1998	1999
National	I. National Total of IRA	55,202,000,000	58,022,990,000	71,049,000,000	80,990,763,000	96,780,000,000
	(a) IRA to all Provinces	12,696,644,000	13,755,011,803	17,813,000,000	20,054,018,925	22,535,543,437
	(b) IRA to all Cities	12,696,460,000	13,345,287,700	16,341,270,000	18,627,875,490	20,370,081,167
	(c) IRA to all Municipalities	18,768,952,000	19,607,715,553	24,849,000,000	28,245,815,434	31,830,589,345
Provincial	II. IRA to Biliran					
	(1) Total: (2) + (3)	116,833,079	125,275,971	162,000,776	185,178,949	209,802,071
	(2) Provincial Government	61,412,604	65,716,087	85,194,781	96,942,592	108,350,591
	Percentage (a)	0.48	0.48	0.48	0.48	0.46
	(3) Municipalities	55,420,475	59,559,884	76,805,995	88,236,357	101,451,480
	Percentage (c)	0.30	0.30	0.31	0.31	0.32
	III. Total Income of the Provincial Government	64,484,871	712,89,658	91,192,267	103,046,377	116,035,651.00
	Percentage of IRA	95.24	92.18	93.42	94.08	93.38
Municipalities	IV. Total Income of the Municipalities 1/	55,156,611	60,080,332	76,750,129	82,518,124	76,646,597
	Percentage of IRA	91.60	90.35	91.05	97.50	87.91
	V. IRA to Municipalities					
	TOTAL	55,420,475	59,559,884	76,805,995	88,236,357	101,451,480
	Almeria	6,071,621	6,436,761	8,361,893	10,084,482	11,563,106
	Biliran	6,281,251	6,920,300	9,146,777	40,428,417	11,955,102
	Cabucgayan	6,668,920	7,297,752	9,291,547	10,580,568	12,175,886
	Caibiran	7,167,181	8,253,739	10,313,204	11,807,250	13,610,811
	Culaba	6,340,408	6,523,002	8,756,953	10,013,878	11,496,512
	Kawayan	7,085,474	7,519,451	9,636,561	10,973,416	12,604,385
	Maripipi	4,872,393	5,272,298	6,868,130	7,790,590	8,900,027
	Naval (Capital)	10,933,227	11,336,581	14,430,930	16,557,756	19,145,651

Source: Provincial Treasurer's Office

Note: 1/ Total income of the municipalities is lower than the total IRA of municipalities due to lack of tax and other revenue income of the following municipality: Maripipi (1995 - 1999), Almeria (1999) and Caibiran (1999).

For the planned capital expenditures of the province, the 20% Development Fund (DF) of the IRA are appropriated. The percentages allotted as the DF are the minimum requirement that should be arranged for capital projects as stated in the memorandum circulars of the DILG.

Table 6.2.3 presents allotted funds for capital expenditures (20% DF) between 1995 and 1999. The 20% DF of the province, were not sufficient to cover the actual expenditures for the year 1995 but from 1996 to 1998, the province had still surplus funds due to delays in releasing of the funds. For 1999, it is projected that the 20% DF is more than adequate to cover the capital expenditures of the province, which is projected at ₱16.28 million.

Table 6.2.3 Actual Funds for Capital Expenditures (20% DF), 1995-1999

Unit: Pesos

Year	IRA of the Province (a)	Planned 20% DF 1/ (b)	Actual Expenditures on 20% DF 2/ (c)	Surplus/(Deficit)
1995	61,412,604	12,269,509.00	23,137,866.44	(10,868,357.44)
1996	65,716,087	13,210,750.20	1,723,389.66	11,487,360.54
1997	85,194,781	17,039,452.00	11,991,792.22	5,047,659.78
1998	96,942,592	19,238,471.20	12,981,349.73	6,257,121.47
1999	108,350,591	22,892,129.20	16,278,615.75	6,613,513.45

Source: Provincial Treasurer's Office

1/ The 20% DF allotted may not be equal to the computed 20% of IRA.

2/ These figures are the capital expenditures shown in Table 6.2.1 from Provincial Accountant's Office.

6.2.3 Financial Indicators

In order to determine the debt servicing capability of the province, the formula used by the Bureau of Local Government Finance (BLGF) under the Department of Finance (DOF) was employed. It takes into account the regular income of the LGU referring to revenues (real property and business taxes), receipts from economic enterprises, as well as fees and charges that are collected regularly. Receipts from borrowings, grants and inter-fund transfers are not considered as regular income.

Following is the formula adopted by BLGF in computing the debt servicing capacity. According to the MDF Policy Governing Board Resolution 4-95, the average annual growth rate to be used should not exceed 15%.

DSC =[{RINC 1 (1+AGR) + RINC 1} + IRA 2] x 20% - AMORT

Where:

DSC = debt servicing capacity of the LGU

RINC = regular income

AGR = average growth rate

IRA = internal revenue allotment

20% = debt servicing ceiling percentage imposed by the Local Government Code of 1991 under Section 324 (b).

AMORT = amortization of the LGU's outstanding loan

1 =current year

2 =preceding year

Based on the above formula, the amount of the debt servicing capacity of the provincial government was computed to be ₱18.7 million for the year 1999 (₱19.7million minus the loan amortization of about ₱1 million). This amount reflects the maximum loan that can be availed of from MDF. The projected local tax income for 1999 (current year) and IRA of the

province in 1998 (preceding year) are P1.62 million and P96.94 million, respectively. In 1995, the province has incurred a loan amounting to P15 million.

6.3 Past Public Investment and Present Plans

6.3.1 Past and Current Annual Investment Plans

The past and recent development of the water supply and sanitation sector in the province was undertaken by the provincial government (PPDO, PEO, PHO), DILG and DPWH (for the ADB-assisted RW3SP). Based on the limited available data, there were minimal investments on the water supply sector for the period 1995-1998 (refer to Table 6.3.1 and Figure 6.3.1), although the province received assistance from UNICEF, ADB, PAF2 (DILG).

Table 6.3.1 Actual Amount of Sector Investment to the Province by Concerned Agencies, 1995 - 1998

Unit: Pesos

Funding Category		1995-1998					
Agency	Funds	Level I	Level II	Level III	Sub-Total	Toilet	Water Disinfection
DILG	PAF 2	3,630,160			3,630,160		
DPWH		9,792,760			9,792,760		
LWUA				3,608,500	3,608,500		
DOH							
NGO (IPHC-OMSF)							
UNICEF							
PROVINCE							
MUNICIPALITY							
Prov./Mun./Rehab/Repair							
Expansion							
Total		13,422,920		3,608,500	17,031,420		

Source: Various Government Agencies.
Note: Naval Water District - No sectoral investment, only water district income on collection from water billing

In the 1998 AIP of Biliran, it was indicated that WATSAN sector projects along with other infrastructure projects (eg. multi-purpose pavement, health center, nutrition center and similar facilities) have been allotted ₱4.2 million. There is no breakdown indicating the amount of allotment specifically for the WATSAN sector. PEO is the implementing agency of various infrastructure projects.

While, in 1995, projects were mainly for maintenance and repair and installation of water meters for Biliran water supply system. In 1996, about P 425,000 have been allocated for the WATSAN sector projects (for Biliran waterworks for the repair with P 20,000; expansion of Jamorawon and Almeria waterworks systems with ₱80,000; Cabucgayan waterworks for maintenance of system with P 200,000; repair of Marvel water system with ₱10,000; Poblacion/Maripipi systems for repair/maintenance with ₱100,000; and Kawayan waterworks

for maintenance of system with P15,000). In 1997, about P1 million were allotted for the repair and maintenance of Kawayan water system that included the replacement of old and dilapidated pipes (refer to Table 6.3.3).

(1) Budgetary Allocation to the Sector

The Budget Office of the province consolidates the budget proposal submitted by all offices of the Provincial Government. While, the DBM issues a Local Budget Memorandum every October of the preceding budget year to guide the provinces in their budget preparation. The sector obtains allotment from the 20% DF allocation by the Provincial Development Council (PDC).

Once the budgetary arrangement is completed, the local chief executive (Governor) endorses it to the SP for approval and appropriation. The SP usually approves the budget, ideally before January of the budget year. In case the budget is not approved, the province operates on a re-enacted budget, which is based on the last year's budget, until the budget for the current year is approved.

(2) Capital Expenditures in the Sector

The projects programmed for implementation in the province by sector, by funding source, and by implementing agency are consolidated and presented by the PPDO in the Provincial Annual Investment Plan (AIP). The AIP is based on the planned investment of the province, as well as on the submission to the PPDO from the municipalities on their planned investments for the coming year. The AIPs of Biliran for the Sector from 1995 to 1998 are summarized in Tables 6.3.2 and 6.3.3. However, there is limited data available for the planned annual investment and the actual allocation and amount for the sector.

Table 6.3.2 shows that there was limited information available for the annual planned activities in the water supply sector, the corresponding funding sources and the amount of investment from 1995 to 1998. It is shown that only P5.9 million was spent for the repair and maintenance of water supply facilities for the period 1995-1998 and these were sourced from both provincial and municipal funds (refer to Table 6.3.3).

Table 6.3.2 Annual Investment Plan, 1995 – 1998

Unit: Pesos

Item	1995	1996	1997	1998	Total	% Share
Construction (DW, SW, Spring Box, Reservoir, Tank) Various Foreign Assisted (OECF) National (DPWH CDF, DILG PAF2) Various Local Funding (Prov / Mun)	320,000	425,000	1,000,000	4,200,000	5,945,000	100.00
Spring Development with L2 Various Foreign Assisted (OECF) National (DPWH CDF) National/Local Funding (DOH) Various Local Funding (Prov./Mun.)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Spring Development with L3 Construction Levels 2/3 (Municipal) National (DPWH CDF) Local funding (Municipal) Maintains/Rehabs/Improve L1 L2 L3 & SD (Prov/Mun) Expansion L2/L3 (Prov/Mun) Construction of Health Center Stations-Barangay (DOH) Water Disinfection Chlorination of Water Sources (DOH) Barangay Sanitation/Sanitary Toilets (DOH DILG MUN) Special Water Supply Projects (Gov't Center, Hospital – Local) – Municipal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Total	320,000	425,000	1,000,000	4,200,000	5,945,000	100.00

Source: Provincial Planning and Development Office.

Table 6.3.3 Sector Allocation in the Annual Investment Plan, 1995 – 1998

Unit: Pesos

Item	1995	1996	1997	1998	Total
Level 1 Foreign Assisted National Local	n.a.	n.a.	n.a.	n.a.	n.a.
Level 2/3 Foreign Assisted National Local	n.a.	n.a.	n.a.	n.a.	n.a.
Other : Expansion Repair/Maintenance Special Water Supply Projects (Gov't. Centers, Hosp.) – Local Water Quality Sub-Total Water Supply	320,000 n.a.	425,000 n.a.	1,000,000 n.a.	(with other infra. Projects) 4,200,000 n.a.	5,945,000 n.a.
Health Centers Sanitation Toilet (DOH) Sanitation Toilet (Municipal) Sub-Total Sanitation	n.a.	n.a.	n.a.	n.a.	n.a.
Grand Total	320,000	425,000	1,000,000	4,200,000	5,945,000

Note: * - Part of DILG - PAF2
Source: Provincial Planning and Development Office

In the AIP of the province, a total investment cost of ₱4.2 million was planned for water supply for the year 1998. But, the actual expenditures for the sector out of the 20% DF of the province were only ₱10,000 or less than 1% of the required investments (refer to Table 6.3.4). There is a further need to clarify which of the planned investments were

implemented and funded from any of the available sources such as local funds (provincial and municipal government) and foreign funds.

6.3.2 Past and Current Breakdown of 20% Development Fund

The allocation of the 20% DF is guided by DILG Memorandum Circular No.95-215 as amended by Memorandum Circular No. 96-263 issuing 'the Policies and Guidelines on the Utilization of the DF and other related matters.'

As presented in Table 6.3.4 and graphically shown in Figure 6.3.4, the infrastructure sector obtained 36% of the 20% DF in 1998 (i.e. ₱7.0 million out of ₱19.24 million). However, water supply and sanitation was given low priority with minimal share of only 1.3% of the DF.

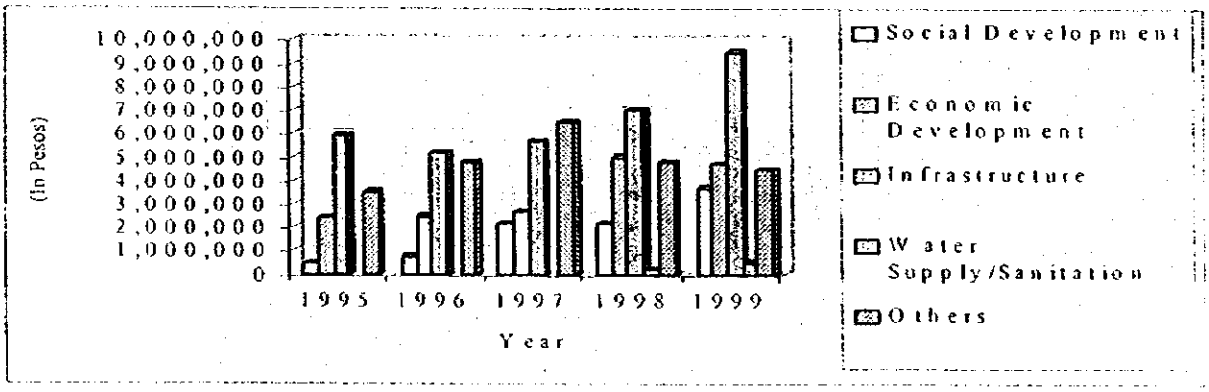
Table 6.3.4 Allocation of the 20% Development Fund, 1995-1999

Unit: Pesos

Year	Planned 20% Dev't. Fund	Actual Expenditures						
		Social Development	Economic Development	Infrastructure	Water Supply/ Sanitation	Others	Sub-Total	% of Water Supply to Actual Disbursed Amount of 20% DF
1995	12,369,510	464,000	2,430,960	5,950,000		3,524,550	12,369,510	
1996	13,210,750	750,000	2,460,750	5,200,000		4,800,000	13,210,750	
1997	17,039,450	2,179,450	2,660,000	5,700,000		6,500,000	17,039,450	
1998	19,238,470	2,180,000	5,005,820	7,000,000	250,000	4,802,650	19,238,470	1.30
1999	22,890,000	3,690,000	4,700,000	9,500,000	500,000	4,500,000	22,890,000	2.18

Source: Provincial Budget Office and Provincial Accountant's Office.
Notes: Infrastructure includes Water Supply and Sanitation
Water Supply/Sanitation expenditures are allocation for RWSSP targets only.
1999 figures are allotted amounts only. Actual figures are not yet available.

Figure 6.3.4
Allocation of the 20% Development Fund, 1995-1998



It was only in 1998 that the provincial government started to provide funds solely for WATSAN projects. Before this, expenditures for the sector were subsumed under infrastructure.

The Provincial Government is involved in the Rural Water Supply and Sanitation Project (RW3SP) which covers sixteen (16) provinces nationwide including Biliran, Eastern Samar and Southern Leyte in Region VIII.

The RW3SP project consists of two parts. Part A covers Institutional Development including (i) a capacity-building and training program for LGUs; (ii) a community participation program to help the communities design and set up WSS management organizations for cost recovery, operation and maintenance; (iii) a health and hygiene education program; and (iv) a water quality control and surveillance program. Part B covers the construction and/ or rehabilitation of water supply subprojects comprising simple, low-cost, point source water supply systems, provision of sanitation facilities in selected subprojects including public toilets, household sanitary latrines, and provision of consulting services to support Project implementation.

The total project cost is estimated at US$ 57.4 million equivalent including a foreign exchange component (US$ 20 million) and a local cost component (US$ 37.4 million). There are two loans which will be utilized until 1 February 2002, with a combined total amount equivalent to US$ 37.0 million, will be provided as follows: (i) loan of US$ 18.5 million equivalent from the Bank's ordinary capital resources (OCR), and (ii) a loan equivalent to US$ 18.5 million from the Bank's Special Funds resources (ADF).

The OCR loan will have an amortization period of 25 years, including a grace period of 5 years, an interest rate to be determined in accordance with the Bank's pool-based variable lending rate system for US$ loans, and a commitment charge of 0.75 percent per annum. The ADB loan will have a repayment period of 35 years, including a grace period of 10 years, and a service charge of 1 percent per annum. The executing agency is the Department of Public Works and Highways (DPWH).

The National Government will provide 80 percent of the cost of water supply subproject, including the proceeds of the loans, in the form of grant financing through the budget for the development of rural WSS facilities. The LGUs concerned will contribute 10 percent in cash as equity and the beneficiary barangay will contribute the remaining 10 percent of each subproject cost in kind through labor for construction works, and donation of land for WSS facilities.

With respect to sanitation facilities (except for private latrines) and district laboratories, the Government will provide all required infrastructure and the LGUs and school administrations

concerns will provide the required land as their respective equity contributions. The cost-sharing arrangements follow the Government's national standard policy for financing of all rural WSS programs.

DPWH will be the Executing Agency for the Project and shall manage and coordinate project activities with other National Government agencies, including DILG and DOH. DILG will be the Implementing Agency for Parts A (i) and (ii); and DOH will be the Implementing Agency for Parts (iii) and (iv). With appropriate inputs from DILG and the communities, LGUs with TA from DPWH through its District Engineers Offices (DEOs) will design and construct, mainly through private contractors, the water supply facilities. The PMO-RWS, headed by a Project Director, and established for the implementation of foreign-assisted water supply projects including the Bank-financed second rural water supply sector project in the Philippines, will be re-established and suitably strengthened for the Project.

DILG will coordinate and implement capacity-building and community management training programs and, through NGOs, initiate community and LGU participation. In addition, DILG, through its own and NGOs resources and assisted by consultants, will carry out socioeconomic surveys and community participation activities for the subprojects. Decisions relating to site selection, subprojects design, and appropriate technology will be made at LGU level with the full participation of the beneficiary communities.

The responsibilities of BWSAs and LGUs will be as follows:

(i) At the community level, BWSAs already established (otherwise the barangay council), assisted by NGOs, will participate in the mobilization of communities and preparation of subproject proposals; and BWSAs, established as a precondition for award of contracts, will assist in construction and be fully in charge of O & M of the facilities;

(ii) The mayor, as chief executive of LGU (municipal level), will be responsible for managing the Project activities at the municipal government level in coordination with DEO and the local DOH office. The project activities at this level will be the selection and formulation of subproject proposals, implementation of subprojects and training.

(iii) At the provincial LGU level, the Governor of the province will have overall responsibility for a provincial board, which will appraise, through the provincial planning and development office and approve subproject proposals prepared at the municipal government level.

For cost recovery, the Government will ensure that BWSAs will provide for a part of the capital costs and all O & M costs (including depreciation) related to the WSS facilities constructed and/or rehabilitated under the Project as follows:

(a) for capital costs, BWSAs will provide 10 percent of the capital costs of the water supply facilities in kind; and

(b) for O & M costs, BWSAs will provide the full costs of both routine O & M costs and replacement of assets.

District laboratories and public toilets will be maintained by LGUs concerned. School toilets will be maintained by the respective school administrators. Thus, the provincial government will fund WATSAN sector project on the basis of observed financial arrangements.

(a) Logistic support with required funding

The LGUs through the course of project implementation shall ensure the provision of adequate logistic support with financial arrangements. The LGUs have not given priority to the requirements considering the budgetary constraint. The AIP needs to include the plan for the logistic supports entailing manpower and vehicle allocation.

Further, the province shall determine financial arrangements for the implementation of Medium-Term Development Plan (2000-2004) to be prepared, entailing the share to the relevant sector from development fund of IRA and other financial sources to be availed.

(b) Raising funds and provision of subsidies to support capital development in municipalities

The province provides the subsidies to support capital development at the municipal and barangay levels through its 20% DF. However, barangays and municipalities that request funding must be prompt in submitting the necessary documents to PPDO for processing. Out of the 20% DF, the province may provide logistics for manpower requirement for devolved functions.

6.4 LGUs' Present Financing Sources and Management Participation in the Sector

6.4.1 Cost Sharing Arrangements / Counterpart Funding

The implementation of water supply projects was previously undertaken by a task force comprising of the Provincial Planning and Development Office (PPDO) where at least one senior staff is assigned for water supply and sanitation on a project basis. Provincial Engineering Office (PEO) for implementation of Levels I, II and III systems where four (4)

civil engineers and one (1) chemical engineer can be assigned for water supply systems and Provincial Health Office (PHO) for water quality surveillance by one sanitary inspector.

It is noted that there are a few functional BWSAs, where majority needs reactivation through a joint effort of the province and the DILG. DPWH has been involved in Level I water supply system and DILG where provincial and municipal staff have been assigned. Under the previous cost-sharing arrangement, the province's share was 10 percent of the project cost while the municipalities/ barangays' share is 10 percent. The share of LGUs and users is mainly contributed through labor. For current O&M expenses, there was minimal contribution by users.

Currently, the sector projects receive funds under the allotment for social services sector and are placed under the construction, repair and maintenance of municipal and barangay infrastructure facilities and utilities. Water supply and sanitation project is combined with multi-purpose pavement, health center, nutrition center and similar facilities.

For any central government grants that are provided for the development of Level I water supply systems and sanitation facilities to the limited classes of municipalities, the LGUs and beneficiaries concerned shall share the capital cost required. No subsidies from the central government will be provided for the construction of Level II and III water supply systems. Cost sharing among concerned parties (LGUs, central government agencies and barangay people) has been made within realistic arrangement/ current capacity (though the level of the practice is far from present GOP policy).

According to AIP, the province allocates part of 20% development fund of IRA to the prioritized municipalities. Although the experience of the province on the access to other donors is still minimal, there has been assistance from ADB (Level I).

The following are other financial arrangements and issues based on discussions with Provincial Treasurer, Budget and Accountant Offices.

a) The PEO implements the Provincial government funded projects under the General Fund. The implementation of these projects is closely monitored with reference to the Local Committee to decide on priority projects for their financing, the members of which come from Budget Office, Treasurer's Office, PPDO and Accounting Office. All projects must have barangay resolutions. The PDC (Provincial Development Council) also prepares its justification for the prioritization of projects and progressive disbursements. For the

sector implementation, the following are the local funding sources and corresponding implementing agencies.

Funding Source	Implementing Agency
Provincial Government	PEO
CDF (Congressmen)	DPWH - District Office
Municipal Government	Municipal Government

A new cost-sharing scheme was authorized in 1998 in accordance with the policy on national government grants. It is stated that "this scheme shall be applied to all new ODA-assisted projects that are currently being packaged in support of LGUs". Programs of central government agencies that involve devolved functions, particularly those that have social and/or environmental objectives are implemented through a cost-sharing arrangement between the central government agency and LGUs.

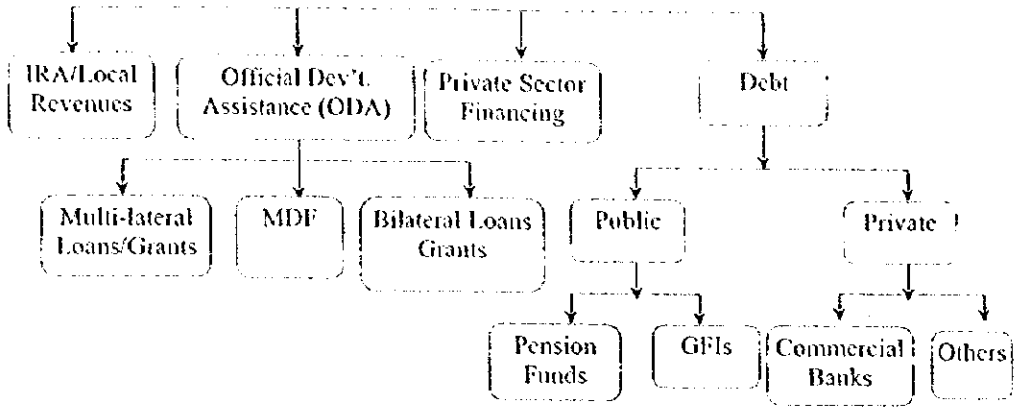
For any central government grants that are provided for the development of Level I water supply systems and sanitation facilities to the limited classes of municipalities, the LGUs and beneficiaries concerned shall share the capital cost required. No subsidies from the central government will be provided for the construction of Level II and III water supply systems.

6.4.2 ODA Assisted Projects and Grant /Aid

Other external source of funds of the province is foreign assisted projects either directly coursed through the province as in the case of the JICA (grant). Water districts in the province likewise avail of funding through loans that are directly obtained from LWUA.

As of now, there was no NGO counterpart funding experienced by the Province. Thus, LGUs have the following financing options (refer to Figure 6.4.1): IRA, ODA, private sector financing and debt, both public and private sector debts. A more detailed discussion of the different financing options is presented in the Supporting Report. Below are the major commonly availed alternative financing options by LGUs.

Figure 6.4.1 LGU Financing Options



Arrangement through Conduits

(1) Municipal Development Fund (MDF)

The MDF is a revolving fund created under Presidential Decree No. 1914 to provide LGUs access to foreign loans, assistance or grants. Operations of the MDF, as well as the evaluation and control of local government transactions of the fund, are guided by the financial policies defined in the Joint Circular No. 6-87 of the DOF, COA and DBM. The policies include, among others, the following:

- On-lending terms for local governments or government corporations to be in accordance with the terms and conditions of the international agreements with foreign financial institutions;
- Loan repayments to conform with the terms and conditions of the corresponding Loan and Project Agreements;
- Annual debt service liabilities to all creditors to be at least 120 per cent of total net annual revenues from all sources after operating costs, unless otherwise provided in a mutual agreement among all parties concerned;
- Repayment to MDF to take precedence over all subsequent borrowings incurred;
- Payment of additional interest, charges and fees on amounts to be relent to local governments may be required by the Secretary of Finance in consultation or agreement with foreign lending institutions and LGUs/Project Cities to cover foreign exchange risks, commitment charges and front-end fees applied on foreign borrowings by lending institutions; and
- Internal revenue/specific tax allotments to be withheld by the DOF in case of default or arrears for more than three (3) months.

The Policy on accessing loans through the MDF is currently under review by the central government to make the terms and conditions more concessional towards the 4th to 6th class LGUs.

(2) Governmental Financing Institutions (GFI)

In the past, the LGUs could not access financing institutions for direct assistance. But with the devolution of the sector to the LGUs, the LGUs could now access direct financing from banks and other financing institutions.

Among the GFIs through which LGUs can access ODA loans are the Land Bank of the Philippines (LBP) and the Development Bank of the Philippines (DBP). For the LGU to enter into a loan, the respective legislative council (Sangguniang Panlalawigan, PA for the Province; Sangguniang Panglunsod, SP for the City; and Sangguniang Bayan, SB for the Municipality) will authorize the Chief Executive Officer (Governor or Mayor, as the case may be). The collateral that the LGU may use in order to avail of loans from the bank could be any of the following: deposit hold out, public land and assignment of IRA.

In a deposit hold out loan, loanable amount is based on the amount in the time deposit account of the LGU in the bank. The LGU is allowed a maximum loanable amount of up to 90 per cent of the total amount of its time deposit account in the bank. One of the terms for this kind of loan includes deduction of amount due from the LGUs IRA deposited in that bank.

Another condition that the bank usually imposes on the loan is the signing of a MOA between the LGU and the bank, where the LGU guarantees that the loan will be honored despite a change in administration in the next election. Interest rate is not fixed. Loanable amount may be based on the amount of time deposit of the province in the bank.

Other collaterals accepted by the bank are: public land and assignment of IRA. Interest rate is not fixed but fluctuating depending on the current interest rates prevailing during repayment. Penalty charges are imposed whenever the IRA of the province is delayed.

(3) Foreign Lending Agencies

The external assistance to the Sector in the province comes from foreign assisted projects. Before the devolution of the sector, the province was a beneficiary of UNICEF and JICA health services. After the devolution, the province became the direct recipient of foreign grants. The most recent experience of the province in foreign grants was the UNDP-WATSAN project, where the province is a direct recipient from the donor.

There is a currently World Bank-assisted project, the Local Government Unit-Urban Water and Sanitation Project (LGUUWSP), which was conceived in mid-1995 by the Government thru the DILG. The project is based on two underlying principles: "demand-driven approach" in project development and implementation (the project shall provide services that the consumers want and are willing to pay for and that the services shall be managed at the lowest appropriate levels); and the "adoption of commercial principles" in the management/operation of the water utilities by involving the private sector or the facilities must be operated as commercial entities and water treated as an economic commodity.

The project promotes full cost recovery, that is, the tariff to be paid by the consumers should cover the cost of operation and maintenance and the repayment of the LGU DBP loan. The system shall be operated by a private operator under a long-term lease contract with the LGU. It aims to support the watersupply requirement in the urban centers of approximately 250 small and medium sized municipalities, benefiting about 6 million people. There are two (2) sets of target markets, namely:

(1) Municipalities/ cities, irrespective of income class, which have not formed a water district; and
(2) Municipalities/ cities, irrespective of income class, which have water districts but are not in LWUA's current program of assistance (in which case, the LGU should secure a certification/ clearance to that effect). In the event that the local water district is receiving a loan from LWUA, it shall seek clearance from LWUA prior to entering into an agreement with LGU concerned in any program of system expansion/rehabilitation. The LGU equity ranges from 10-25% of the total project cost.

The overall cost estimated nationwide and implementation timetable of the LGUUWSP are as follows:

In US$ Million

Phase	World Bank	LGU	Total
1999 - 2002	23.3	13.7	37.0
2000 - 2004	60.0	20.0	80.0
2003 - 2006	100.0	33.0	133.0
Total	183.3	66.7	250.0

Relending terms are as follows:

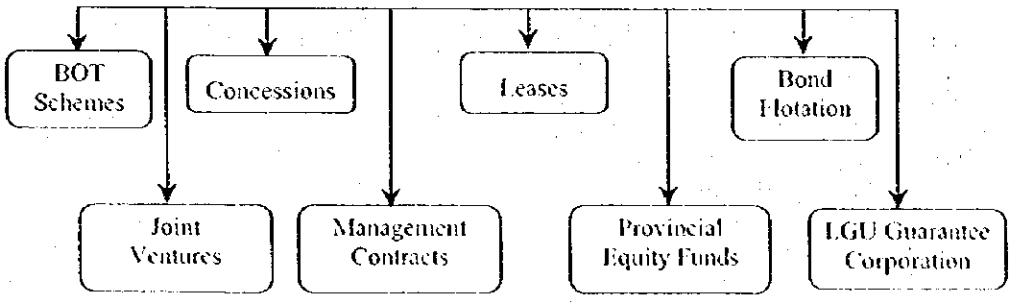
1) World Bank funds shall be channelled thru the Development Bank of the Philippines (DBP) which shall relend them as sub-project loans to the LGUs.
2) The DBP sub-project loan shall include cost of feasibility study, technical design and construction of the water supply facility.
3) Basic terms of the loan are:
   - Interest per annum; 15%
   - Amortization Period; 15 years with 3-year grace period.

(4) Private Sector Financing Schemes

There are several private sector financing modalities that can be promoted to finance WATSAN sector projects particularly in urban areas, where service area coverage may warrant liability of WATSAN investments for a profit by the private sector proponent. Further, Level III water supply expansion projects are now increasingly financed thru private sector financing mainly thru concession contracts and BOT schemes.

Figure 6.4.2 presents the different modalities for private sector financing that may be tapped by LGUs for financing water supply and sanitation sector projects. A more detailed discussion of the private sector financing schemes is presented in the Supporting Report.

Figure 6.4.2 Private Sector Financing



6.4.3 LGU-Financed and Managed Waterworks/Water District

(1) Past Financial Performance of WDs and RWSAs/ BWSAs

Currently, the priority in budget allocation is given to physical construction works, and not to supporting activities to sustain the sector projects.

- Expansion of the system is required to meet current demand (existing system was constructed about 20 – 30 years ago), but there is no expansion plan/design prepared by the municipality. The required study includes, among others, a social study with an assistance from Provincial government to confirm user's participation and willingness to pay, and financial analysis entailing cost sharing among concerned parties.
- The municipal government is providing the maintenance required. The municipal treasurer collects water charges.

As shown in Table 6.4.1, though the information provided is limited, Naval WD has the largest number of metered connections, totalling 2,696 connections. Average household water consumption is about 20 cu.m. per month. Other WDs/ waterworks have no financial data on their revenues and expenditures.

Further, there are no data available on the loan status of the WDs (refer to Table 6.4.2).

Table 6.4.1 Financial Indicators of Provincial/Municipal Waterworks in the Province (as of June 1998)

Waterworks	Description						
	No. of Metered Connec-tions	No. of Flat Rate/ Unmetered Connec-tions	Average Monthly Rate	Average Consump-tion per HH	Average Expenditu-res	Average Revenue	Collection Efficiency
	Nos.	Nos.	Pesos/cu. m.	Cu.m./mo.	Pesos/mo.	Pesos/ mo.	Percent (%)
Almeria – Almeria WWS	1,078			20.0			
Biliran - LGU-Biliran	412			26.3	n.a.	n.a.	n.a.
Cabucgayan - Sitio Naga WWS		432					
Caibiran - Caibiran WWS (Palanay)		147					
- Caibiran WWS (Victory)		464					
Culaba - Bohol RWSA		273		150.0			
- Culaba Central							
- Kalipayan		16					
- Pinamihagan							
Kawayan - Baganito		20					
- Bahte WW		90					
- Bilwang WW		6					
- Bulalacao WW		5					
- Barabod WW		35					
- Inasuyan		50					
- Kansanoc WW		20					
- Madao WW		50					
- Mapuyo WW		63					
- Masagaosao WW		25					
- Masagongsong		55					

Table 6.4.1 Financial Indicators of Provincial/Municipal Waterworks in the Province (as of June 1998)

(Cont'd)

Waterworks	Description						
	No. of Metered Connections	No. of Flat Rate/ Unmetered Connections	Average Monthly Rate	Average Consumption per HH	Average Expenditures	Average Revenue	Collection Efficiency
	Nos.	Nos.	Pesos/cu. m.	Cu.m./mo.	Pesos/mo.	Pesos/ mo.	Percent (%)
- Poblacion WW		121					
- San Lorenzo WWS		15					
- Tabunan - North		15					
- Tubig Guinoo WW		30					
- Tuedao WW		108					
- Ungale WW		80					
- V. Cornejo WW		15					
Naval (Capital) - Naval WD	2,696			19.2			
Provincial Total	4,186	2,135					

Source: Water Districts.

Table 6.4.2 Loan Status of Provincial/Municipal Waterworks (as of June 1998)

Waterworks	Description			
	Total Loan Availed (1,000 Pesos)	Remaining Payment Period Months	Average Monthly Amortization	Current Arrears
n.a.	n.a.	n.a.	n.a.	n.a.

Source: Local Water Utilities Administration

6.5 Existing Practices by the LGU on Cost Recovery

6.5.1 Capital Cost

In the previous arrangements, the capital cost for Level I system was free to the community, while operation and maintenance was the responsibility of the association. As for Level II systems, the capital cost was shouldered by the RWSA through loan or grants. Water charges collected by each association cover the cost of operation and maintenance and loan amortization. According to the Loan Department of LWUA, the new loan disbursement to RWSAs has been stopped.

For Level III system, WDs or RWSAs bear the entire capital cost financed by LWUA through loans with concessional terms of 8.5%-12.5% interest rate and repayment period extending up to thirty (30) years. Less capable WDs are granted soft loans that are interest free during the first five (5) years operation. In the occasion of the first assistance by LWUA, the loan for the full investment required could be provided for the WDs.

For the expansion/rehabilitation works of the WDs, 90% of required investment may be granted by a loan and the remaining 10% shall be arranged by the equity of WDs. The cost of

amortizing the loan and operation and maintenance of the system is recovered through monthly water bills. In case of LGU's operating Level III systems, the capital cost is managed by the LGU using part of DF and other financial sources (borrowings and aids).

Regarding the sanitation sector, the construction of the superstructure and the depository of household toilets is through self-help.

6.5.2 Operation and Maintenance Cost

The operation and maintenance cost for Level I and II water supply systems is envisioned to be the responsibility of the users. As such, the users shall form an organization (or association) to handle the collection of water charges.

When DPWH had been undertaking the construction of Level I water supply facilities, the DPWH through DEOs and PEOs assisted to form many BWSAs. However, most of these BWSAs are no longer functioning, due to non-collection of water fees. As a consequence, the users had to go to the LGUs (usually barangay or municipal government) to address the problem. In some cases, the users likewise requested the PEOs for assistance.

Although the DEO had no budget for operation and maintenance, it extended assistance in the form of materials (such as gaskets or joint pipes) from their supplies, if these items are available. Because of this situation, the emphasis was placed on the need of monthly contributions from the users for the O&M.

Cost recovery for Level III systems, particularly those covered by Water Districts is managed through different systems. The households covered by the Water District can be disconnected in case of no payment by the users.

6.6 Affordability of Users

This sub-section presents the affordability of users by service level. However, base information for the analysis is limited to the results from field survey at selected barangays and from the water districts in the province.

6.6.1 Capital Cost Contribution

All respondents of the group interview survey were members of the BWSA. About half of the respondents had participated in the construction of previous WATSAN facilities by providing needed labor, while the other half had donated sites for various WATSAN facilities. Thus, as in the past, all the respondents indicated their willingness to participate in the future water supply projects, from BWSA formation to water rates' formulation, selection of sites and levels of service, the construction of facilities and even in the O & M of the facilities.

All respondents indicated their willingness to contribute in cash or in kind for the construction of WATSAN facilities in their respective barangays. Should they be required to contribute, all the respondents preferred to provide free labor during the construction.

From the key informant survey, it was noted that all barangays were recipients of technical and financial assistance from the provincial and municipal government, which consisted mostly of construction of water tanks, health centers and provision of training programs. Further, it was noted in the rapid assessment survey and the group interviews that some municipalities would need a government subsidy particularly in the construction of WATSAN facilities.

With respect to the construction cost of private toilet, the cost seems to be relatively expensive as compared with the family income. The estimated cost of flush type toilet facility is about 5.47 times higher than the median monthly family income in the province and since this is the case, subsidy may be provided by the LGU concerned.

6.6.2 Operation and Maintenance Cost

Based on the results of the key informant survey for Level I services, common problems cited by the respondents with respect to O & M of WATSAN facilities is the lack of funds for maintenance work. This can be attributed to the fact that majority of the members/ beneficiaries do not pay for their water supply. As indicated by the respondents, only the beneficiaries from Barangay Almeria pay for the O & M cost of their WATSAN facilities. The monthly payment for water consumption is minimal, which is ₱10.00 or below, and is believed by users to be sufficient to cover the cost of O & M of WATSAN facilities. The BWSA Treasurer was responsible for collecting the fees.

Similarly, from the group interview survey (Level I services), the respondents indicated that women in their barangays actively participate in the O & M of the watersupply facilities. Majority of the respondents presently paying for water indicated that they paid less than P5.00 a month. About 17 respondents, on the other hand, said they paid from P6.00 to 10.00, while the rest did not respond.

The respondents who paid their water bills believed that the amount was sufficient to cover the cost of O & M of the WATSAN facilities. Those who did not pay were uncertain on the issue. More than half of the respondents noted that the barangay council is responsible for shouldering the O & M costs, while the majority was willing to pay for the cost of O & M of future water supply facilities. Of the respondents who were willing to pay, the majority claimed they could only pay water fees below P5.00, while 16 respondents would pay P6.00 to P10.00 per month.

In the water districts or Level III waterworks, O & M expenses are basically covered by the user fees depending on the water consumption amount by water user category. The water charge system was established by LWUA to compel water districts to be self-sufficient, financially viable and be able to repay any loans obtained to improve water supply services.

Table 6.6.1 presents the affordability of households by service level. At present, the current water bills in the province seem to be within an affordable range based on experience, although the actual income level varies from municipality to municipality and barangay to barangay (urban barangay population have higher income than those in rural barangays, because of the more diverse economic and commercial activities).

Table 6.6.1 Affordability in Water Supply and Sanitation Services

Income/ Level of Service	Amount (Pesos)	% to Monthly Income	Affordable Range (%) [3]
Median of Monthly Income [1]	4,201.08		-
Average Level III: Monthly Water Bill [2]	50.00	1.19	5.0 or less
Average Level II: Monthly Water Bill	30.00	0.71	2.0 - 3.0
Mo. Level I Expenditures	10.00	0.24	1.0 or less
Private Toilet Construction Cost - Flush Type Toilet [2]	23,000	5.47	

Notes:

[1] 1994 Family Income and Expenditures Survey, NSO. Average mean income of Biliran (Leyte province figure) in 1994 is P51,042 annually for Biliran and median income is P35,944. In 1999, its average mean income is estimate as P71,589 and P50,413 for median income. For Region VIII, the mean income and median income in 1994 were P49,912 and P34,780, respectively and in 1999, the mean income is estimated to be P70,004 and the median income is P48,780.75

[2] Data from PSPT; It is assumed that 21 cu m. will be consumed per family.

[3] Current prices estimated in this study

[4] Based on the experiences mainly from LWUA, DPWH and DILG

Chapter 7

WATER SOURCE DEVELOPMENT

7. WATER SOURCE DEVELOPMENT

7.1 General

The study on water source development covers the entire province in order to come up with water source potential exploitable mainly as domestic water supply. Emphasis is placed on groundwater availability due to its prevalent use and comparatively conservative development through the future in the jurisdiction of the provincial government. It is also advantageous to utilize groundwater for domestic water supply because of better quality and economical use. Nevertheless, with reference to river basin water resources management, surface water potential of major rivers was studied to provide information for the future use.

A "Groundwater Availability Map" was prepared, which identifies the areas with available potable water sources. The study has two major components: (1) interpretation of existing geologic and groundwater conditions, and (2) preparation of Groundwater Availability Map to show groundwater potential areas under three categorized areas. Furthermore, standard well specifications by municipality were also established to reflect in the medium-term sector development plan.

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 from relevant local offices in the field (including spring inventories with verifications). The field information directly collected by the Study Team was also used to increase the accuracy of the Map. Among the information, the Geologic Map published by BMGS, the Water Resource Investigation Report and the Well Inventory Database of NWRB are 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 (details are referred to Table 7.1.2, Data Report).

The Groundwater Availability Map may be used for provincial level master plan and feasibility study at present. However, recommendations on the required investigations were presented for specific areas with scope of survey, as reference for LGUs, to conduct these prior to D/D and construction work. Aside from the requirements, 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.

An overview on current groundwater use with the conditions is summarized in Table 7.1.1 (well data collected from each municipality are presented in Table 7.1.1, Water Source Information, Data Report). There are 169 shallow wells, 37 deep wells and 122 developed springs in the province (functional sources). Majority of the wells is shallow wells. About 61% of these water sources are public facilities. Of the total existing wells, only 10 shallow wells and 6 deep wells are not functional at present. Information of untapped springs was not available at present.

Table 7.1.1 Existing Groundwater Sources in the Province

Category and Classification	Shallow Well	Deep Well	Spring	Total
1. Water source being availed				
a. Public sources	40	37	122	199
b. Privately owned sources	129	0	0	129
c. Number of water sources	169	37	122	328
d. % share of different sources	52%	11%	37%	100%
2. Water sources with problems and non-functional facilities				
a. Water quality problems*1	51	0	0	51
b. Non-functional	10	6	3	19
3. Spring source information				
a. Undeveloped	-	-	8	8
b. Untapped	-	-	NA*2	NA*2

Note. 1: Number of water sources being availed at present including those with water quality problems.
2: Number of existing water sources with problems: being used, but with water quality problem/abandoned wells.
3: Number of springs availed, but not adequately protected; and those as candidate sources to be developed.
*1: Assumed number of sources (unsafe category) based on the study on existing water supply facilities in Chapter 4.
*2: Information of untapped spring source was not available at present.

7.2 Geology

There are volcanic cones and associated flows distributed in Biliran and Maripipi Islands controlled by a major fault structure which runs parallel to the Philippine Rift Zone. These probably emerged contemporaneous with extensive volcanism prevalent throughout the archipelago during the Quaternary. The evolution of Biliran and Maripipi Islands are related to this period of volcanism.

The clastic rocks and limestone are found unconformably overlying the clastic rocks with late Miocene to early Pliocene epochs. The clastic rocks occur along the western slope of the Biliran Island. In eastern and western coastal areas in Biliran Island, the recent deposits are well sorted along the rivers in form with thin and narrow.

On the islands of Biliran and Maripipi, three broad lithologic classifications have been identified: (1) the sedimentary sequence during early Miocene to Pleistocene epochs, (2) Quaternary volcanics and (3) Recent deposits.

For the purpose of preparing the Groundwater Availability Map of the province, only rock units significant to groundwater storage and permeability are briefly described. The rock units in the province are classified into 3 main groups based on the geologic ages. In geologic age these are; the Miocene and Older Systems, the Plio-Pleistocene Series and Recent Deposits. The grouping of rock units is related to their potential as groundwater sources. The younger rocks are essential groundwater development because of their porosity and permeability relative to the older rocks. The distribution of these rock groups is shown in Figure 7.2.1, Geological Map. Its geological features are described below.

(1) Miocene and Older Systems

Rock units of Miocene and older have impermeability. They are classified as aquicludes. These rock systems are found in western part of Biliran Island.

Volcanic rock units of Biliran and Maripipi Islands are porphyritic hornblende-pyroxene andesite. The rock units of early to middle Miocene epochs generally consist of conglomerate, sandstone, and shale. In the highland areas, light to medium gray volcanics occur. In general, the rock units of middle Miocene to early Pliocene epochs are composed of tuffaceous clastics that have been greatly folded and intruded by volcanic flows and dikes.

(2) Plio-Pleistocene Series

Sedimentary rocks of this series have various range of the permeability. This formulation overlaps the older sedimentary/metamorphic/volcanic series and fringes the broad alluvial basin in eastern part of the Biliran Island.

The rock units of Plio-Pleistocene epoch are composed of clastic rocks and limestone. The clastic rocks are made up chiefly of pyroclastic materials and a sequence of low-dipping beds of conglomerates, sandstone, and shale with limestone. The overlying limestone contains minor facets of conglomerate, sandstone and shale at its base. This limestone is white, porous, corraline and is poorly bedded to massive. The sandstone and shale bed is calcareous and exhibits cross bedding.

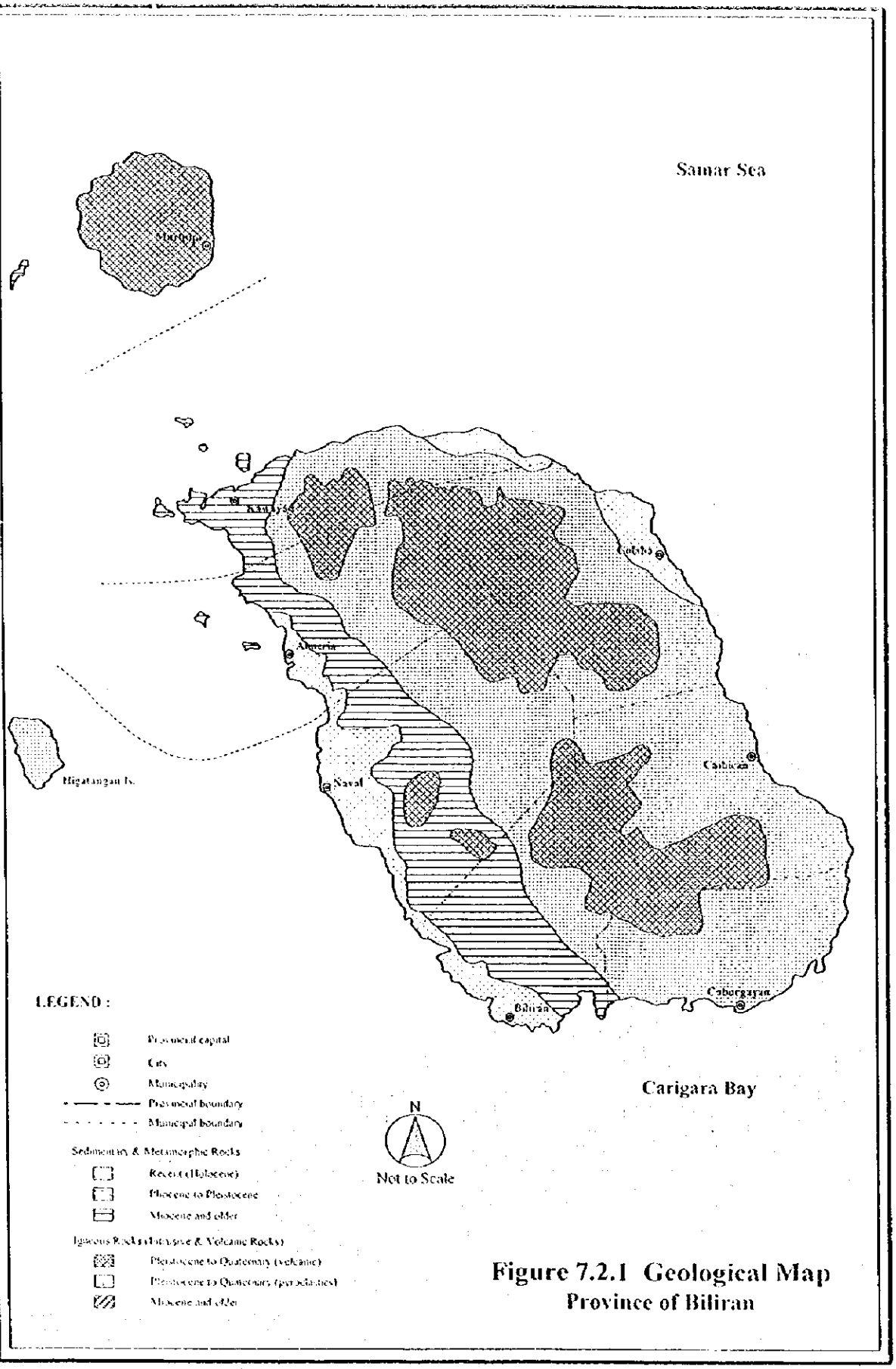


Figure 7.2.1 Geological Map
Province of Biliran

(3) Recent Deposits (Holocene Series)

Quaternary volcanics are represented in both Biliran and Maripipi Islands such as Mt. Guiauasan, Mt. Sayao and the Mt. Maripipi Summit. The volcanic cone is a hornblende-pyroxene andesite characterized by a porphyritic texture with trachitic ground mass.

The recent deposits cover broad areas in the eastern and western coasts of the Biliran Island. Narrow alluvial plains are developed in the vicinity of river mouths. The deposit consists of unconsolidated fine sand, silt, clay with minor gravel and rich tuffaceous sediments.

7.3 Groundwater Sources

7.3.1 Classification of Groundwater Availability

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

(1) Solo shallow well area

Solo shallow well area is defined in this study as area where only shallow well is available. These areas have water bearing rock formations extending not more than 20m in depth below the ground surface. Solo 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 solo shallow well area is limited, because most of the recent formations are thick or deposited on the Late Plio-Pleistocene series that usually have multiple aquifers located at greater depths.

(2) Deep well area

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

(3) Difficult area

This area is not suitable for well development. The areas under this category largely consist of rock formations older than Miocene epoch. The groundwater availability in the aforesaid rocks is very low and usually released in the opened rock fractures. Springs are the common sources of water supply in these areas.

are the common sources of water supply in these areas.

In addition to the above classification, potential areas to have high yielding deep aquifers are also presented based on NWRB's geo-resistivity survey.

7.3.2 Groundwater Availability in the Province

The Groundwater Availability Map is presented in Figure 7.3.1. The major databases used in the preparation of the map were obtained from BMGS and NWRB. The methodology and study procedures with respective outputs are discussed in 7.3.2, Supporting Report.

Technical information on the wells by municipality is also shown in the Data Report. The groundwater development potential areas in the province for the future are summarized below.

(1) Solo shallow well area

The province has a solo shallow well area which covers approximately 5% of the province. The development of shallow wells is, however, possible in the "Deep Well Area" (recent alluvium and beach deposits), where shallow aquifers usually occur.

The essential definition of shallow well is to develop an unconfined aquifer. However, it is difficult to classify an aquifer clearly into whether confined or unconfined. In this study, therefore, well classification was derived from well depth. In this connection, the shallow wells in the province are driven to depths ranging from 5.0 mbgs to 18.0 mbgs. These wells have static water level of about 3.0 mbgs (insufficient available data) and specific capacity of approximately 0.2 lpsm (insufficient available data).

(2) Deep well Area

The deep well area covers approximately 40% of the province, widely distributed in eastern hillside of Biliran Island. The deep well area is composed of alluvial plain and low hills made of sedimentary rocks. The alluvial plain is composed of recent deposits of clay, silt, sand, and gravel, which forms a groundwater storage basin for some aquifers. While, the sedimentary formation of Plio-Pleistocene epochs consist of reef limestone, sandstone, conglomerate and pyroclastics in the hillside of Biliran Island.

The coastal areas of Maripipi and Higatangan Islands, where weathered volcanic rocks are observed, can be classified into deep well area.

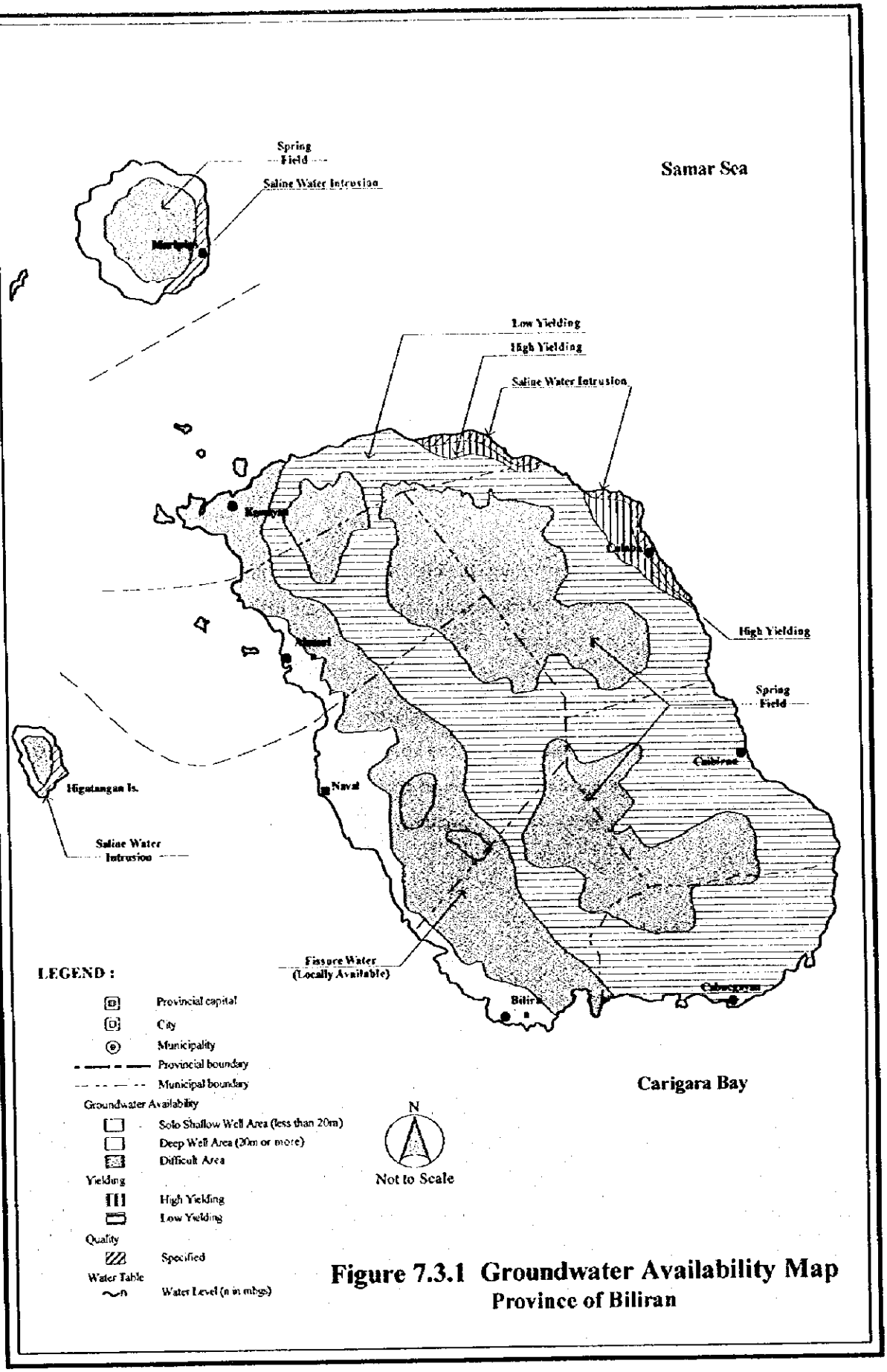


Figure 7.3.1 Groundwater Availability Map
Province of Biliran

Considering the geological formation, the alluvial plain is categorized as a high potential area for deep well development, while the pyroclastics of Plio-Pleistocene epochs are classified as a low-yielding area for deep well development. The database for deep well was not prepared due to none availability of deep well inventory at present. In alluvial plain, however, the presumptive depth of the existing deep wells is 30m with water level of 10 mbgs. The specific capacity may be estimated at 1.0 lpsm.

In the coastal areas of Biliran and Maripipi Islands made of Quaternary volcanic rocks and Plio-Pleistocene series, groundwater development is not performed yet due to the sufficient spring sources and limited population. When deep well development becomes necessary in this area, the average depth of the planned deep wells would probably be 30m with an average water level of 5 mbgs. However, the specific capacity will be good for Level-II service.

(3) Difficult area

About 55% of the provincial area are classified as a difficult area to exploit groundwater, in which the volcanic cone and sedimentary rock areas belong. These are located in the central islands and western part of Biliran Island.

The geology is made up of 2) well-compacted sediments of Oligocene to Miocene epochs including sandstone, siltstone and conglomerate, and 3) volcanic rocks of Quaternary. These rocks and formations are in dense, massive and consolidated conditions and have impervious characteristics. Groundwater occurs only in fissures or fault fracture zones.

7.3.3 Groundwater Quality

There is water quality problem in both shallow and deep wells in eastern coastal areas of the province (details are referred to Table 7.3.2, Data Report). Water quality problems are acidic groundwater in eastern piedmont areas and saline water intrusion along the eastern seashore. The results of water resources investigation for the province conducted by NWRB and the general information from DPWH-DEO and PPDO revealed these problem areas and are shown in the Groundwater Availability Map in Figure 7.3.1.

Among the water quality problems of the province, saline water intrusion is serious with a high percentage of affected existing wells (much numbers of shallow and deep wells) in populated area. The problem is extended to most of the coastal areas in the municipalities of

Culaba, Kawayan, Maripipi and Naval (Higatangan Island).

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 formation and through rock features. Because of the intense fracturing, particularly older formation, and the presence of large solution openings in limestone, secondary permeability is induced to the rocks that favors spring development.

For the study, springs are categorized into developed, undeveloped and untapped springs. A developed spring is utilized with sanitary protection provided, 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 prepared throughout the study, the province has 122 developed springs currently serving the province. Such spring sources come out from volcanic mountain areas in Biliran and Maripipi Islands. Of these springs, 17 have discharge rates of less than 2.0 lps (2.0 lps is enough for Level II water supply with service population of about 2,000 and can be applicable to grade up for small Level III water supply), while 17 springs exceed discharge rates of 2.0 lps. The other 88 developed springs have no data on discharge rates. Most of these springs are not dried up during a drought year or dry season with yields varying from 0.1 lps to 61.6 lps. Developed springs with high yields ranging from 10.5 lps to 61.6 lps are observed in the municipality of Culaba. The technical information of springs in each municipality is presented in Table 7.4.1 Existing Spring Sources, Supporting Report.

7.5 Surface Water Sources

The major surface water sources in the province are Anas (Kawayan), Amambahag, Mapula, Cabucgayan, Santol, Caray-caray, Anas (Naval) and Bagombong Rivers. There is no gauging station in the province. Other 2 stations in the province of Leyte are selected with due consideration of same climate pattern of Biliran, since their specific discharges were applied for major rivers without gauging station in the province.

Surface water use in the province totaled to 0.01 m^3/sec according to the NWRB's water rights registration database as of March 1997. All of the water rights were registered for irri-

gation purpose. The diversions for major flume, which are operated by private associations, are located at Naval, the Caray-caray River. Those water rights were registered in the 1970's.

Data on river flow together with maintenance flow and water use of the major rivers/streams were obtained from available runoff records at the gauging stations (refer to Table 7.5.1, Supporting Report). The inflow to and the outflow from the respective municipalities are estimated as the exploitable potential of the major rivers in the province as shown in Table 7.5.2, Supporting Report.

Water quality analyses at selected rivers were conducted by the PSPT during this study period. The water quality of major rivers meets the Class "A" limitation of "DENR Fresh Water Quality Criteria".

7.6 Future Development Potential of Water Sources

(1) Groundwater

Based on the study of existing water sources, groundwater is considered as a safe and more economical source for future water supply requirements of the province. Well database was prepared using collected well information. Available data were 14 shallow wells with well depth, which were collected from the municipalities of Cabucgayan, Culaba, Kawayan and Maripipi.

Shallow wells are the possible source for Level-I service. Considering the existing wells in the province, the potential aquifers for shallow wells occur between 5.0 mbgs to 18.0 mbgs. One disadvantage of shallow wells is the lowering of water level during dry season that reduces the discharge 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 depends if the wells tap to comparatively deeper aquifer. It reduces the hazards of groundwater pollution. In addition, lowering of groundwater level does not affect the discharge, since usual confinement of deep aquifer rises water level above the aquifers. In Recent deposits and Plio-Pleistocene series, good aquifers apparently may occur from 30m to 80m in depth assumed from geologic study.

Table 7.6.1 Groundwater Development Potential in the Province

Area	Groundwater Development Potential	Water Quality	Area Feature
Eastern Biliran & Maripipi Islands Area	There are several volcanic cones in Biliran and Maripipi Islands. These areas with cones are classified as difficult area. Other areas along seashore are put into deep well area. High yielding areas are found in eastern small alluvial fans of Biliran Island. Low yielding field covers hilly and piedmont areas. Deep well area in Maripipi Island is made of weathered volcanic rocks. Spring is major water source in western part of Biliran and Maripipi Islands. Spring discharge rates are generally large. Such springs are applicable for Level II water supply.	Groundwater (spring and deep well) is reported as potable. The saline water intrusion is observed in coastal areas of alluvial fans at Culaba and Kawayan. Slight acidic groundwater may be observed based on geologic background.	In the Biliran Island, there are several inactive volcanoes reaching a maximum height of 1,340 masl. Eastern plains are alluvial fans in municipalities of Culaba and Kawayan. Maripipi Island is on line of the Leyte Central Range and volcanic island. Mt. Maripipi Summit with height of 924 masl formed this island. The evolution of Biliran and Maripipi Islands are related to volcanism.
Western Biliran & Higatangan Islands Area	Solo shallow well area is located in western coast of Biliran Island. This area is distributed in three municipalities of Almeria, Biliran and Naval. Numerous shallow wells were used for drinking. Hillside of this solo shallow well area is classified as difficult area because of metamorphic rocks. Higatangan Island is classified as difficult area except coastal area where weathered formation is found. Spring is major water source in western part of Biliran Island including Naval as a provincial capital.	Groundwater quality (spring and shallow well) is potable. The saline water intrusion was reported in eastern coast of Higatangan Island.	Western coast of Biliran Island is alluvial plain including fans distributed in Almeria, Naval and Biliran. Higatangan Island lies on the northern extension of the western mountain system of Leyte Island. The clastic rocks occur along the western slope of the Biliran Island and in Higatangan Island.

Additional wells can still be developed to meet future water supply demand of the province. For future planning purpose, the Groundwater Availability Map includes basic information for municipal groundwater development with the following information: well type, well yield, water quality and static water level. Aquifer formations are shown in Table 7.6.2, Supporting Report. The groundwater development potential in the province is shown in Table 7.6.1.

The well design with gravel placement is required for additional well development. However, the natural gravel packed well for Level-I water supply is also adaptable within limited areas. The percentages of the natural gravel packed wells in the expected municipality area are assumed in Table 7.6.3, Supporting Report. However, the construction ratio of natural gravel packed well to the total requirements of the province is assumed merely at 0% presently, due to none availability of geologic information with sieve analysis results.

Most of the Level-I deep well facilities had been designed with well materials made of either galvanized iron, mild steel or low carbon steel. In the area where groundwater with acidic pH is observed, anti-metallic (polyvinyl chloride; PVC) for well casing pipes and screens, and anti-corrosive metals (stainless steel; SUS) for pump facility are required. Such groundwater quality condition may be presented in eastern hilly and piedmont area of Biliran Island. But, it was not confirmed yet due to lack of water quality examination data. Presently, the ratio of deep wells using PVC materials to the total requirements of the province is assumed at a few percent.

(2) Spring

The data/information of identified untapped spring source was not available during this study period. However, there is a high possibility to present numerous spring sources in areas belonging to the eastern slop of volcanic mountain in Biliran Island and to the whole Maripipi Island, that information was based on existing springs and geologic background. Most of untapped spring sources may have enough discharge rates (exceeding 0.5 lps) for Level-II water supply in eastern coasts of Biliran Island based on data from existing spring sources. Other areas may have few untapped springs.

(3) Surface Water

The potential surface water volume exploitable from major rivers for the use of domestic water supply was estimated by municipality. It was arranged in this calculation to ensure maintenance flow of the rivers under the drought flow in the 10-year return period with

due consideration of the present water rights.

The calculation results are shown in Table 7.5.2, Supporting Report. In particular, municipalities situated in the Caray-caray River basin are privileged to use larger amount of river water.

7.7 Water Source Development for Medium-Term Development Plan

For the preparation of the medium-term development plan in terms of water source development, standard and/or tentative specifications of wells by municipality were prepared. The parameters, such as: proportion of well type, well depth, static water level and specific capacity are shown in Table 7.7.1. These were established using the well information from NWRB and the province (detailed database is included in Table 7.1.1, Data Report), and the hydrogeological assessment presented in Table 7.6.2, Supporting Report.

Groundwater source availability (well and spring) is reflected in Table 7.7.1 that was assumed based on water sources study considering the limited information on geology, topography, water sources inventory, etc. The groundwater source availability indicates the general profile of the different types of groundwater source available in the municipalities. Hence, the descriptions have no projected meaning on future development values of its groundwater source. Considering the present water sources utilization, the percentages of spring development compared with well development for the future demand of the entire province are studied in Chapter 8 of this report.

Shallow wells are currently used in some municipalities. The municipal areas are categorized into deep well and solo shallow well areas considering the on-going practices. The proportions (%) by deep well and shallow well area are determined with reference to groundwater development potential in the Groundwater Availability Map. Furthermore, well locations are assumed in terms of rural and urban areas by municipality using the classification of rural and urban barangays.

For municipalities without any well data, the well parameters are estimated using the data of adjoining towns, provided they have similar hydrogeologic features.

Table 7.7.1 Standard/Tentative Specification of Wells by Municipality

Municipalities with Classification		Type	Proportion (%)	Standard Specification Depth Range (m)	SWL (m)	Sp. Cap. (lpsm)	Availability of Sources
Almeria	Rural	SW	10	18 <D< -	3.0	0.2	Fair DW and Few SP
		DW	40	40 <D< -	-	0.4	
	Urban	SW	100	18 <D< -	3.0	0.2	
		DW	-	- <D< -	-	-	
Biliran	Rural	SW	20	18 <D< -	3.0	0.2	Fair DW and Few SP
		DW	10	40 <D< -	-	0.4	
	Urban	SW	100	18 <D< -	3.0	0.2	
		DW	-	- <D< -	-	-	
Cabucgayan	Rural	SW	-	- <D< -	-	-	Poor DW and Few SP
		DW	80	80 <D< -	-	0.4	
	Urban	SW	-	- <D< -	-	-	
		DW	100	40 <D< -	-	0.4	
Caibiran	Rural	SW	-	- <D< -	-	-	Poor DW and Rich SP
		DW	70	80 <D< -	-	0.4	
	Urban	SW	-	- <D< -	-	-	
		DW	100	40 <D< -	-	0.4	
Culaba	Rural	SW	-	- <D< -	-	-	Fair DW and Rich SP
		DW	30	80 <D< -	-	0.4	
	Urban	SW	-	- <D< -	-	-	
		DW	100	40 <D< -	-	0.9	
Kawayan	Rural	SW	-	- <D< -	-	-	Fair DW and Few SP
		DW	40	80 <D< -	-	0.4	
	Urban	SW	-	- <D< -	-	-	
		DW	50	40 <D< -	-	0.9	
Maripipi	Rural	SW	-	- <D< -	-	-	Fair DW and Rich SP
		DW	20	40 <D< -	-	0.4	
	Urban	SW	-	- <D< -	-	-	
		DW	100	40 <D< -	-	0.4	
Naval	Rural	SW	20	18 <D< -	3.0	0.2	Fair DW and Few SP
		DW	40	80 <D< -	-	0.4	
	Urban	SW	100	18 <D< -	3.0	0.2	
		DW	-	- <D< -	-	-	

For the furtherance in collecting accurate information to design the concrete specifications of the planned wells, the following recommendations are made (details are referred to Chapter 7.7.1, Supporting Report). Prior to the detailed design or pre-construction stages, additional detailed groundwater investigations entailing the water quality examination shall be conducted. The municipalities that fall on this group are belonging to Biliran Island (7 municipalities). Table 7.7.2 summarizes the requirements.

Table 7.7.2 Detailed Groundwater Investigation Required

Municipality	Area	Investigation Activities and Specification
Entire Province	Urban & Rural Area	Groundwater Database a) Type of Sources; deep well & shallow well (functional source) Parameters to include; location, well structures (depth, diameter & screen position), static water level (SWL), discharge, draw-down, operation hour, water quality (examination results), service level, utilization, completion year & ownership b) Type of Sources; untapped spring Parameters to include; location (with map), discharge (in dry season), distance (pipeline route), relative elevation (gravity supply) and water quality (examination results)
Cabucgayan, Caibiran, Culaba & Kawayan	Urban & Rural Area	Water Quality Examination a) Type of Sources; deep well Water Quality Examination to include Fe, Mn, pH, Color, Turbidity, etc. b) Type of Sources; shallow well Water Quality Examination to include pH, Color, Turbidity, Bacteria, Coliform, etc.
Almeria, Biliran & Naval	Rural Area	Water Quality Examination Type of Sources; developed spring & untapped spring Water Quality Examination to include Physical; Turbidity, Color & TDS Chemical; pH, Total Hardness, Alkalinity & Acidity Bacteriological; Bacteria & Coliform Major Cation; Na^+, K^+, Ca^+ & Mg^+ Major Anion; CO_3^-, HCO_3^-, Cl^- & SO_4^- Trace Element; Fe & Mn

Groundwater development for water supply in urban areas (Level-II and -III systems) may require the construction of deep wells with larger casing diameter of 6 inches or more to ensure larger production rates. In these cases, short spacing intervals between the adjacent wells often cause the well interference due to the large lowering of pumping water level when the adjacent wells are operated simultaneously in a longer period. As the remedy of the problem pump-operation with excess electric consumption and deterioration of deep well life may be obliged. Thus, appropriate spacing interval and number of wells to be constructed per km^2 shall be considered. Table 7.7.1, Supporting Report presents reference information on spacing arrangements for planned wells.

Spring sources, proposed by barangay level, for future developments are shown in Table 7.6.4, Supporting Report. They shall also be investigated to confirm the development possibility in the following items: (1) location and type of spring sources, (2) fluctuation of discharge rates throughout the year, (3) distance from spring sources and proposed served areas, and (4) elevation differences between the two points.

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 almost the same manner as adopted in the 1998 Philippine National Development Plan (PNDP) and the National Sector Master Plan (NSMP), Medium-Term Investment covering the years 2000 to 2004 and Long-Term Development covering the period 2005 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 (1998) and national sector targets indicated in the National Sector Master Plan (NSMP) and the updated Medium-Term Philippine Development Plan, 1996 - 1998 (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 1995 Census of Population and Housing, the statistical data of the province and the information from relevant agencies. Provincial population by target year and the base year (1998) is estimated referring to the NSO population census results (past 10 census periods: 1903 - 1995), the 1995 Census-based National and Regional Population projection prepared by NSO, the 1995 Census-based Regional and Provincial Population projection prepared by the NEDA Regional Office VIII and the Provincial Physical Framework Plan/Comprehensive Provincial Land Use Plan. While, the population distribution to urban and rural areas prepared by NSO in 1995 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 NSMP and the NEDA Board Resolution No. 12 (s. 1995). 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 each target and its base year service coverage. In this regard, planned/on-going projects to be completed by respective base years are considered as part of existing services for each target year. 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. Also, minimum requirements for setting up a provincial laboratory to support drinking water quality surveillance and monitoring are described. This will include building, instrument/equipment and reagent/chemical requirements. The 1993 Philippine National Standards for Drinking Water (PNSDW) requires that initial examinations of water from newly constructed sources should first be undertaken before operation for public use and henceforth periodic examinations of these water supply sources/facilities.

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

8.2 Targets of Provincial Sector Plan

Provincial sector targets for the years 2004 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 (1998) service coverage was calculated as a total of 1998 figures and expected by planned/on-going projects scheduled to be completed by 1999. Table 8.2.2 shows service coverage for the planning purpose (details are referred to Supporting Report).

Table 8.2.1 Provincial Sector Targets

Sub-sector	Base Year Service Coverage	Phase I (2000-2004)		Phase II (2005-2011)	
Water Supply	Population Coverage (%)	Population Coverage (%)	Additional Population to be Served	Population Coverage (%)	Additional Population to be Served
Urban Water Supply	76	76	8,177	95	21,566
Rural Water Supply	73	76	6,840	93	19,328
Sanitation	Household Coverage (%)	Household Coverage (%)	Additional Households to be Served	Household Coverage (%)	Additional Households to be Served
Household Toilet					
Urban Area	59	68	2,674	93	6,435
Flush	14	25	724	50	5,320
Pour Flush	85	70	1,644	50	1,115
VIP/Dry	1	5	306	0	0
Rural Area	59	68	3,739	80	6,996
Flush	12	15	1,009	20	1,658
Pour Flush	87	80	2,129	80	5,338
VIP/Dry	1	5	601	0	0
School Toilet	Public School Student Coverage (%)	Public School Student Coverage (%)	Additional Public School Students to be Served	Public School Student Coverage (%)	Additional Public School Students to be Served
	35	60	10,442	90	12,847
Public Toilet	Public Utilities Coverage (%)	Public Utilities Coverage (%)	Additional Public Utilities with Sanitary Toilets	Public Utilities Coverage (%)	Additional Public Utilities with Sanitary Toilets
	83	100	17	100	5
Sewerage	Urban Population Coverage (%)	Not Applicable		Urban Population Coverage (%)	Urban Population to be Served
	0			50	14,542
Solid Waste	Urban Household Coverage (%)	Urban Household Coverage (%)	Additional Urban House-holds to be Served	Not Applicable	
	38	50	3,237		

Table 8.2.2 Estimation of Base Year Service Coverage of Water Supply

Name of Municipality	Area	Population (1998)	Population Served by 1998 Facilities				
			Level III	Level II	Level I	Total	Percentage Coverage
Almeria	Urban	2,857	2,567			2,567	90
	Rural	11,023	6,573	2,011	344	8,928	81
	Total	13,880	9,140	2,011	344	11,495	83
Biliran	Urban	4,799	1,920	330	2,483	4,733	99
	Rural	9,710		3,501	5,395	8,896	92
	Total	14,509	1,920	3,831	7,878	13,629	94
Cabucgayan	Urban	8,972	1,600	770	3,107	5,477	61
	Rural	7,937	2,000	1,320	996	4,316	54
	Total	16,909	3,600	2,090	4,103	9,793	58
Caibiran	Urban	6,053	3,816	30		3,846	64
	Rural	12,851	324	1,611	6,647	8,582	67
	Total	18,904	4,140	1,641	6,647	12,428	66
Culaba	Urban	4,447	2,128			2,128	48
	Rural	9,198	1,874	1,981	2,422	6,277	68
	Total	13,645	4,002	1,981	2,422	8,405	62
Kawayan	Urban	1,844	1,033	725		1,758	95
	Rural	15,027	3,023	6,525	4,251	13,799	92
	Total	16,871	4,056	7,250	4,251	15,557	92
Maripipi	Urban	1,434		366	779	1,145	80
	Rural	6,717		1,578	3,246	4,824	72
	Total	8,151		1,944	4,025	5,969	73
Naval (Capital)	Urban	10,559	9,630			9,630	91
	Rural	23,423	3,850	1,825	8,523	14,198	61
	Total	33,982	13,480	1,825	8,523	23,828	70
Provincial Total	Urban	40,965	22,694	2,221	6,369	31,284	76
	Rural	95,886	17,644	20,352	31,824	69,820	73
	Total	136,851	40,338	22,573	38,193	101,104	74

The base year service coverage in urban area (76%) is higher than the updated MTPDP sector target (69%) for the year 1998, likewise rural area (73%) is slightly higher than the sector target of 79%. As identified in Chapter 4, the service coverage both in urban and rural area has achieved the national targets at present.

For Phase I development, targets of service coverage for water supply by urban and rural were set up considering the following conditions:

i) at least the existing service coverage shall be secured to meet population increase;
ii) physical targets of Level I facility for rural water supply under ADB-assisted project shall be incorporated into medium-term development plan (details are referred to Supporting Report); and
iii) viable investment using available IRA to be allocated to water supply sector shall be considered.

Thus, the service coverage of 76% both for urban and rural area shall be set up in the medium-term period.

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

(2) Sanitation

1) Household toilets

As with water supply, the base year service coverage is calculated as shown in Table 8.2.3 reflecting any planned or on-going projects scheduled to be completed by 1999 (details are referred to Supporting Report).

Table 8.2.3 Base Year Service Coverage of Household Toilets

Name of Municipality	Area	1998		Households and Population Using Sanitary Toilets								
				Number of Households					Service Coverage (%)			
		Population	HHs	Flush	Pour Flush	VIP/Dry	Total	Population	Flush	Pour Flush	VIP/Dry	Total
Almeria	Urban	2,857	547		382		382	2,000		70		70
	Rural	11,023	2,170		1,886		1,886	9,591		87		87
	Total	13,880	2,717		2,268		2,268	11,591		83		83
Biliran	Urban	4,799	858	336	171	52	559	3,120	39	20	6	65
	Rural	9,710	1,722	476	235	83	794	4,467	28	14	5	46
	Total	14,509	2,580	812	406	135	1,353	7,587	31	16	5	52
Cabucgayan	Urban	8,972	1,649		889		889	4,845		54		54
	Rural	7,937	1,556		782		782	3,969		50		50
	Total	16,909	3,205		1,671		1,671	8,814		52		52
Caibiran	Urban	6,053	1,127	303	59		362	1,937	27	5		32
	Rural	12,851	2,411	864	243		1,107	5,912	36	10		46
	Total	18,904	3,538	1,167	302		1,469	7,849	33	9		42
Culaba	Urban	4,447	731		80		80	490		11		11
	Rural	9,198	1,546		649		649	3,864		42		42
	Total	13,645	2,277		729		729	4,354		32		32
Kawayan	Urban	1,844	388		369		369	1,752		95		95
	Rural	15,027	3,105		2,226		2,226	10,820		72		72
	Total	16,871	3,493		2,595		2,595	12,572		74		71
Maripipi	Urban	1,434	294		101		101	488		34		34
	Rural	6,717	1,320		671		671	3,426		51		51
	Total	8,151	1,614		772		772	3,914		48		48
Naval (Capital)	Urban	10,559	2,137		1,820		1,820	8,976		85		85
	Rural	23,423	4,942		2,879		2,879	13,586		58		58
	Total	33,982	7,079		4,699		4,699	22,562		66		66
Provincial Total	Urban	40,965	7,731	639	3,871	52	4,562	23,608	8	50	1	59
	Rural	95,886	18,772	1,340	9,571	83	10,994	55,635	7	51		59
	Total	136,851	26,503	1,979	13,442	135	15,556	79,243	7	51	1	59

The province has base year service coverage of 59%, which is a little below the current national average coverage of 60%. Both urban and rural areas register a level of 59% that is also below the national average coverage. The low coverage is due to the presence of numerous unsanitary facilities. By type of sanitary toilet facility, the existing percentage composition to total households is as follows:

Type	Urban (%)	Rural (%)
Flush	14	12
Pour-flush	85	87
VIP latrine	1	1

To attain sufficiency and equitable access to basic services, provincial target of Phase I for both urban and rural household toilets is planned at 68%. This is just a little higher than the existing national service coverage of 60% that is pursued to lessen the gap of the coverage between the urban and rural areas and to achieve a balanced distribution of this basic facility as embodied in the PNDP. For Phase II, 93% as set by the NSMP is adopted for urban household toilets, while, 80% is arranged for rural household toilets.

The existing composition of the 3 facility types serves as an indicator in the distribution for Phase I, while for Phase II, VIP and sanitary pit privy/latrine (dry-type) 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 1999 (details are referred to Supporting Report).

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

Name of Municipality	Public School Toilets			Public Toilets		
	Total Number of Public School Students (1998)	Std. No. of Public School Student that can be Served by Base Year (1998) Sanitary Toilets	Service Coverage (%)	Number of Public Utilities with Toilets in 1998	Number of Public Utility with Sanitary Toilets in Base Year (1998)	Service Coverage (%)
Almeria	3,583	1,040	29	1	1	100
Biliran	2,932	1,080	37	2	2	100
Cabucgayan	3,632	800	22	2	1	50
Caibiran	5,370	1,000	19	1		
Culaba	3,088	1,280	41	1	1	100
Kawayan	4,411	2,640	60	1	1	100
Maripipi	1,950	720	37			
Naval (Capital)	6,650	2,400	36	4	4	100
Provincial Total	31,616	10,960	35	12	10	83

Base year service coverage is 35% applying the standard number of public school students to be served by one (1) unit of toilet facility. The very low level is due to a large number of unsanitary or absence of facilities.

In the absence of national targets for school toilets, the existing level of service coverage is the base in setting up the targets. 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, 60% and 90% are set, respectively.

3) Public toilets

The base year service coverage considering expected additional coverage by 1999 is shown in Table 8.2.4 (details are referred to Supporting Report).

Almost all existing public utilities are served with at least one sanitary toilet giving an 83% coverage. This can be attributed by the fact that almost all public utilities (mostly public markets) are provided with sanitary toilet facilities.

Without national targets as of now, the indicator in setting up provincial targets would be the existing level of coverage. Accordingly, 100% coverage for both Phase I and Phase II are 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 1998 on the number of households served by the municipal refuse collection revealed that the current practice is concentrated to urban areas. The base year service coverage for urban area by municipality is reflected in Table 8.2.5.

Only about 11% of the total households in the province relied on municipal refuse collection using trucks or 38% urban household coverage. These municipalities have a total of 3 units of collection truck.

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 (2000-2004).

Table 8.2.5 Base Year Service Coverage of Municipal Solid Waste System in 1998

Name of Municipality	Total No. of Households	No. of Urban Households	No. of Households Served	Coverage of Households (%)	Coverage of Urban Households (%)
Almeria	2,717	547	492	18	90
Biliran	2,580	858			
Cabucgayan	3,205	1,649			
Caibiran	3,538	1,127			
Culaba	2,277	731			
Kawayan	3,493	388			
Maripipi	1,614	294			
Naval (Capital)	7,079	2,137	2,420	34	100
Provincial Total	26,503	7,731	2,912	11	38

8.3 Projection of Frame Values

8.3.1 Population Projection

Future population for all municipalities by urban and rural areas was projected for the target years 2004 and 2010 together with the present population in 1998 as a planning base year.

Future regional population is published by the NSO, while projection at the provincial and municipal levels were not available during the study. On the other hand, the NEDA Regional Office VIII projected the regional and provincial population for year 2006. The future population of LGUs was therefore projected (details are included in the Supporting Report). Available information for the study at present is as follows:

- NSO population census results from 1903 to 1995
- 1995 Census-based National and Regional Population Projection prepared by the NSO
- 1995 Census-based Regional and Provincial Population Projection prepared by the NEDA Regional Office-VIII
- Provincial Physical Framework Plan/Comprehensive Provincial Land Use Plan (1993-2002) prepared by the Provincial Office

(1) Comparison of regional population projected by NSO and NEDA

The NSO conducted the national population projections for the period 1995-2040 and the regional projections for the period 1995-2020. The assumptions take into account future trends in the demographic processes of fertility, mortality and migration required by the cohort-component method for projecting population.

In the regional population projection, Region VIII is classified as medium-sized region.

On the other hand, the NEDA Regional Office-VIII projected the regional population together with the provincial population for year 2006 based on the 1995 census result.

Comparing with the projected population by NSO with the NEDA projection, the latter is rather conservative, which reflects the past trend.

Table 8.3.1 Comparison of Regional Population Projection by the NSO and NEDA

Year		1980	1990	1995	2000	2005	2010
Census	Population	2,799,534	3,054,490	3,366,917			
	Growth Rate		0.88%	1.97%			
NSO Projection	Population			3,356,854	3,743,895	4,132,242	4,523,762
	Growth Rate				2.21%	2.00%	1.82%
NEDA Projection	Population			3,366,917	3,538,664	3,719,171	
	Growth Rate				1.00%	1.00%	

Note: The 1995 population as of July 1995 was used as a basis for NSO population projection.
NEDA population in 2000 and 2005 are estimated in the study.

(2) Provincial Physical Framework Plan/Comprehensive Provincial Land Use Plan (1993-2002)

The provincial and municipal population for the year 2002 was projected with 1990 as base year. The population growth rate by municipality experienced between 1980 and 1990 was basically adopted for the projection. The provincial growth rate was 0.58% between 1980 and 1990. While the experienced and projected growth rates of Region VIII were 0.88 % between 1980 and 1990 and 0.95 % between 1990 and 2002.

The population projection on the provincial total and component municipalities was made with 1990 as base year. The population for the year 2002 was projected using a uniform growth rate between 1990 and 2002 referring to the experience from 1980 to 1990 (census years).

Comparing the census and the projected population in 1995, the provincial population based on the census is about 9% higher than the projected. Regarding municipal census

population in 1995, all municipalities were higher with a range of 0.1% to 30.0% comparing with the projected figures. In addition to this, the province is presently updating its Land Use Plan using the NEDA projection based on the 1995 census population. Thus, the future projection shall be made using the 1995 census results as the base year.

(3) Population Projection of the Province

The following conditions are considered in the population projection.

Regional Population

For the regional population in the study, the projection conducted by NEDA Regional Office may be adopted assuming that a rather conservative population growth will be realized comparing with that of the NSO projection.

1) The regional population projected by the NEDA for the year 2006 is referred to for the short and medium-term periods. The annual growth rate of 1.00% between 1995 and 2006 will be adopted for the projection in 1998 and 2004 using the compounded formula with 1995 as base year.

2) For the long-term projection, it is assumed that the annual growth rates will decrease gradually as adopted in the NSO projection. The annual growth rates adopted in the NSO projection decline from 2.00% (2000 - 2005) to 1.82% (2005 - 2010), which indicate that the relative reduction rate is 0.09%. In this study, the same reduction rate may be used to the NEDA projected growth rate of 1.00% (2000 - 2005). Thus, the population in year 2010 is estimated at 3,891,501 applying the growth rate of 0.91% from year 2005. The growth rates adopted in the study correspond to half the figures employed by NSO.

Year	Population	Growth Rate
1995	3,366,917	Census result
1998	3,468,938	1.00% (1995 - 1998)
2004	3,682,348	1.00% (1995 - 2004)
2005	3,719,171	1.00% (1995 - 2005)
2010	3,891,501	0.91% (2005 - 2010)

Provincial Population

In the NEDA projection, the regional population to be increased from 1995 to 2006 was distributed to each province in proportion to the share of the provincial population increase to the regional population experienced between 1990 and 1995. In this study, it is assumed that the tendency of population growth by province will not drastically change.

Thus, the same manner as adopted by the NEDA projection was employed both for short/medium-term and long-term periods in the population distribution from the regional population to those for concerned provinces. The distribution of the regional population to be increased to the provincial population was made between the respective base/target years. Table 8.3.2 shows the projected population in year 1998, 2004 and 2010 together with the NEDA projection.

Table 8.3.2 Projected Population of the Province

Province	NEDA Projection				Projected Population		
	Population		Population Increase				
	1995	2006	Number	Share	1998	2004	2010
Biliran	132,209	149,921	17,712	4.55%	136,851	146,561	156,077
Eastern Samar	362,324	403,509	41,185	10.58%	373,118	395,697	417,825
Leyte	1,511,251	1,689,501	178,250	45.79%	1,557,966	1,655,686	1,751,458
Northern Samar	454,195	542,288	88,093	22.63%	477,282	525,577	572,908
Samar	589,373	658,859	69,486	17.85%	607,584	645,678	683,012
Southern Leyte	317,565	312,115	-5,450	-1.40%	316,137	313,149	310,221
Region	3,366,917	3,756,193	389,276	100.00%	3,468,938	3,682,348	3,891,501

Municipal Population

1) The total population of the province in 1998, 2004 and 2010 was fixed.
2) For the population projection by municipality, the same method employed in NEDA projection for the distribution of regional population to provincial population was applied. The provincial population to be increased in respective planning years was distributed to each municipality in proportion to the share of the population increase of each municipality to the provincial total experienced between 1990 and 1995. Table 8.3.3 presents the census results (1990 and 1995) and the projected population of the municipalities.

Table 8.3.3 Census Results and Projected Population of Municipalities

Municipality	Census Result				Projected Population					
	1990	1995	Pop. Growt	Share to Prosincial Pop Growth	1998		2004		2010	
					Population	Growth Rate	Population	Growth Rate	Population	Growth Rate
Almeria	12,013	13,420	1,407	9.9%	13,880	1.13%	14,812	1.12%	15,785	1.03%
Biliran	11,531	13,775	2,244	15.8%	14,509	1.75%	16,044	1.69%	17,548	1.50%
Cabucgayan	15,240	16,498	1,258	8.9%	16,909	0.82%	17,769	0.83%	18,612	0.78%
Caibiran	17,596	18,582	986	6.9%	18,901	0.57%	19,578	0.59%	20,239	0.55%
Culaba	9,822	12,703	2,881	20.3%	13,645	2.41%	15,615	2.27%	17,516	1.96%
Kawayan	15,056	16,424	1,368	9.6%	16,871	0.90%	17,807	0.90%	18,724	0.84%
Maripipi	6,943	7,853	910	6.4%	8,151	1.25%	8,773	1.23%	9,383	1.13%
Naval	29,811	32,954	3,143	22.1%	33,982	1.03%	36,133	1.03%	38,249	0.95%
Province	118,012	132,209	14,197	100.0%	136,851	1.16%	146,561	1.15%	156,077	1.05%

Note: Growth rates in 1998, 2001 and 2010 were calculated using compounded formula.

Population by Urban and Rural Area

1) Past population development

With regard to the ratio of the urban population of the province to the total population, the provincial averages in 1980 and 1990 were 20.9% and 21.1% and further increased to 27.8% in 1995. The provincial growth rate of 0.69% between 1980 and 1990 increased to 8.03% in 1995. While, the provincial average of the rural population by municipality was decreasing from 0.55% (1980 - 1990) to 0.52% (1990 - 1995).

2) Projection of urban and rural population for the years 1998, 2004 and 2010

The urban population by municipality for the target years was first projected and the rural population was calculated to meet the aforementioned total population by fixing the urban population.

In the projection of municipal urban population, the following are assumed by short/medium-term and long-term period.

- Short/Medium-term target: 1998 and 2004

  Growth rates between 1990 and 1995 in terms of the profile of urban population to total population by municipality were basically adopted. However, for those municipalities having drastic changes of growth rates between the two census periods (1990 - 1995 and 1980 - 1990), the average growth rates between 1980 and 1995 were employed. These municipalities are Cabuegayan, Culaba, Kawayan and Naval.

  In addition, some modifications were made as follows:

  - Municipality of Maripipi; Population in 1995 was fixed for short/medium-term to avoid negative growth rate.

- Long-term target: 2010

  For the long-term projection, the adopted share of urban/rural population in 2004 may be applied for the municipal population in 2010, assuming that the share of urban/rural population in the medium-term period will not drastically change.

Under the above assumptions, the provincial average share of urban population for the year 2010 was arrived at 35.4%, higher than the figure in 1995 (27.8%) and 1990 (21.1%). Table 8.3.4 presents the projected urban and rural population. The growth

rates and the shares on rural population were calculated using the estimated rural population.

Table 8.3.4 Population Projection by Urban and Rural Area:1998, 2004 and 2010

	Municipality	1998				2004				2010			
		Total	Urban/ Rural	G.R. (%)	Share (%)	Total	Urban/ Rural	G.R. (%)	Share (%)	Total	Urban/ Rural	G.R. (%)	Share (%)
Urban Area	Almeria	13,880	2,857	3.63%	20.6%	14,842	3,540	3.64%	23.9%	15,785	3,765	1.03%	23.9%
	Biliran	14,509	4,799	2.18%	33.1%	16,044	5,460	2.17%	34.0%	17,548	5,972	1.51%	34.0%
	Cabucgayan	16,909	8,972	8.51%	53.1%	17,769	14,612	8.51%	82.4%	18,612	15,337	0.78%	82.4%
	Caibiran	18,904	6,053	1.43%	32.0%	19,578	6,593	1.43%	33.7%	20,239	6,816	0.56%	33.7%
	Culaba	13,645	4,447	3.30%	32.6%	15,615	5,403	3.30%	34.6%	17,546	6,071	1.96%	34.6%
	Kawayan	16,871	1,844	0.16%	10.9%	17,807	1,862	0.16%	10.5%	18,724	1,958	0.84%	10.5%
	Maripipi	8,151	1,434	0.00%	17.6%	8,773	1,434	0.00%	16.3%	9,383	1,534	1.13%	16.3%
	Naval	33,982	10,559	3.51%	31.1%	36,133	12,988	3.51%	35.9%	38,240	13,745	0.95%	35.9%
	Province	136,851	40,965	3.72%	29.9%	146,561	51,922	4.03%	35.4%	156,077	55,198	1.02%	35.4%
Rural Area	Almeria	13,880	11,023	0.52%	79.4%	14,842	11,302	0.42%	76.1%	15,785	12,020	1.03%	76.1%
	Biliran	14,509	9,710	1.54%	66.9%	16,044	10,584	1.45%	66.0%	17,548	11,576	1.50%	66.0%
	Cabucgayan	16,909	7,937	-	46.9%	17,769	3,127	-14.38%	17.6%	18,612	3,275	0.77%	17.6%
	Caibiran	18,904	12,851	0.18%	68.0%	19,578	12,985	0.17%	66.3%	20,239	13,423	0.55%	66.3%
	Culaba	13,645	9,198	1.99%	67.4%	15,615	10,212	1.76%	65.4%	17,546	11,475	1.96%	65.4%
	Kawayan	16,871	15,027	0.99%	89.1%	17,807	15,945	0.99%	89.5%	18,724	16,766	0.84%	89.5%
	Maripipi	8,151	6,717	1.52%	82.4%	8,773	7,339	1.42%	83.7%	9,383	7,849	1.13%	83.7%
	Naval	33,982	23,423	-	68.9%	36,133	23,145	-0.20%	64.1%	38,240	24,495	0.95%	64.1%
	Province	136,851	95,886	0.14%	70.1%	146,561	94,639	-0.22%	64.6%	156,077	100,879	1.07%	64.6%

Note: G.R. - Growth Rate

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 6 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 1995 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. Based on the projection, an increase of 4% from the 1998 rate is foreseen in 2004 and another increase of 1% from the 2004 rate in 2010 (details are referred to Table 8.3.6, Supporting Report). It should be noted that a municipality had a participation rate in 1998 of 100%, an indication that some of the school enrollees are over-aged.

Table 8.3.5 shows the projected number of public school students by municipality, by target year. About 35,670 and 38,054 public school students are estimated to enroll for years 2004 and 2010, respectively.

Table 8.3.5 Projected Public School Enrollment and Number of Public Utilities by Municipality

Name of Municipality	Number of Public School Student			Number of Public Utilities		
	1998	2004	2010	1998	2004	2010
Almeria	3,583	3,825	3,943	1	3	4
Biliran	2,932	3,570	4,148	2	3	4
Cabucgayan	3,632	4,028	4,483	2	4	4
Caibiran	5,370	5,570	5,758	1	3	4
Culaba	3,088	3,579	4,259	1	3	4
Kawayan	4,411	4,482	4,713	2	4	4
Maripipi	1,950	1,989	2,128	1	3	3
Naval (Capital)	6,650	8,627	8,622	3	5	6
Provincial Total	31,616	35,670	38,054	13	28	33

8.3.3 Projection of the Number of Public Utilities

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

A total of 15 public utilities are planned for construction by year 2004 and another 5 by the year 2010. Refer to Table 8.3.2 for the number of public utilities by municipality by target year (details are referred to Supporting Report).

8.3.4 Planning Area and its Projected Population for Sewerage

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

Two (2) municipalities with a total urban population of about 14,542 are considered (refer to Table 8.5.4).

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

The number of urban households in 2004 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 and the NEDA Board Resolution No. 12 (s. 1995) are adopted to this PW4SP.

8.4.1 Water Supply

The following are the 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

Prevailing situation of urban water supply in each municipality was firstly reviewed mainly focusing on existing water sources and magnitude of service coverage. Planned/on-going projects for concerned municipalities were also studied and reflected in the planning, with due attention to merging of municipalities into an integrated water supply system. Potential water source for future development was then evaluated based on the study results in Chapter 7, taking into account the possibility to utilize untapped spring sources. Recommendations arising from these studies were also incorporated as overall development strategy.

Aforementioned studies were carried out by the following sequence:

- Review of existing water supply systems and water sources;
- Review of planned/on-going projects;
- Establishment of planning conditions covering service level, utilization of existing

facilities, water sources, and number of systems; and

- Recommendations for overall development strategy.

Table 8.4.1 presents summary of the study results by municipality.

1) Review of existing water supply systems and water sources

The municipality of Naval is served by WDs. While the municipalities of Almeria, Biliran, Cabucgayan, Caibiran, Culaba and Kawayan are served by Level III systems operated either by the municipal government or the local community.

Population served by existing Level III systems supplying to urban areas range from about 400 persons at Balite WWS in Kawayan to 13,500 persons at the Naval Water District. The average size of served population is about 3,700 persons. All existing Level III systems in urban areas are utilizing spring sources.

The remaining municipality (Maripipi), out of the total 8 municipalities has no Level III system in their urban area and is presently served by Level II systems and/or Level I facilities.

2) Review of planned/on-going projects

There is no available information on planned/on-going projects during the course of PW4SP preparation.

3) Establishment of planning conditions

a. Service level

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

b. 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 is to be absorbed by Level III service in Phase II.

Table 8.4.1 Summary of Urban Water Supply Development by Municipality

Municipality	Existing Condition	On-going/Planned Project	Water Source Availability	Future Requirements
Almeria	There is a LGU-managed Level III system to serve 1 urban barangay with served population of 2,600 (90% of urban population). Water source is spring. There are sufficient spring sources. No remarkable problems on the water supply services at present. Maintenance of the system is propoerly done by the municipal government.	None	Both spring and shallow well are possible water sources. Priority shall be given to spring development for Level III water supply. Numerous springs exist at upland area of urban barangays. Urban barangays are covered by shallow well area.	System expansion using spring source is required. Proper maintenance of the existing facilities is also required.
Biliran	There is a LGU-managed Level III system serving 2 urban barangays with served population of about 1,900 (40% of urban population). Water source is spring. The WWs adopts combined system with communal faucets. It is proposing construction of additional reservoir and distribution pipes.	None	Both spring and shallow well are possible water sources. Priority shall be given to spring development for Level III water supply. Numerous springs exist at upstream area of urban barangays. Urban barangays are covered by shallow well area.	System expansion is required and need concurrence of beneficiaries. Additional spring source development to meet future demand shall be studied.
Cabucgayan	There is a waterworks (Sitio Naga WWS) managed by association serving 3 urban with served population of about 1,600 (18% of urban population). Water source is spring. The WWs adopts combined system with communal faucets. Flat rate is adopted for water charge collection at present. Financial arrangement is not properly done. WWs would like to install water meters to sustain the WWs.	None	Both spring and deep well are possible water sources. Priority shall be given to spring development for Level III water supply. Urban barangays are covered by deep well area. When spring source is not enough for urban water supply, deep well is alternative water source. Deep well shall be designed with 40m in depth and production capacity of about 500 cu.m/d. Groundwater quality may have acidic and	System expansion of distribution pipes is required to increase service coverage. High yielding spring source shall be sought. Metering system shall be introduced for sound management of finance.

Table 8.4.1 Summary of Urban Water Supply Development by Municipality (Cont'd)

Municipality	Existing Condition	On-going/Planned Project	Water Source Availability	Future Requirements
Calbiran	There are two Level III systems serving 3 urban barangays with a total served population of 3,800 (63% of urban population). Their operating bodies are barangays. These systems adopt combined system with communal faucets. Water sources of these WWs are springs.	None	Both spring and deep well are possible water sources. Priority shall be given to spring development for Level III water supply. Urban barangays are covered by deep well area. When spring source is not enough for urban water supply, deep well is alternative water source. Deep well shall be designed with 40m in depth and production capacity of about 500 cu.m/d. Groundwater quality may have acidic and	Expansion of distribution network with water source augmentation (spring source) is required to increase service coverage. Rehabilitation of the existing system is also necessary.
Culaba	There is a Level III system to serve 3 urban barangays with served population of about 2,100 (48% of urban population). Water source is spring. Appropriate water supply service is provided at present.	None	Both spring and deep well are possible water sources. Priority shall be given to spring development for Level III water supply. Urban barangays are covered by deep well area with high yielding in the alluvial fan. When spring source is not enough for urban water supply, deep well is alternative water source. Deep well shall be designed with 40m in depth and production capacity of about 1,000 cu.m/d or more. Groundwater quality may have slight acidic locally and saline water intrusion is observed in seashore.	System expansion using spring source is required. Additional spring source shall be developed.
Kawayan	There are 2 small Level III systems serving 2 urban barangays with served population of 1,000 (56% of urban population). These waterworks are managed by association or Barangay Council. They were originally designed as Level II systems and modified with individual connections as Level III systems. Water sources are springs.	None	Urban barangays are located in difficult area. Therefore, spring is only potential water source for Level III water supply. Deep well field is located at about 4km in eastern seashore side. Well design is 40m in depth and production capacity of about 500 cu.m/d. Water quality may have acidic characteristics.	Merging of the existing systems in terms of management shall be studied.

Table 8.4.1 Summary of Urban Water Supply Development by Municipality (Cont'd)

Municipality	Existing Condition	On-going/Planned Project	Water Source Availability	Future Requirements
Maripipi	Maripipi is an island municipality. There is no Level III system in urban area at present. Urban population is 1,400. They use Level I facilities (Deep/Shallow/Developed spring). Water source is not enough in the municipality. Australian assisted project using solar system is in operation.	None	This municipality is located in volcanic island. There are spring sources at any place in this municipality. Deep well is also alternative water source in seashore belt with aquifer of weathered volcanic rocks. Deep well depth shall be 40m and its production capacity is estimated at 500 cu.m/d. Saline water intrusion is reported in seashore area.	New system using spring source shall be created. Upgrading from existing Level II system shall be studied in consideration of capacity of water source. Priority shall be given to water source study before development of Level III system.
Naval (Capital)	There is Naval Water District serving 3 urban barangays with served population of about 9,600 (91% of urban population). Water source of WD is Bongot spring and its discharge is estimated to be 3,600m3/d. The WD practices rationing water supply due to insufficient capacity of pipeline and insufficient water source especially during dry season. Water leakage from distribution pipes is also a current problem. Augmentation of transmission pipe together with water source is a requisite. As per development of another spring source along with system expansion, LWUA conducted F/S in early 1990s.	None	Both spring and shallow well are possible water sources. Priority shall be given to spring development for Level III water supply. Numerous springs exist at upstream area of urban barangays. Urban barangays are covered by shallow well area.	Function of existing system shall be reviewed/examined considering future demand. Availability of additional water source shall be confirmed. Countermeasures for water leakage from distribution pipelines shall be studied. Improvemrnt of distribution system is required. Supplementary intake, transmission facility shall be constructed to augment existing service area.

c. Water sources

Possibility/availability to utilize surface water and groundwater (spring and deep well) is evaluated as potential water sources for water supply development.

From the viewpoints of cost effectiveness and easy O&M of water supply system, utilization of spring sources is given due priority in the course of urban water supply planning. Application of deep wells for water source is regarded as the second priority in principle. Surface water is, on the other hand, not adopted at this moment, because of large capital investment requirements and complexity of surface water treatment.

d. Number of systems

In principle, one (1) Level III system is considered for urban area of every municipality. In the municipalities with an existing Level III system/s, the expansion of the system was first considered. In case of no existence of Level III system/s, a new system was recommended. Existing plan/s on the development of Level III/WD are also taken into account to determine the respective systems of the municipalities.

Possibility and necessity to merge service area of some neighboring municipalities to an urban water supply system were also studied from the viewpoint of:

- water source constraints, and
- economical development/scale merit of water supply system by cost reduction of water source development and other common facilities as well as O&M cost/minimized number of technical staff.

Any rural barangay/s being served by an existing urban Level III system are considered to continue throughout the future.

e. Rehabilitation

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

4) Overall development strategy

Expansion of the existing system/s was planned for those with WD/Level III, while creation of the system is considered for those without systems at present.

Merging of municipal systems (physical arrangement) in the long-term is considered. Integrated management systems shall also be sought. Conditions to be studied include; water source availability, willingness by concerned municipalities and technical study on cost recovery/economical construction.

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

Some municipalities have high potential for spring development due to the presence of a number of untapped spring sources favorable for urban water supply. However, a detailed survey to ensure appropriate development of spring sources shall be conducted in the implementation of the projects.

(2) Rural water supply

1) Service level

Level I systems (deep well/shallow well/developed spring) are generally planned for rural areas where houses are scattered.

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 during actual implementation.

2) Utilization of existing facilities

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

3) Water source

For Level I facilities, deep well construction is given priority wherever applicable considering 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 favorable substrata or 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. In addition to this, for deep well with high iron content, application of iron removal facility is recommended. The standard structure of iron removal facility is presented in Figures 8.4.2 (a) and 8.4.2 (b), Supporting Report.

Spring development is also included in Level I planning by adopting ADB-assisted project.

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	50mm	100mm
Borehole Diameter	150mm	200mm
Ranges of Well Depth	Standard Depth	
0 - 20m	20m	Not Applicable
21 - 50m	Not Applicable	40m
51 - 100m	Not Applicable	80m
101 - 150m	Not Applicable	120m

Profile between gravel packed well and natural gravel packed well for Level I water supply:

The open-hole drilling method is employed for the well construction to ensure yield of ground water from adequate aquifer in provision of proper screen location and specifications. The conventional "cased-hole driven well" shall be used only in cases where well specifications are established in the specified area with sufficient information on the hydrogeological condition including existence of natural gravel at the expected aquifer.

It is important to study the potential areas to adopt natural gravel method, which can perform the same level of function as gravel-packed wells. Such areas are usually limited to the upper stream of larger rivers in alluvial fans and alluvial plains. The arial proportion between those in application of gravel-packed and natural gravel pack wells will be worked out referring to the condition of the province.

Modification needs of riser pipe diameter according to the water level of deep wells:

The standard specification of deep well hand pump is set with a diameter of 2-1/2 inch in the plan. However, water level of the deep wells may range between 20m and around 40m, depending on the aquifer conditions.

Although the Malawi type deep well pump with a cylinder that is currently used in the Philippines has operation experience up to 40 m in pumping water level, the diameter of riser pipe must be adjusted between 1" to 2-1/2" in order to lower required power at the pump handle (calculating required power under the specific pumping water level).

For Level II systems, only untapped springs suitable for water supply purpose are considered. However, there was no available information on untapped springs during the course of PW4SP preparation.

4) Number of systems/facilities

The number of Level I wells and spring development is estimated based on the service level standard, while the number of Level II systems coincides with the number of untapped springs.

5) Rehabilitation

Rehabilitation of existing Level I wells is not considered, since most of the wells constructed by driving method are not suitable for rehabilitation to recover their functions. However, minor repair work for hand-pump 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/sanitary pit privy (dry-type). 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. Iso-

lated rural areas where there is dearth of water supply, sanitary pit privy (dry type) is taken into account.

(2) School toilets

Standard service level currently used by DECS (40 students per unit facility) is employed for both phases.

The standard toilet facility (1 building) with 5 units of toilet bowl to serve for 200 students is adopted for the planning purpose, which is modified from PW4SP design to provide a shallow well as a water source. Since DECS is currently promoting the "one classroom-one toilet" concept, the PW4SP also adopts this concept on a 50-50 basis, that is 50% of the school toilet requirements will be allocated using the JICA-RESP design and the other 50% will be adopting the new concept.

(3) Public toilets

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

The standard design of DOH 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 at 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 2004. 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;
- physical targets under ADB-assisted project;
- population projection by target year; and
- base year service coverage (served population) by existing facilities.

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

(1) Phase I requirements

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

With regard to development of rural water supply, the on-going ADB-assisted Rural Water Supply and Sanitation Sector Project (RW3SP) is considered as a major role in medium-term plan of PW4SP.

The physical targets of the province under the ADB-assisted project are construction of shallow well (6 units), deep well (36 units) and developed spring (34 units). Although a total of 76 units were allocated to the recipient municipalities, the actual construction has not yet started to date. Accordingly, these physical targets may be included in the Phase I requirements of this plan (details are referred to Supporting Report).

Although the utilization of untapped springs for Level II systems is given priority for rural water supply in this plan, Level I facilities under ADB-assisted project are solely considered for rural water supply (Level II systems are excluded from the proposed project).

(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 presents the service coverage by target year and by level of service as well as the additional population to be served (details are referred to Supporting Report).

Through Phase I development, approximately 16,100 persons in the province will be served by additional water supply services, of which 9,200 persons or 57% of the total will be urban population and 6,900 persons or 43% will be rural population.

For Phase II period, a total of 38,900 persons, of which 20,600 persons or 53% in urban area and 18,300 persons or 47% in rural area, will be further benefited by water supply services. This additional service coverage in urban area includes the upgrade of service level for 8,600 persons served by Level I and II facilities in 1998.

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

Name of Municipality	Area	Phase I Coverage (2004)									Phase II Coverage (2010)								
		Total Population	Service Coverage				Additional Population to be Served				Total Population	Service Coverage				Additional Population to be Served			
			Level III	Level II	Level I	Total	Level III	Level II	Level I	Total		Level III	Level II	Level I	Total	Level III	Level II	Level I	Total
Almeria	Urban	3,540	3,238			3,238	671			671	3,765	3,577			3,577	339			339
	Rural	11,302	6,573	2,011	524	9,108			180	180	12,020	6,573	2,011	2,595	11,179			2,071	2,071
	Total	14,842	9,811	2,011	524	12,346	671		180	851	15,785	10,150	2,011	2,595	14,756	339		2,071	2,410
Biliran	Urban	5,460	1,920	330	2,483	4,733					5,972	5,673			5,673	3,753			3,753
	Rural	10,584		3,501	5,665	9,166			270	270	11,576		3,501	7,265	10,766			1,600	1,600
	Total	16,044	1,920	3,831	8,148	13,899			270	270	17,548	5,673	3,501	7,265	16,439	3,753		1,600	5,353
Cabucgayan	Urban	14,642	4,374	770	3,107	8,251	2,774			2,774	15,337	14,570			14,570	10,196			10,196
	Rural	3,127	2,000	1,320	1,896	5,216			900	900	3,275	2,000	1,320	1,896	5,216				
	Total	17,769	6,374	2,090	5,003	13,467	2,774		900	3,674	18,612	16,570	1,320	1,896	19,786	10,196			10,196
Caibiran	Urban	6,593	5,065	30		5,095	1,249			1,249	6,816	6,475			6,475	1,410			1,410
	Rural	12,985	324	1,611	7,997	9,932			1,350	1,350	13,423	324	1,611	10,548	12,483			2,551	2,551
	Total	19,578	5,389	1,641	7,997	15,027	1,249		1,350	2,599	20,239	6,799	1,611	10,548	18,958	1,410		2,551	3,961
Culaba	Urban	5,403	3,151			3,151	1,023			1,023	6,071	5,767			5,767	2,616			2,616
	Rural	10,212	1,874	1,981	3,232	7,087			810	810	11,475	1,874	1,981	6,817	10,672			3,585	3,585
	Total	15,615	5,025	1,981	3,232	10,238	1,023		810	1,833	17,546	7,641	1,981	6,817	16,439	2,616		3,585	6,201
Kawayan	Urban	1,862	1,033	725		1,758					1,958	1,860			1,860	827			827
	Rural	15,945	3,023	6,525	5,061	14,609			810	810	16,766	3,023	6,525	6,044	15,592			983	983
	Total	17,807	4,056	7,250	5,061	16,367			810	810	18,724	4,883	6,525	6,044	17,452	827		983	1,810
Maripipi	Urban	1,434		366	779	1,145					1,534	1,457			1,457	1,457			1,457
	Rural	7,339		1,578	5,586	7,164			2,340	2,340	7,849		1,578	5,722	7,300			136	136
	Total	8,773		1,944	6,365	8,309			2,340	2,340	9,383	1,457	1,578	5,722	8,757	1,457		136	1,593
Naval (Capital)	Urban	12,988	12,090			12,090	2,460			2,460	13,745	13,058			13,058	968			968
	Rural	23,145	3,850	1,825	8,703	14,378			180	180	24,495	3,850	1,825	17,105	22,780			8,402	8,402
	Total	36,133	15,940	1,825	8,703	26,468	2,460		180	2,640	38,240	16,908	1,825	17,105	35,838	968		8,402	9,370
Provincial Total	Urban	51,922	30,871	2,221	6,369	39,461	8,177			8,177	55,198	52,437			52,437	21,566			21,566
	Rural	94,639	17,644	20,352	38,664	76,660			6,840	6,840	100,879	17,644	20,352	57,992	95,988			19,328	19,328
	Total	146,561	48,515	22,573	45,033	116,121	8,177		6,840	15,017	156,077	70,081	20,352	57,992	148,425	21,566		19,328	40,894