

Chapter

6

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

6. PAST FINANCIAL PERFORMANCE 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 serves 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. The municipalities' past financial performance in the same period (1995 to 1998) are 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 2.56% of the total income of the province.
- (c) Grants, Aids and Subsidies – There are no grants and subsidies reported by the province. However, there are national projects being contracted by the province that are considered as grants.
- (d) Other Income – there are no economic enterprises, but receives minimal income from various fees and charges on certain services.

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 Antique during the period 1995-1999. Local tax revenues, which were 2.56% of the total income of the province, consist of real property tax, business taxes and licenses, and miscellaneous taxes. IRA's annual average share to total income was 91.45%, which indicates that the province has historically been dependent on IRA with its low tax and non-tax revenue collections.

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. The LGU financing options are discussed in Section 6.4 and in the Supporting Report.

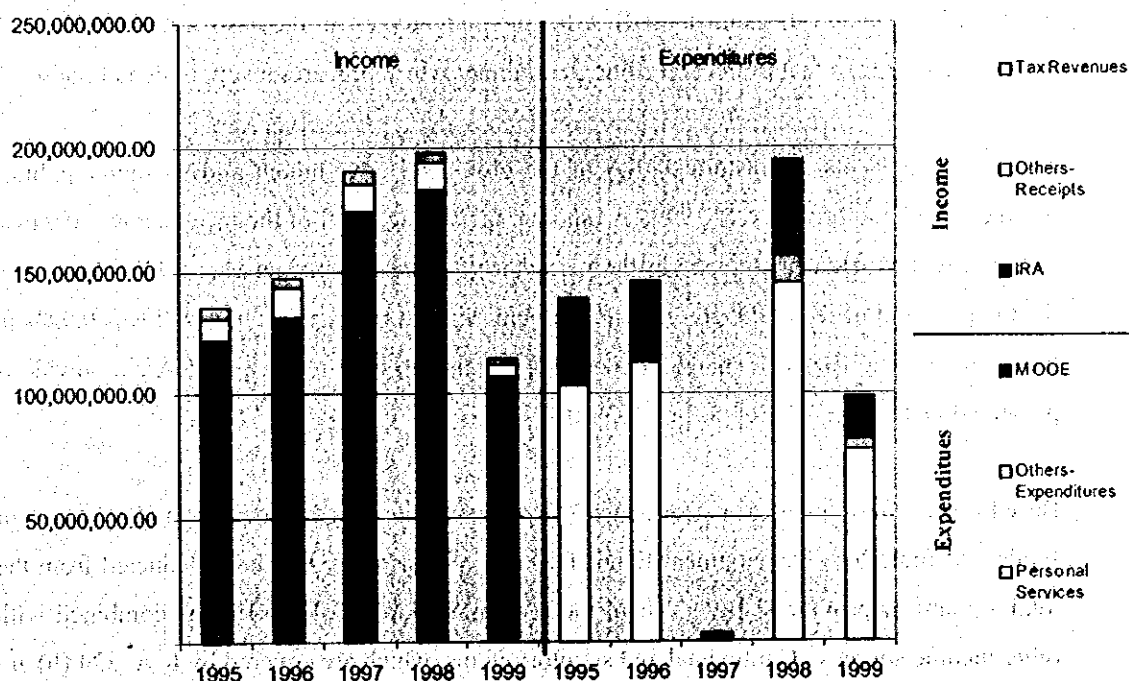
Table 6.2.1 Income and Expenditures between 1995 and 1999

Province	1995	1996	1997	1998	1999
Receipts					(As of June 30, 1999)
Tax Revenue					
- Real Property Tax	2,831,239.00	3,140,965.21	4,199,505.40	3,983,165.81	2,001,087.09
- Business Tax	-	-	-	-	-
- Others	1,344,759.86	827,353.37	1,083,067.86	443,924.91	281,995.76
IRA	122,553,364.00	131,614,640.00	174,214,423.01	182,446,470.00	107,233,674.00
Other (Non-tax)	8,659,801.23	11,732,071.81	11,078,235.58	10,866,732.64	4,687,635.73
Sub-total	135,389,164.09	147,315,030.39	190,575,231.85	197,740,293.36	114,204,392.58
Expenditures	-	-	-	-	-
Personal Services	103,243,699.00	113,054,346.94	696,511.74	144,752,282.54	77,256,182.79
MOOE	34,532,090.00	32,153,611.15	2,764,979.65	39,005,364.05	17,211,784.71
Others	626,968.00	301,030.00	43,261.17	10,962,314.66	4,534,297.70
Sub-total	138,402,757.00	145,508,988.09	3,504,752.56	194,719,961.25	99,002,265.20
Net Operating Income	(3,013,592.91)	1,806,042.30	187,070,479.29	3,020,332.11	15,202,127.38
Add: Borrowings	-	-	-	15,868,526.58	-
Surplus (Income from	-	-	-	-	-
Less: Capital Outlays	626,968.00	301,030.00	43,261.17	10,962,314.66	4,534,297.70
Net Income	(3,640,560.91)	1,505,012.30	187,027,218.12	7,926,544.03	10,667,829.68

Source: PPDO and 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 and Expenditures of Antique, 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 comprise majority of expenses with an average of 75.54% to the total revenue, as a result of devolution. Maintenance and operating expenses of the province was 16% of total revenues. In addition, the province has a capital outlay with an average share of 2.10% 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 ₱48.43 million net operating income from operations. For 1999, based on January to June data, the province has a projected net operating income of ₱30.40 million. After deducting capital outlay and non-office expenditures, the province projects a net income of ₱21.33 million (or 9.33% of the total revenues).

6.2.2 Availability of Funds

As previously noted, the IRA comprises 91.45% 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 0.946% 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 0.92% in the 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 was just sufficient to cover operating, capital and non-office expenses. Thus, there was little surplus income that could be tapped for additional expenditures.

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 the allotted funds for capital expenditures (20% DF) between 1995 and 1999. The 20% DF of the province was sufficient to cover the actual expenditures for the years 1995 to 1998. For 1999, it is projected that the 20% DF amounting to ₱47.97 million will not be adequate to cover the capital expenditures of the province, which is projected at ₱94.03 million. Thus, the province has a surplus in funding of about ₱46.06 million in 1999.

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 (DF) 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.

The 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%.

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

Where:

DSC = debt servicing capacity of the LGU

RINC = regular income

AGR = average growth rate

Table 6.2.2 Past Internal Revenue Allotment to Province from Central Government

Unit: Pesos

Distribution of IRA		1995	1996	1997	1998	1999
National	1. 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	22,259,400,000
	b) IRA to All Cities	12,696,460,000	13,345,287,700	16,341,270,000	18,627,875,490	22,259,400,000
	c) IRA to All Municipalities	18,768,952,000	19,607,715,553	24,849,000,000	28,245,815,434	32,905,200,000
Provincial	2. IRA to Antique Province					
	a) Total: (b)+(c)+(d)	243,579,476	316,780,618	411,958,052	411,223,848	522,595,489
	b) Provincial Government	122,553,364	131,614,639	174,188,341	172,844,024	214,467,353
	Percentage of 1.a)	(0.97)	(0.96)	(0.98)	(0.86)	(0.96)
	c) Cities					
	Percentage of 1.b)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	d) Municipalities	121,026,112	185,165,979	237,769,711	238,379,824	308,128,136
	Percentage of 1.c)	(0.64)	(0.94)	(0.96)	(0.84)	(0.94)
Municipalities	3. Total Revenue of Provincial Gov't.	122,553,364	131,614,640	174,214,423	182,446,470	107,233,674
	Percentage of IRA of Provincial Gov't.	(100.00)	(100.00)	(99.99)	(94.74)	(200.00)
	4. IRA to Municipalities					
	Total	121,026,112	185,165,979	237,769,711	238,379,824	308,128,136
	Anini-y	0	7,824,160	10,275,961	10,536,963	13,464,396
	Barbaza	7,739,730	8,347,908	11,443,997	11,842,933	15,107,171
	Belison	5,677,917	6,141,897	7,971,840	7,804,565	9,922,352
	Bugasong	9,763,464	10,553,193	14,676,394	15,205,060	19,451,491
	Caluya	7,849,435	8,478,880	10,859,852	11,236,359	14,356,480
	Culasi	11,569,778	12,495,997	15,963,057	16,559,677	21,212,903
	Hamtic	11,941,528	12,917,955	16,178,837	16,129,382	20,682,651
	Laua-an	9,956,149	10,712,733	13,450,472	12,134,044	15,491,566
	Libertad	6,347,376	6,854,576	9,031,721	9,285,866	11,836,081
	Pandan	9,712,663	10,495,464	13,084,518	13,061,247	16,721,737
	Patnongon	10,221,030	11,060,168	13,885,179	14,062,588	18,042,562
	San Jose de Buenavista (Capital)	11,556,154	12,563,717	15,918,925	16,649,615	21,408,012
	San Remigio	0	11,849,427	17,075,696	17,906,952	22,992,943
	Sebaste	0	7,411,159	9,136,681	8,718,096	11,115,466
	Sibalom	0	16,121,442	20,259,063	20,110,441	25,857,649
	Tibiao	9,038,220	10,211,825	12,364,989	12,826,922	16,380,944
	Tobias Fomier	9,652,668	10,453,649	12,789,223	13,180,526	19,905,973
	Valdenrama	0	10,671,829	13,403,306	11,128,588	14,177,759

Table 6.2.3 Actual Funds for Capital Expenditures (20% DF), 1994-1999

Unit: Pesos

Year	IRA of the Province (a)	Planned 20% DF ^{1/} (b)	Actual Expenditures on 20% DF ^{2/} (c)	Surplus/(Deficit)
1995	122,553,364.00	24,510,674.00	19,225,609.72	5,285,064.28
1996	131,614,640.00	26,322,928.00	17,309,659.55	9,013,268.45
1997	174,214,423.01	34,757,726.00	24,466,668.42	10,291,057.58
1998	182,446,470.00	39,348,625.00	31,320,460.12	8,028,164.88
1999 ^{3/}	214,467,348.00	47,971,821.00	94,030,254.80	(46,058,433.80)

Source: Provincial Treasurer's Office

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

^{2/} These figures are not necessarily similar with the capital expenditures shown in Table 6.2.1 from Provincial Accountant's Office. Includes current and previous years. For 1999, no expenditures incurred have not been consolidated.

^{3/} Actual expenditures for 1999 is the non-office expenditures in Table 6.2.1

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 ₱38.26 million for the year 1999. This amount reflects the maximum loan that can be availed of from MDF. The local tax income (current year) and IRA of the province are projected at ₱4.43 million and ₱182.45 million (preceding year), respectively. The province has not incurred any loan.

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 DPWH, DOH, and the provincial government through the Provincial Engineering Office (PEO) and PPDO (mainly monitoring). Based on the limited available data, there were minimal investments on water supply and sanitation sector for the period 1995-1998. For the same period, about 62.83% of investments went to Level II systems, followed by Level I at 18.36% and Sanitation, at 18.84%. DPWH and DOH projects accounted for more than 80% of total sector investments.

(1) Budgetary Allocation to the Sector

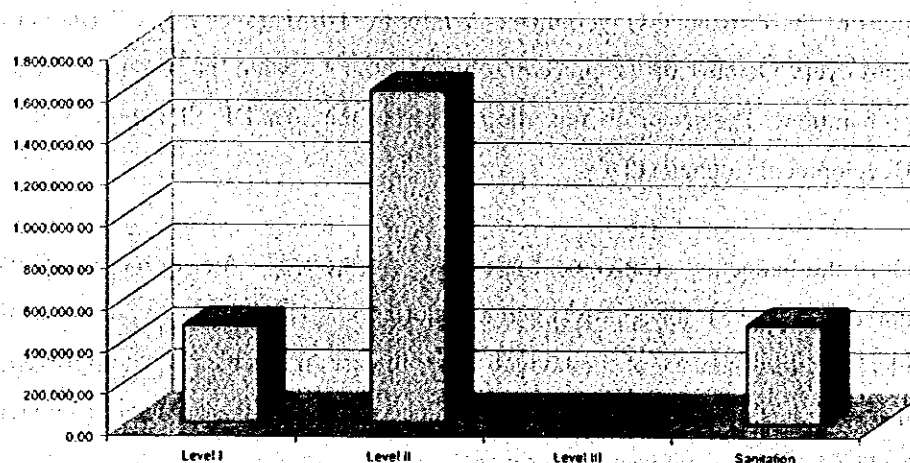
The Budget Office of the province consolidates the budget proposal submitted by all offices of the Provincial Government. While, the DBM issues a Local Budget Memorandum every October of the preceding budget year to guide the provinces in their budget preparation. The sector obtains allotment from the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

Table 6.3.1 Previous Sector Investment to the Province by Concerned Agencies

Item		1995 - 1999				
Agency	Source of Funds	Level I	Level II	Level III	Sub-total	Sanitation
Unit: Pesos						
DILG					0.00	
DPWH			980,000.00		980,000.00	
IWUA					0.00	
DOH	HDF	372,244.80	621,024.00		993,268.80	100,000.00
Province	20% Dev. Fund	95,000.00			95,000.00	380,000.00
Municipality					0.00	
Anini-y					0.00	
Barbaza					0.00	
Belison					0.00	
Bugasong					0.00	
Caluya					0.00	
Culasi					0.00	
Hamtic					0.00	
Laua-an					0.00	
Libertad					0.00	
Pandan					0.00	
Patnongon					0.00	
San Jose (capital)					0.00	
San Remigio					0.00	
Sebaste					0.00	
Sibalon					0.00	
Tibiao					0.00	
Tobias Fornier					0.00	
Valderrama					0.00	
Total		467,244.80	1,601,024.00	0.00	2,068,268.80	480,000.00

Figure 6.3.1
Actual Amount of Sectoral Investments to
the Province, 1995-1999



(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.

Table 6.3.2 shows the form to summarize annual planned activities in the water supply sector, the corresponding funding sources and the amount of investment from 1995 to 1998 (Table 6.3.3 is the form for annual sector investments by service level for the period 1995 to 1998). However, there is no data available.

Table 6.3.2 Annual Investment Plan, 1995 – 1998

Unit: Pesos

Item	1995	1996	1997	1998	1999	Total	% Share
Construction (DW, SW, Spring Box, Reservoir, Tank) Various Foreign Assisted (OECE) National (DPWH/CDF/DILG/PAF2) Various Local Funding (Prov / Mun.)							
Spring Development with L2 Various Foreign Assisted (OECE) National (DPWH/CDF) National/Local Funding (DOH) Various Local Funding (Prov/Mun.)							
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							
Total							

Source: Provincial Planning and Development Office and Provincial Accountants.

Note: 1/ Includes non-WATSAN project.

2/ No data available as of December 1999

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					
Level 2/3					
Foreign Assisted					
National					
Local					
Other :					
Expansion					
Repair/Maintenance					
Special Water Supply Projects					
(Gov't. Centers, Hosp.) - Local					
Water Quality 1/					
Sub-Total Water Supply					
Health Centers					
Sanitation Toilet (DOH)					
Sub-Total Sanitation					
Grand Total					

Note: 1/ includes non-WATSAN project.

2/ no data available as of December 1999

Source: Provincial Planning and Development Office, Provincial Accountant.

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 43.27% of the DF in 1998 (i.e. P13.55 million out of P31.32 million actual expenditures). However, the WATSAN sector was not a priority sector and it was only in 1997 that the provincial government provided some funds for WATSAN projects.

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

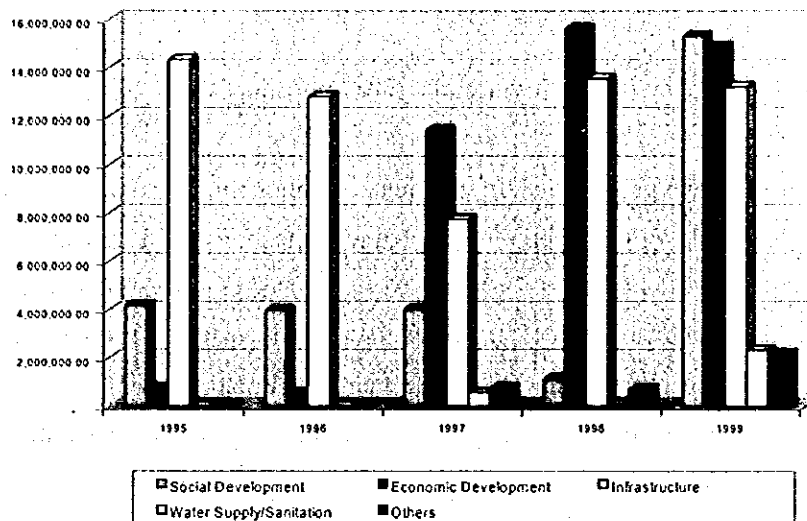
Unit: Pesos

Year	Planned 20% Dev't. Fund	Actual Expenditures						% of Water Supply to Actual Dis-bursed Amount of 20% DF
		Social Development	Economic Development	Infrastructure	Water Supply/ Sanitation	Others	Sub-Total	
1995	24,510,674.00	4,168,451.39	726,147.03	14,331,011.30	-	-	19,225,609.72	-
1996	26,322,928.00	3,967,462.32	536,818.13	12,805,379.10	-	-	17,309,659.55	-
1997	34,757,726.00	4,010,298.27	11,414,321.61	7,739,848.07	556,450.00	745,750.47	24,466,668.42	2.27%
1998	39,348,625.00	1,117,530.80	15,616,306.92	13,551,234.87	23,452.50	708,935.03	31,017,460.12	0.08%
1999	47,971,821.00	15,301,821.00	14,855,000.00	13,220,000.00	2,310,000.00	2,185,000.00	47,871,821.00	4.83%

Source: Provincial Budget Office and Provincial Accountant's Office.

1 The 1999 figures for expenditures are allotted amounts only. Actual figures are not available.

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



In 1998, out of the planned 20% DF of ₱ 39.35 million, only the amount of ₱23,452 was disbursed to WATSAN sector (which is equivalent to 0.06% of the planned 20% DF or 0.08% of the actual total disbursements from 20% DF).

6.3.3 Existing Plans of the LGUs for the Sector

(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 support entailing manpower and vehicle allocation.

Also, 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 of.

(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.

Based on the policy of the province, the following annual activities are undertaken in the province:

- Project proposals from the different municipalities and barangays are compiled;
- Consultation with the representatives of municipalities and barangays as to prioritization of the sector projects. During the occasion, the Governor announces the policy on the sector project implementation including budgetary allocation, the planned and implemented projects, and the obligation of the people/ beneficiaries (cost-sharing between province and municipalities according to financial capabilities of the municipalities concerned).
- For Level I and II water supply, LGUs implement the projects based on the available fund. Generally, projects are initiated by the BC. In case that project needs (finance, technology, etc.) exceed the capacity of BC, the request is made to municipality followed by action by the province. There are cases when BCs directly request projects to Governor's Office.

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

6.4.1 Cost Sharing Arrangements / Counterpart Funding

The implementation of rural water supply projects was previously undertaken by PPDO, PEO and PHO. The PEO receives requests for assistance from barangay people although planning the sector projects is under the PPDO. The request, however, are granted on a case to case basis, usually if the manpower, materials and budget are available. It was assigned to the PEO for project implementation (Level I and II) since the PEO can undertake the design, construction and provide O & M assistance.

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).

The following are other financial arrangements and issues:

- a) There is no priority list of projects for the municipalities and no budget allocation was made in advance to reflect in the AIP. There is a Local Finance 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.

- b) The PEO implements the Provincial government-funded projects under the General Fund. The implementation of these projects is closely monitored with reference to progressive disbursements. For the sector implementation, the following are the local funding sources and corresponding implementing agencies.

<u>Funding Source</u>	<u>Implementing Agency</u>
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.

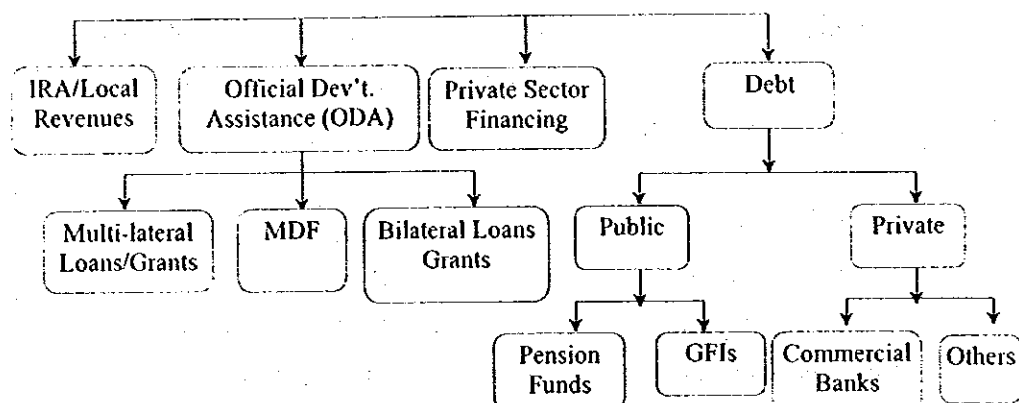
6.4.2 ODA Assisted Projects and Grant/Aid

Other external source of funds of the province is foreign assisted projects either directly coursed through the province as in the case of JICA funds (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 dif-

ferent financing options is presented in the Supporting Report. Below are the major commonly availed or 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 relented 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 for-

eign 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 lower classes of LGUs, such as the 4th to 6th class municipalities.

(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), Philippine National Bank and the Development Bank of the Philippines (DBP). For the LGU to enter into a loan, the respective legislative council (Sangguniang Panlalawigan, SP 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 the amount due from the LGU's 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.

There is currently a World Bank-assisted project, the Local Government Unit-Urban Water and Sanitation Project (LGUWSP), 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 water supply 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 ex-

pansion/rehabilitation. The LGU equity ranges from 10-25% of the total project cost.

The overall cost estimated nationwide and implementation time table of the project are as follows:

Unit: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:

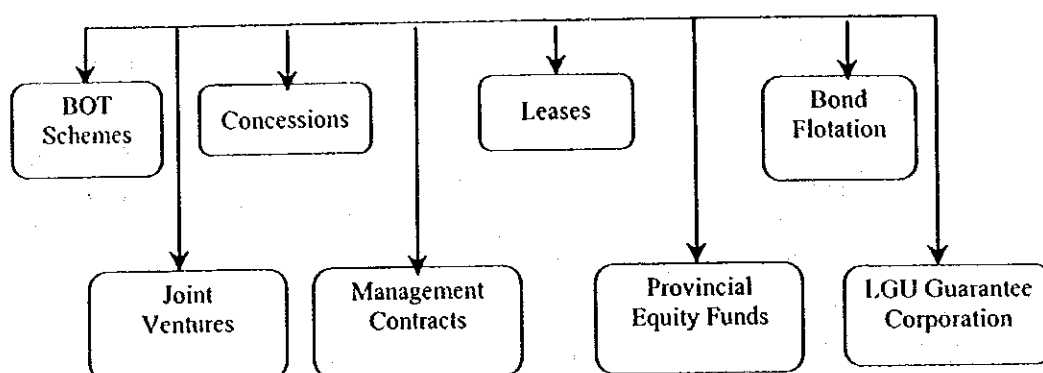
- 1) World Bank funds shall be channelled thru the Development Bank of the Philippines (DBP) which shall relend them as sub-project loans to the LGUs.
- 2) The DBP sub-project loan shall include the cost of feasibility study, technical design and construction of the water supply facility.
- 3) Basic 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 existing service area coverage may warrant viability 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 and Water District

As presented in Table 6.4.1, there are six (6) WDs in the province with the San Jose Water District having the largest number of metered connections at more than 2,000 connections. Moreover, there are five (5) LGU WWS.

The WDs adopted progressive charge method and have achieved average water charge collection efficiency, ranging from 60 to 100%. The average monthly consumption per connection is 19.80 cu.m. per month. Shown in Table 6.4.2, is the status of existing loans of provincial/municipal waterworks. The Culasi and Tobias Fornier WDs are paying the highest amortizations, at ₱817,224, and ₱ 500,000, respectively.

Table 6.4.1 Financial Indicators of WD/Waterworks

Water District/ Waterworks	Number of Metered Connections	Number of Flat Rate Connections	Average Monthly Rate	Average Consumption per Connec- tion	Average O&M Cost	Average Revenue	Collection Efficiency
	Number	Number	Pesos/m ³	m ³ /Month	Pesos/Month	Pesos/Month	Percent (%)
Barbaza WD	467		96.00	11.24	65,104.71	77,409.72	60.00
Bagasong WD	802		232.00	16.68	46,403.36	111,692.31	63.00
Culasi - LGU WWS		153	30.00				
Culasi WD	867	1	86.00	15.00	145,957.00	187,938.91	78.00
Hamtic WD	333		111.00	13.05	44,625.00	63,810.33	70.00
Malandog LGU WWS	122	2	50.00	9.05			
Patnongon WD	484	2	95.00	14.36	63,153.00	94,277.00	100.00
San Jose - LGU RWW	2,044		85.00	33.06	2,768,833.33	4,050,000.00	90.00
Sebaste - LGU WWS	510	9	30.00	15.60		15,300.00	
Tibiao - LGU WWS	677						
Tobias Fornier WD	770		95.00	9.26	63,395.00	114,104.00	92.00

Table 6.4.2 Loan Status of Water District

Water District	Description			
	Total Loan Aailed (in '000 Pesos)	Remaining Pay- ment Period (months)	Average Monthly Amortization (in Pesos)	Current Arears (in '000 Pesos)
Barbaza WD			160,452.00	
Bagasong WD			436,562.48	
Culasi WD			817,224.00	
Hamtic WD			45,000.00	
Patnongon WD			376,837.00	
Tobias Fornier WD			500,000.00	

Note: Information except for average monthly amortization is not available

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 systems was free to the community. 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 the non-collection of water fees. As a consequence, the users had to go to the LGUs (usually barangay or municipal governments) 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. While, some of the active BWSAs for Level I water supply collected monthly fees ranging from ₱5.00 to as much as ₱30.00 per household per month. Of the four BWSAs organized, two BWSAs depended on the barangay council for O & M, while the other two BWSAs had association members who were trained to operate and maintain the facilities.

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.

The Water Districts of Bagasong and Hamtic are charging the higher amounts of ₱23.20 per cu.m. and ₱11.10 per cu.m., respectively. The other WDs of Barbasa, Culasi, and Patnongon are charging much lower amount of fees of ranging from ₱8.60 to ₱9.60 per cu.m.

The water rate structure is based on LWUA's guidelines for water rate setting. Water rates are socialized, based on O&M, operating expenses and capital expenditure requirements of the system for the period, and it should not exceed 5% of the low-income group's household income. Water rates are kept minimal since the Water District should be service-oriented and not profit-oriented.

6.6 Affordability of Users

This sub-section presents the affordability of users by sector 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

Based on the results of the key informant survey, all the respondents indicated that the barangay councils are willing to participate in sector projects by initiating the formation of a water and sanitation association. All the respondents indicated their willingness to contribute in cash or in kind for the construction of WATSAN facilities in their respective barangays.

Referring to the group interview results for Level I and II water supply conducted in this study, 40% of respondents have participated by providing labor in past water supply construction projects. 27.5% have contributed either cash, materials or donated site. For future projects, the respondents, as a whole, were willing to participate and/or contribute for future WATSAN projects. There were a few who volunteered to participate depending on the activity to be undertaken such as in the formulation of water rates and in the selection of sites.

With respect to the construction cost of private toilet, its cost seems to be 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 key informant survey for Level I services, the most common problem cited by the respondents was the absence of maintenance work for these facilities due to the lack of sufficient funds to operate and maintain WATSAN facilities. It is noted by the respondents that most barangays were recipients of financial and institutional development assistance from the provincial and municipal government. The assistance included the funds for repair and maintenance of WATSAN facilities and the provision of various training programs.

Referring to the results of the group interview survey (Level I services), about 57.5% of the respondents claimed it was the barangay council that shouldered the cost of O & M of

WATSAN facilities. About 97.5% of the respondents expressed willingness to pay for the O & M of future WATSAN facilities. Of those who were willing to pay, majority or around 57.5% of the total respondents claimed they could pay from ₱ 6.00 to around ₱10.00. Around 12.5% wanted to pay water fees of below ₱5.00 only; only 27.5% of the respondents would pay about ₱11.00 to ₱20.00 per month, and the rest would pay from ₱21.00 to ₱30.00 per month.

In the water districts or Level III waterworks, O & M expenses are basically covered by the user fees depending on the amount charged for water consumption by water user category. The water tariff 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	3,400		
Average Level III: Monthly Water Bill ²	177.83	5.23	5.0 or less
Average Level II: Monthly Water Bill ²			2.0 -3.0
Mo. Level I Expenditures ³			1.0 or less
Private Toilet Construction Cost – Flush Type Toilet ⁴	23,000.00	5.47xMonthly Income	

Notes:

¹ 1994 Family Income and Expenditures Survey, NSO, escalated to 1998 prices using 7% inflation rate.

² Data from PSPT; It is assumed that 17.90 cu.m. will be consumed per family.

³ No data available

⁴ Current prices estimated in this study

⁵ Based on the experiences mainly from LWUA, DPWH and DILG.

Chapter

WATER SOURCE DEVELOPMENT

7

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 expected 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 15,728 shallow wells, 568 deep wells and 280 developed springs in the province (functional sources). Majority of the wells is shallow wells. Only about 19% of these water sources are public facilities. Of the total existing wells, 710 shallow/deep wells are not functional at present. In addition to the above sources, 48 untapped springs are accounted.

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	2,567	328	280	3,175
b. Privately owned sources	13,152	240	0	13,392
c. Number of water sources	15,728	568	280	16,567
d. % share of different sources	95%	3%	2%	100%
2. Water sources with problems and non-functional facilities				
a. Water quality problems*	5,033	0	0	5,033
b. Non-functional	268	442	0	710
3. Spring source information				
a. Undeveloped	-	-	8	8
b. Untapped	-	-	48	48

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.

*: Assumed number of sources (unsafe category) based on the study on existing water supply facilities in Chapter 4.

7.2 Geology

The geology of Antique province located in the western portion of Panay Island is complex and mainly attributed to tectonic and magnetic actions generated from Cretaceous to Quaternary period. The high mountains of the province formed by the oldest rocks, largely volcanic origin, are the completely folded and faulted assemblages of igneous and metamorphic rocks. During late Miocene epoch, serpentinized igneous rocks of Cretaceous period to Oligocene epoch are assumed to have intruded through old fractures accompanied by faulting.

Overlying unconformably the basement complex is the Tertiary sequence of volcanic and sedimentary rocks, which forms the lower hills and the rolling areas in the western-half part of the province. Middle Miocene volcanism intervened with the deposition of the younger

Oligocene to middle Miocene sedimentary rocks. Continuous accumulation of sediments in this rolling hills gave rise to the formulation of late Miocene to Pliocene sedimentary sequence, composed of sandstone, shale, limestone, mudstone and conglomerate.

Physiographic configuration is an expression of structures that are formed throughout the complex geologic evolution of the province and the whole of Panay Island. The main structures trend more or less, N-S, NE and NW. Tertiary rocks are generally folded. Normal or gravity faulting affected the Tertiary and Quaternary systems. In general, the structural trend of the province is attributed to steeply sloping terrains and moderate to steep dips.

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 in 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 systems are impermeable, which are classified as aquicludes. These rock systems are found in western mountain ranges of the province and at several islets in Cuyo East Pass. Basement complex of Mesozoic era is composed of serpentine, basalt flows, and metamorphic rocks, commonly fractures. Groundwater is limited to fractured and weathered zones.

Basement complex in the northern province represents the folded metamorphosed rocks possibly sedimentary origin, which forms the Buruanga Peninsula. Intrusive rock unit of Neogene period consists of nudge-like shaped quartz diorite. It is essentially quartz, biotite, hornblende and oligoclase with accessories of magnetite and disseminated pyrite.

In the southern part of the province, the rock units of Cretaceous period to Paleocene epoch are made up of metamorphosed basalt flow, bedded cherts and green clastics. These formations are highly folded along the NE trending axis, which make up the core of complex mountain ranges. The other rock units of this age consist of intrusive sequence of serpentized peridotite, gabbro and diorite.

The sedimentary rocks of early Miocene epoch are well exposed in the hanging wall side of Patnongon thrust fault as narrow discontinuous patches resting directly on basalt and dipping steeply to the east. The extrusive rock of late Miocene epoch separates the limestone from the next younger andesite that forms a cluster of peaks. The sedimentary rocks of late Miocene consist essentially of thin to medium-bedded tuffaceous shale and sandstone with occasional lenses of conglomerate and coarse lithic crystals of tuffs.

(2) Plio-Pleistocene Series

The sedimentary rock units of Plio-Pleistocene epochs have various ranges of permeability, which are extensively exposed on the western side of the province. These sedimentary rocks consist of gently to moderate dipping conglomerate, calcareous mudstone-siltstone and shale, and coralline. The formation made of limestone bodies is partly marly, sandy and rubbly with gravel and clay, which are accumulate in depressions of the formations.

(3) Recent Deposits (Holocene Series)

The alluvium consists of lenticular, intertonguing loose coastal and river deposits of clay, silt, sand, gravel and shells. These are the detrital fragments weathered and eroded from the pre-existing rocks and transported mainly by water into the river valleys, coastal plains and beaches of the area. The most extensive plain in the province is located in the southern basin formed by Sibalom River. The alluvial deposits in this plain have a various thickness ranging from 100 to 200m. The members or formations in this plain are partly confined by a dense clay stratum. Most of the deep aquifers in this plain with depth of more than 50m have a high permeability and there exist flowing wells.

In the upstream portion of Sibalom River, unconsolidated terrace gravel deposits are found along the river, extending NE-SW from Sibalom to Osorio for a stretch of about 30km. These formations have suitable grain sizes for the deep well construction using the natural gravel packed method.

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 the 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, coastal plains and inland small basins, where recent unconsolidated materials overlie on the 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 several aquifers occurring at various depths. In this area, shallow wells can also be developed.

(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 water is rarely released in the opened rock fractures. Springs 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 presented based on NWRB's geo-resistivity survey.

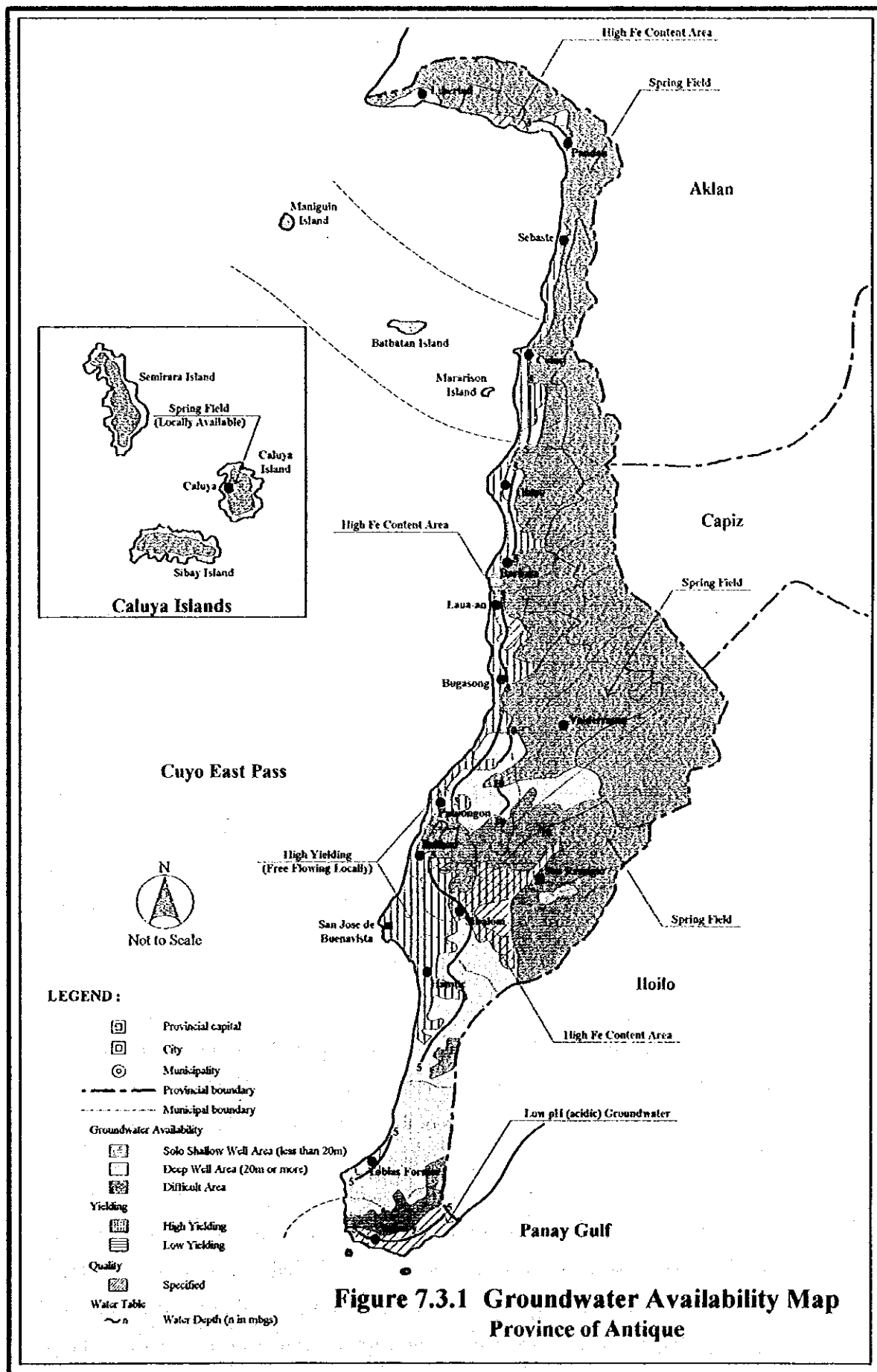
7.3.2 Groundwater Availability in the Province

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.

(1) Solo shallow well area

Solo shallow well areas in the province are limited. The development of shallow wells is, however, possible in the "Deep Well Area" (recent alluvium basin, beach deposits and weathered metamorphic rocks), 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 into confined or unconfined. In this study, therefore, the well classification was made referring to the well depth of 20m as the boundary. The depths of shallow wells in the province were assumed ranging from 3.0 to 19.6m. The static water levels are from 1.0 to 9.1 mbgs and specific capacities from 0.1 to 7.2 lpsm.

(2) Deep well Area

The deep well area covers approximately 30% of the province, distributed in western coastal plain and southern hills of the province. 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 form a groundwater storage basin for some aquifers. While, the sedimentary formations of Plio-Pleistocene epoch consist of conglomerate, calcareous mudstone-siltstone and shale, and coralline in western slopes of the Cordillera.

Considering the geological formation, the alluvial plain is categorized as a high potential area for deep well development, while the sedimentary rocks of Plio-Pleistocene epoch are classified as a low to moderate-yielding area. In alluvial plain, the average depth of the existing deep wells is 30.1 m with an average water level of 5.8 mbgs. The average specific capacity is 0.4 lpsm.

In the southern mountain area of the Cordillera made of Plio-Pleistocene series, groundwater development has not yet been performed sufficiently due to limited demand, although enough spring sources exist in the barangay vicinity. The average depth of the deep wells would probably be 40 m with an average water level of 10 mbgs. The specific capacity of the wells may be enough for only Level-II service.

(3) Difficult area

About 70% of the provincial area are classified as the difficult area to exploit groundwater, in which the Cordillera, Buruanga Peninsula and Caluya Islands exist. These are located in the eastern and northern portions of the province and in Cuyo East Pass, respectively.

The geology is made up of 1) volcanic rock units of Miocene and older, 2) intrusive rock units of Neogene period, 3) metamorphosed basalt flow, bedded cherts and green clastics of Cretaceous period to Paleocene epoch, and 4) sedimentary and extrusive rock units of early to late Miocene epoch. These rocks and formations are in dense, massive and con-

solidated conditions and have impervious characteristics. Groundwater occurs only in fissures, fault fracture and weathered zones.

7.3.3 Groundwater Quality

The water quality problem in deep wells is found in the coastal area and in the upstream area of Sibalom River (details are referred to Table 7.3.2, Data Report). Major water quality problem is ironic and acidic groundwater. 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, ironic water is serious with a high percentage of affected existing wells (about half of the numbers of deep wells) in populated area. The problem is extended to most of the areas in the municipalities of Sibalom and Laua-an. Slight acidic groundwater is confirmed mainly in the municipality of Anini-y.

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 280 developed springs currently serving the province. Such spring sources come out from the western slopes of the Cordillera. Of these springs, 29 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 for small Level III water supply), while 83 springs exceed discharge rates of 2.0 lps. The other 168 developed springs have no data available on discharge rates at present. Most of these springs are not dried up during a drought year or dry season, though yields

varying from 0.1 lps to 100 lps. 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 Bacóng, Paliwan, Cangaranan and Sibalom Rivers. There are 2 gauging stations at Paliwan and Sibalom Rivers in the province.

Surface water amount used in the province totaled to $18.4 \text{ m}^3/\text{sec}$ according to the NWRB's water rights registration database as of March 1997. Almost all of the water rights were registered for irrigation. The diversions for major flume, which are operated by NIA, are located at Sibalom, Belison and San Remigio, Sibalom River and its tributaries, respectively. Only one surface water right is lodged to private company for fisheries use in the municipality of Hamtic.

Data on river flow including 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 not conducted during this study. According to the classification obtained from Regional DENR, water quality at each river meets the Class A or B limitation of "DENR Fresh Water Quality Criteria". It is noted that the river water quality in southern part of the province is slightly turbid after heavy rain compared with northern rivers because of limy formation distributed. Generally, river water in northern area has crystal color, since watersheds of these rivers are formed by only metamorphic and volcanic rocks.

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.

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 3.0 to 19.6 mbgs.

One disadvantage of shallow wells is the lowering of water level during dry season that reduces the discharge of the wells or disturbs the hand-pump operation. 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 static groundwater level does not affect the discharge rate and hand-pump operation. In Recent deposits and Plio-Pleistocene series, good aquifers apparently occur from 20 to 96 mbgs in depth.

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 in the province. The percentages of the natural gravel packed wells to the total potential number of wells to be developed in the expected municipality areas are assumed in Table 7.6.3, Supporting Report. The construction ratio of natural gravel packed well to the total requirements of the province is assumed at merely 5%.

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. However, 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. The municipalities requiring such countermeasures are recommended in Table 7.6.4, Supporting Report. The ratio of deep wells using PVC materials to the total requirements of the province is assumed at about 5%.

Table 7.6.1 Groundwater Development Potential in the Province

Area	Groundwater Development Potential	Water Quality	Area Feature
Northern Mountain Range & Coastal Plain	<p>Difficult area is distributed in eastern mountains, while deep well area is in the small plains along the western coast.</p> <p>In the mountainside, potential water source is spring but existing springs are few and scattered with a moderate yield for Level-I water supply. Many rainwater collector facilities are found.</p> <p>Deep wells in the plain have a sufficient productivity for Level-III water supply. Flowing wells are found in Patnongon.</p> <p>Solo shallow well area is very limited that is located only in Barbaza. Groundwater levels both in deep and shallow wells are shallower than 10 mbgs.</p>	Groundwater of both wells and springs is potable. Existence of iron ground water is confirmed in the small plains of Pandan and Lava-an locally.	This area covers the northern part of the province consisting of thirteen (13) municipalities from Libertad and San Remigio. The topographic feature of this district is dominated by a high rugged range of mountains that run parallel to its western coast. The slope of the Cordillera is steep.
Southern Plain & Rolling Hills	<p>Most of this area is classified as deep well area. Majority of existing wells is deep wells with depths of 30 to 100m. The deep well capacity in the plain is sufficient for Level-III water supply. Aside of this, free flowing deep wells are found in the municipalities of Sibalom, San Jose de Buenavista and Hamtic. In the upstream area of Sibalom River, the natural gravel packed method can be adapted, because suitable grain sizes are distributed in the terrace gravel formation.</p> <p>The rainwater collectors are commonly found in the southern islets of Nogas and Juraojurao. There are very few spring sources in this district.</p>	High Fe contents in groundwater is reported in Sibalom. Acidic groundwater is confirmed in Aniniy locally. In the other area, there is no groundwater quality problem both in wells and springs.	This district covers the southern part of the province consisting of five (5) municipalities. The dominant topographical features are highland hills and mountain peaks. The most extensive plain in the province is located in the southern basin formed by Sibalom River.
Semirara Islands & Western Islets	<p>These islands are classified as the difficult area. Shallow well is available in the area where weathered volcanic or metamorphic rock is distributed along the coast. Groundwater level is shallow.</p> <p>Spring source is locally available but its potential area is very limited. Many rainwater collector facilities are found in Maniguin Island.</p>	Groundwater both in shallow wells and springs is potable.	Semirara Islands are formed by metamorphic rocks. Other small islets are clustered and believed as the hot-spot volcanoes.

(2) Spring

A total of 48 untapped spring sources identified by the PSPT is listed in Table 7.6.5 Untapped Spring Source Identification, Supporting Report. The list includes detailed data on barangay name, owner, discharge rate in dry season, transmission line length and relative elevation between spring source and served area. Such springs are mainly located in the Cordillera of the province. Other areas have few untapped springs. Of these springs, 33 untapped springs with discharge rates ranging from 0.5 lps to 100 lps (actual data base) are generally applicable for Level-II water supply. Spring development potential in the province is shown in Table 7.6.5, Supporting Report.

(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 Sibalom and Cangaranan River basins 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 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 Specification of Wells by Municipality

Municipalities With Classification		Type	Proportion (%)	Standard Specification			Availability of Sources
				Depth Range (m)	SWL (m)	Sp. Cap. (lpsm)	
Anini-y	Rural	SW	0	- <D< -	-	-	Fair DW and Few SP
	Urban	DW	100	40.0 <D< -	3	0.6	
Barbaza	Rural	SW	10	18.0 <D< -	3	0.4	Good DW and Few SP
	Urban	DW	50	40.0 <D< -	5	1.0	
Belison	Rural	SW	0	- <D< -	-	-	Good DW and Few SP
	Urban	DW	80	20.0 <D< 96.0	5	1.5	
Bugasong	Rural	SW	0	- <D< -	-	-	Good DW and Few SP
	Urban	DW	100	20.0 <D< 55.0	5	2.0	
Caluya	Rural	SW	20	18.0 <D< -	1	0.2	Risky DW and Few SP
	Urban	DW	0	- <D< -	-	-	
Culasi	Rural	SW	10	3.0 <D< 18.0	2	0.4	Good DW and Few SP
	Urban	DW	70	30.0 <D< 50.0	6	1.0	
Hamtic	Rural	SW	0	- <D< -	-	-	Good DW and Poor SP
	Urban	DW	100	80.0 <D< -	3	3.0	
Laua-an	Rural	SW	0	- <D< -	-	-	Good DW and Few SP
	Urban	DW	100	40.0 <D< -	3	1.0	
Libertad	Rural	SW	0	- <D< -	-	-	Fair DW and Few SP
	Urban	DW	70	20.0 <D< 60.0	5	0.8	

Table 7.7.1 Standard Specification of Wells by Municipality

(cont'd)

Municipalities With Classification		Type	Proportion (%)	Standard Specification			Availability of Sources
				Depth Range (m)	SWL (m)	Sp. Cap. (lpsm)	
Pandan	Rural	SW	0	- <D< -	-	-	Fair DW and Few SP
		DW	20	40.0 <D< -	5	0.4	
	Urban	SW	0	- <D< -	-	-	
		DW	40	40.0 <D< -	3	0.6	
Patnongon	Rural	SW	0	- <D< -	-	-	Good DW and Poor SP
		DW	70	20.0 <D< 55.0	3	2.0	
	Urban	SW	0	- <D< -	-	-	
		DW	100	20.0 <D< 55.0	ff	3.0	
San Jose de Buenavista	Rural	SW	0	- <D< -	-	-	Good DW and Poor SP
		DW	100	40.0 <D< -	3	2.0	
	Urban	SW	0	- <D< -	-	-	
		DW	100	80.0 <D< -	1	3.0	
San Remigio	Rural	SW	10	6.0 <D< 12.0	3	0.2	Fair DW and Few SP
		DW	10	40.0 <D< -	10	0.4	
	Urban	SW	0	- <D< -	-	-	
		DW	50	40.0 <D< -	10	0.6	
Sebaste	Rural	SW	0	- <D< -	-	-	Fair DW and Poor SP
		DW	10	40.0 <D< -	6	0.6	
	Urban	SW	0	- <D< -	-	-	
		DW	60	40.0 <D< -	3	0.8	
Sibalom	Rural	SW	10	18.0 <D< -	3	0.1	Good DW and Few SP
		DW	40	40.0 <D< -	10	1.0	
	Urban	SW	0	- <D< -	-	-	
		DW	100	40.0 <D< -	5	1.5	
Tibiao	Rural	SW	0	- <D< -	-	-	Good DW and Few SP
		DW	10	40.0 <D< -	6	1.5	
	Urban	SW	0	- <D< -	-	-	
		DW	100	40.0 <D< -	3	2.0	
Tobias Fornier	Rural	SW	0	- <D< -	-	-	Fair DW and Few SP
		DW	90	40.0 <D< -	10	0.6	
	Urban	SW	0	- <D< -	-	-	
		DW	100	40.0 <D< -	5	0.8	
Valderrama	Rural	SW	0	- <D< -	-	-	Risky DW and Few SP
		DW	10	40.0 <D< -	10	0.2	
	Urban	SW	0	- <D< -	-	-	
		DW	0	- <D< -	-	-	

Note: The mark of "ff" in the column of SWL means free flowing well.

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 construction of test wells shall be conducted.

The entire province falls on this investigation area. Table 7.7.2 summarizes these requirements.

Table 7.7.2 Detailed Groundwater Investigation Required

Municipality	Area	Investigation Activities and Specification
Entire Province	Urban & Rural	Preparation of Groundwater Database Deep Wells Inventory service level, depth, diameter, SWL and discharge with draw-down Developed Springs Inventory service level, discharge, relative elevation and distance Undeveloped & Untapped Springs Inventory discharge, relative elevation and distance
Entire Province	Urban & Rural	Water Quality Examination Type of Sources; deep well Water Quality Examination to include Fe, Mn, Cl, pH, Color, Turbidity, etc. Type of Sources; shallow well & spring (both developed & untapped) Water Quality Examination to include Fe, Mn, Cl, pH, Color, Turbidity, Bacteria, Coliform, etc.

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 km² 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.

There is no possibility to develop potable groundwater using well or spring in the eastern mountains and several islands of Maniguin, Nogas and Juraojurao. Improved rainwater collector facility will be promoted for the rural water supply with due consideration of roof materials, reservoir with sand filtration and chlorination system.