

### 5.9.3 The LGUs and Gender

The province of Northern Samar is aware of gender and development where some of the provincial and municipal officials have already undergone gender sensitivity training. The inclusion or utilization of gender sensitive approach to planning of WATSAN projects has been limited, however, more on the health, sanitation and hygiene projects.

### 5.9.4 Gender in WATSAN Sector Projects

#### (1) Gender Participation in Sector Development Projects

One of the objectives of the province-wide group interviews undertaken in this study was to assess gender sensitivity of the intended sector beneficiaries in the roles and modes of participation that they, as men and women, perceive for themselves in WATSAN projects. Another important objective was to identify potential service population and service level desired by the community, to assess the degree of involvement of both men and women in planning, managing, operating and maintaining WATSAN projects, and the willingness and capacity to pay of potential users.

The respondents in the group interviews were composed of 21 females and 20 males, the majority of whom belong to the 26-45-age bracket. The majority of the interviewees received elementary education, where the females outnumbered the male in this level. Some of the respondents graduated from high school, but with more males graduating as compared to the females. Only two respondents completed college, one male and one female. The occupation of a big majority of the male respondents was farming/fishing while that of the female respondents was mat weaving.

In the two barangays surveyed for the group interviews, the total number of barangay council members was 14. Of this number, 13 were males and only one was a female. Both barangay captains were male.

#### On the formation/composition of the BWSA/RWSA and WD Board:

The key informants in the three barangays surveyed indicated that there was BWSA/RWSA in their respective barangays although the association in Barangay Dale (San Roque) was not functional. Each of the three barangays has a committee on water and sanitation within the barangay council.

There are five sectors represented in the water districts' Board of Directors, one of which is the womens' sector. More often than not, the educational sector almost always nominates/appoints a female educator.

On participation in WATSAN training:

Only 12% of the respondents (3 females and 2 males) were able to attend training programs for the year 1998. As for sector-related training, all the female respondents said they were not aware of or did they attend any training for the same period; while about six of the male respondents were aware of the caretakers' training, finance/collection and the repair/O&M training. Sixteen out of the 20 male respondents were interested to attend training programs for the WATSAN sector compared to only less than half of the female respondents. The female respondents were willing to attend from less than a day to one day's worth of training; while the male interviewees' desirable training period was spread out from one day to three days.

On participation in health and hygiene:

None of the male respondents participated in any health and hygiene education and training. Only five female interviewees did; three categorically said they did not participate; while 13 did not respond. On water-related illnesses, it was found out that the men were more afflicted than the women with diseases such as diarrhea and skin diseases.

On participation in operation and maintenance:

The male respondents were consistent at indicating their willingness to participate in different activities of future WATSAN projects, including operation and maintenance tasks. The female interviewees, however, showed varying degrees of willingness to participate where only eight out of 21 wanted to be involved in O&M work. Most of the females were uncertain as to who was responsible for minor repairs on the facilities, while the male interviewees indicated that it was mostly the male members of the community.

(2) Gender in Water Supply and Sanitation Practices

The same survey also indicated gender sensitivity in water supply and sanitation practices, as presented in the following findings:

Responsibility in Fetching Water

According to the 11 of the 21 female respondents, the wife was still the one responsible for fetching water. Only seven female respondents said that the husband helped. The male and female children helped in the task, according to only three female respondents.

For 16 of the 20 male respondents, it was the husband who was responsible for hauling drinking water for family use, although 10 of them admitted that the wife assisted in this task. For 17 male respondents, the male children were equally responsible for fetching water, although for another 15, the female children also helped out.

## 5.10 Existing Project and Sector Monitoring

### (1) Sector Monitoring

The primary sources of sector data are the field offices of DPWH, DOH, LWUA, DILG and NSO. Other agencies, including NEDA and LGUs, use data from these agencies. These agencies run their own project and/or activity monitoring system largely based on required reports of its field offices. Only the NSO gathers and assesses information nationwide on a regular basis as part of its Census on Population and Housing (CPH).

Periodical WATSAN sector monitoring shall be conducted aside from project monitoring to study and evaluate existing sector development conditions against national and provincial sector targets for making necessary arrangements at the sector level. The sector monitoring activities needs an appropriate budgetary allocation annually. Participatory monitoring with associations/barangays and municipalities would be practical and cost effective. Formulating sector development strategies and planning the development projects can not be practiced without sector monitoring, hence, establishment of sector monitoring and reporting mechanism with responsibilities defined for all concerned parties is an urgent requirement.

### (2) Project Monitoring

Project monitoring has been conducted by different government levels depending on the characteristics of the project i.e., local funded or foreign assisted projects. However, only projects handled by the local offices of central government agencies are monitored, mainly focusing on physical accomplishments and capital expenditures of projects, by respective central government line agencies.

Monitoring activities under the Regional Development Council cover four components: Macro, Economic, Social Welfare and Infrastructure. Monitoring report on foreign assisted infrastructure projects, including water supply projects are submitted by PPDO to the national government agencies of which the report submittals and reporting schedule are defined in the Implementing Guidelines of the projects. The monitoring report submitted to agencies concerned is also sent to the NEDA Central Office. The central gov-

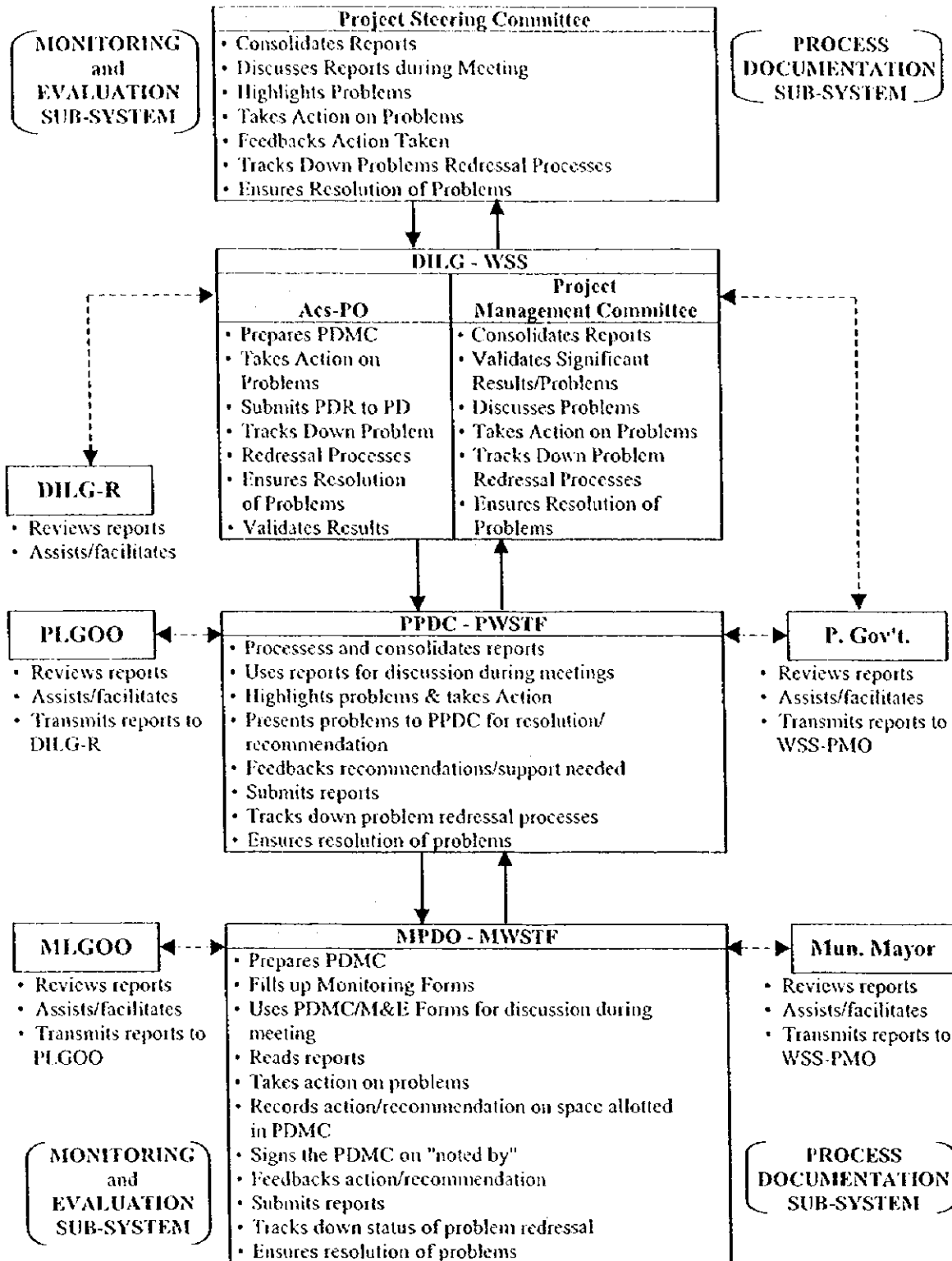
ernment agencies also report to the foreign assistance agencies such as ADB, WB, etc.

It was field confirmed at the NEDA Regional Office that there are some foreign assisted projects directly provided to the regional office, e.g., grass-roots assistance with a limited amount. NEDA is not involved during the signing with foreign donor for such projects. However, reporting on the project is usually made from the regional office to the central office of NEDA. Hence, the central office of NEDA sometimes overlooks these projects.

There are no significant differences in the current project monitoring systems at the LGU level. The monitoring for WATSAN related projects are conducted under the Regional Monitoring and Evaluation System. The PPDO/MPDO concerned conducts monitoring from the start until completion of the project. Projects that are getting negative feedback and require validation and verification are closely monitored. The report covers status of implementation, finance, percentage of accomplishment and slippage/problems as well as evaluation and countermeasures. Figure 5.10.1 shows an example of UNDP assisted project illustrating the linkages among concerned agencies.

In both sector and project monitoring, the exchange of information between concerned agencies seems to be insufficient/not systematic, though there are opportunities to do so, like during the RDC regular meetings. In addition, the absence of a reliable data management system not only adds burden to the monitoring work but also causes wide dissatisfaction among project implementors themselves. The preparation of monitoring reports is seen by some as a nuisance and disrupts them from performing more important tasks, thus the monitoring reports are haphazardly done. When this happens, the reliability of information presented in the reports is compromised. An effective monitoring mechanism and data management system must be in place and put to work by the concerned agencies.

**UNDP/PHI/93/010 PROJECT  
PARTICIPATORY MONITORING FEEDFORWARD  
AND FEEDBACK MANAGEMENT MECHANISM**



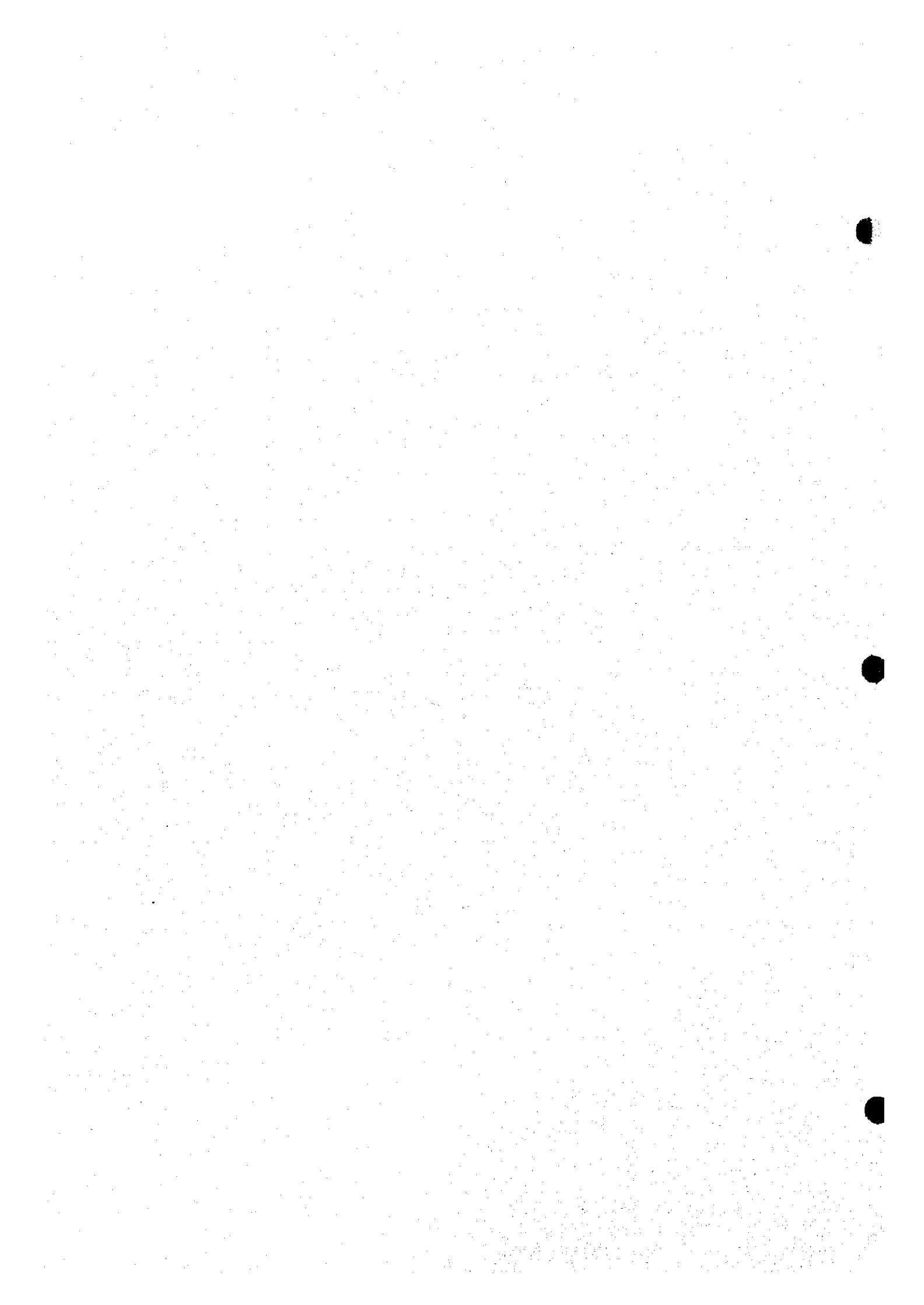
**Figure 5.10.1 UNDP Monitoring Mechanism**

Chapter

6

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**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 that 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 appropriate financial arrangements in the medium term development. The major components of financial study 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 for the same period (1995 to 1998) is shown 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 LGUs include Internal Revenue Allotments (IRA), local tax revenues, non-tax revenues such as grants, aids and subsidies, as shown below. At present, IRA is a major financial source of the LGUs.

- (a) IRA – LGUs share in the national internal revenue taxes is based on the collection of the 3<sup>rd</sup> fiscal year preceding the current fiscal year and is shown as follows: 1<sup>st</sup> year of effectivity of the LGC of 1991 – 30% (1992), 2<sup>nd</sup> year (1993) – 35% and on the 3<sup>rd</sup> 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 1<sup>st</sup> 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 3.12% of the total income of the province.
- (c) Grants, Aids and Subsidies -- the province has not received any technical assistance grants from the ADB and other multi-lateral financial institutions.
- (d) Other Income -- there are no economic enterprises, but receives 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 3<sup>rd</sup> 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 Northern Samar during the period 1995-1999. Local tax revenues, which were 3.12% 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 96.53%, which indicates that the province has historically been dependent on the 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.

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, 1995 - 1999

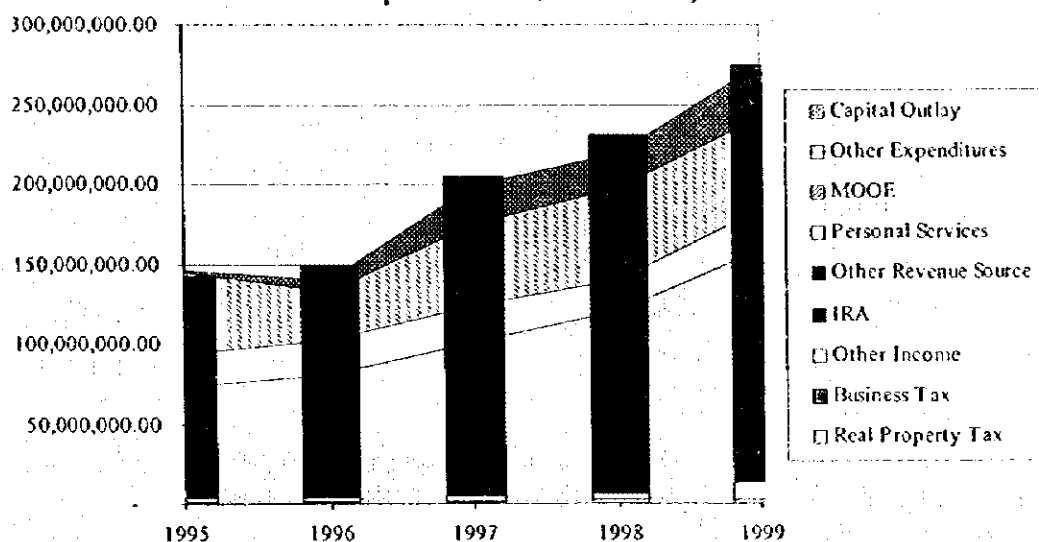
	Unit: Pesos				
PARTICULARS	1995	1996	1997	1998	1999
<b>RECEIPTS</b>					
Tax Revenue					
Real Property Tax	649,638.76	1,073,817.14	1,160,085.09	1,913,733.24	2,200,000.00
Business Tax	134,618.28	149,357.93	169,500.66	221,075.90	317,000.00
Others	2,644,560.57	2,885,958.99	3,665,507.40	4,185,694.53	10,305,940.00
IRA	136,425,265.00	145,370,702.00	200,251,820.00	224,168,898.00	248,747,600.00
Other Revenue Source	2,856,922.92	51,120.00	50,000.00	311,470.15	635,000.00
Sub-Total	142,711,005.53	149,530,956.11	205,296,913.15	230,800,871.82	262,205,540.00
<b>EXPENDITURES</b>					
Personal Services	74,076,736.21	81,151,737.66	101,621,906.19	119,966,954.51	158,725,727.00
MOOE	20,297,882.01	21,202,782.14	22,321,555.49	19,280,210.48	25,850,801.04
Others	49,602,282.13	30,725,620.89	51,056,778.44	57,838,510.66	57,212,701.96
Sub-Total	143,976,900.35	133,080,140.69	175,000,240.12	197,085,675.65	241,789,230.00
<b>NET OPERATING INCOME</b>	(1,265,894.82)	16,450,815.42	30,296,673.03	33,715,196.17	20,416,310.00
Add: Borrowings Surplus					
Less: Capital Outlay	1,705,441.52	6,146,171.90	23,443,488.04	22,546,113.48	32,350,000.00
<b>NET INCOME</b>	(2,971,336.34)	10,304,643.52	6,853,184.99	11,169,082.69	(11,933,690.00)

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 and Expenditure of Northern Samar, 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 most of the expenses with an average of 53.13% to the total revenue. Maintenance and operating expenses of the province was 11.59%. Also, the province has a capital outlay with an average of 7.86% to the total revenue. Funds for the water supply sector were part of the capital outlays of the province.

From 1995 to 1999, the province had an average of ₱ 19.8 million net operating income from operations. For 1999, the province has projected ₱20.42 million net operating income. After deducting capital outlay amounting to ₱32.35 million, the province projects a negative net income amounting to ₱11.9 million.

### 6.2.2 Availability of Funds

As previously noted, the IRA comprises 96.53% 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 1.10% 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 1.10% 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.

**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	17,813,060,000	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 Northern Samar					
	(1) Total: (2) + (3)	334,665,214	359,069,822	479,553,620	543,314,179	639,964,842
	(2) Provincial Government	136,425,265	145,370,702	200,251,820	224,168,898	248,747,600
	Percentage (a)	1.07	1.06	1.12	1.12	1.12
	(3) Municipalities	198,239,949	213,699,120	279,301,800	319,145,281	367,035,576
	Percentage (c)	1.06	1.09	1.12	1.13	1.12
III. Total Income of the Provincial Government						
Percentage of IRA	142,711,005.53 95.60	149,530,956.11 97.22	205,296,913.15 97.54	230,800,871.82 97.13	262,205,540.00 94.87	
Municipalities	IV. Total Income of the Municipalities <sup>1/</sup>	178,262,731.99	205,763,135.06	283,817,844.66	301,708,738.44	380,995,888.75
	Percentage of IRA	111.16	103.84	98.40	105.62	96.32
Municipalities	V. IRA to Municipalities					
	TOTAL	198,239,949	213,699,120	279,301,800.00	319,145,281	367,035,576
	Allen	6,816,479	7,384,184	9,717,711.83	11,057,011	12,725,629
	Biri	5,020,582	5,430,713	7,186,321.81	8,035,133	9,182,231
	Boron	8,042,330	8,633,907	11,473,250.23	13,051,184	14,852,126
	Capul	5,448,693	5,900,312	7,487,233.35	8,520,079	9,756,672
	Cataman (Capital)	17,346,576	18,723,490	25,630,009.71	29,462,922	34,084,172
	Catubig	11,477,854	12,320,373	15,903,918.01	17,056,390	19,570,331
	Gamay	7,796,073	8,415,629	11,181,180.67	12,822,551	14,761,375
	Leoang	14,276,064	15,442,669	20,333,482.44	2,341,482	27,127,182
	Lapinig	5,512,025	5,955,223	7,810,637.87	8,909,455	10,201,881
	Las Navas	10,271,969	11,069,891	14,135,082.74	15,823,521	18,248,030
	Lavezares	8,461,583	9,144,285	11,518,166.29	13,211,039	15,213,984
	Lope de Vega	8,834,942	9,445,961	12,296,701.09	14,298,361	16,345,185
	Mapanas	6,160,811	6,634,729	8,604,620.61	9,775,669	11,212,757
	Mondragon	11,304,536	12,143,468	15,730,976.42	18,225,514	20,970,284
	Palapag	9,541,951	10,284,201	13,649,354.41	15,717,409	18,116,231
	Pambujan	8,771,026	9,465,209	12,527,183.72	14,441,918	16,656,465
	Rosario	4,781,002	5,178,973	6,899,490.22	7,862,220	9,020,954
	San Antonio	5,051,885	5,455,273	7,184,992.49	8,108,799	9,222,312
	San Isidro	10,146,997	10,908,162	14,294,638.32	16,580,903	19,104,991
	San Jose	5,609,062	6,079,209	8,011,550.35	9,101,012	10,449,460
	San Roque	8,278,297	8,908,524	11,325,373.20	13,061,787	15,043,373
	San Vicente	4,316,284	4,683,823	5,882,959.98	6,696,710	7,677,768
	Silvino Lobos	7,680,064	8,250,369	10,419,821.79	12,182,233	14,020,985
	Victoria	7,295,864	7,840,543	10,097,142.69	11,728,629	13,471,198

Source: Provincial Treasurer's Office

Note: 1/ Data for tax and other revenue income of the following municipalities: Catubig (1996), Gamay (1995), Lapinig (1995), Lavezares (1995) and Las Navas (1995-1999) are not available.

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 capital 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 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 1998. For 1999, it is projected that the 20% DF is adequate to cover the capital expenditures of the province, which is projected at P52.1 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 <sup>1/</sup> (b)	Actual Expenditures on 20% DF <sup>2/</sup> (c)	Surplus/(Deficit)
1995	136,425,265.00	27,285,053.00	24,638,552.38	2,646,500.62
1996	145,370,702.00	29,074,140.40	26,902,537.59	2,171,602.81
1997	200,251,820.00	40,050,364.00	37,743,974.10	2,306,389.90
1998	224,168,898.00	42,592,090.40	47,296,880.87	(4,704,790.47)
1999	248,747,600.00	52,136,258.00	52,136,258.00	0

Source: Provincial Treasurer's Office

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

<sup>2/</sup> 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 (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

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 P47.39 million for the year 1999. This amount reflects the maximum loan that can be availed of from MDF. The projected local tax income and IRA of the province in the preceding year are P12.8 million and P224.16 million, respectively. The province has no outstanding 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 the provincial government and DPWH. The fund from the CDF (Countrywide Development Fund) was also availed of. The water supply sector spent a total of P1.8 million for the period 1995-1998 (refer to Table 6.3.1 and Figure 6.3.1). The largest investment registered so far is those for Level II water supply with an aggregate amount of P1.02 million during the said period, followed by Level I water supply with P0.78 million.

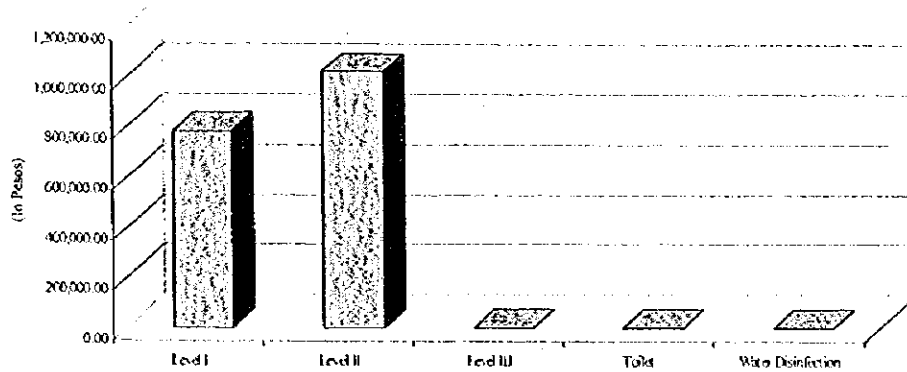
**Table 6.3.1 Actual Amount of Sector Investment to the Province  
by Concerned Agencies, 1995 - 1998**

Unit: Pesos

Funding Category		1995-1998					
Agency	Funds	Level I	Level II	Level III	Sub-Total	Toilet	Water Disinfection
DILG							
DPWH							
LWUA							
DOH		105,000.00			105,000.00		
NGO (IPHC-DMSF)							
UNICEF		257,341.12			257,341.12		
PROVINCE		419,639.25	1,020,107.78		1,439,747.03		
MUNICIPALITY							
Prov./Mun./Rehab/Repair							
Expasion							
Total		781,980.37	1,020,107.78		1,802,088.15		

Source: Provincial Planning & Development Office.

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



**(1) Budgetary Allocation to the Sector**

The Budget Office of the province consolidates the budget proposal submitted by all offices of the Provincial Government. Meanwhile, 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 Northern Samar for the Sector from 1995 to 1998 are summarized in Tables 6.3.2 and 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)	285,739.31	64,516.40	10,421,798.69	117,178.10	10,889,232.50	90.36
Various Foreign Assisted (OECE)						
National (DPWIL/CDF/DILG/PAF2)			10,421,798.69		10,421,798.69	86.48
Various Local Funding (Prov / Mun.)	285,739.31	64,516.40		117,178.10	467,433.81	3.88
Spring Development with I.2	787,624.64			132,192.94	919,817.58	7.63
Various Foreign Assisted (OECE)						
National (DPWIL/CDF)						
National/Local Funding (DOH)				35,000.00	35,000.00	0.29
Various Local Funding (Prov/Mun.)	787,624.64			97,192.94	884,817.58	7.34
Spring Development with I.3	196,430.66		46,283.03		242,713.69	2.01
Construction Levels 2/3 (Municipal)						
National (DPWIL/CDF)						
Local funding (Municipal)	196,430.66		46,283.03		242,713.69	2.01
Maintains/Rehabs/Improve I.1/I.2/I.3 & SD (Prov/Mun)						
Expansion I.2/I.3 (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						
<b>Total</b>	<b>1,269,794.61</b>	<b>64,516.40</b>	<b>10,468,081.72</b>	<b>249,371.04</b>	<b>12,051,763.77</b>	<b>100.00</b>

Source: Provincial Planning and Development Office.

**Table 6.3.3 Sector Allocation in the Annual Investment Plan, 1995 – 1999**

Unit: Pesos

Item	1995	1996	1997	1998	1999	Total
Level I						
Foreign Assisted						
National			10,421,798.69			10,421,798.69
Local	285,739.31	64,516.40		117,178.10		467,433.81
Level 2/3						
Foreign Assisted						
National						
Local	984,055.30		46,283.03	132,192.94		919,817.58
Other :						
Expansion						
Repair/Maintenance						
Special Water Supply Projects (Gov't Centers, Hosp.) - Local						
Water Quality						
Sub-Total Water Supply						11,809,050.08
Health Centers						
Sanitation Toilet (DOH)						242,713.69
Sanitation Toilet (Municipal)						
Sub-Total Sanitation						
<b>Grand Total</b>	<b>1,269,794.61</b>	<b>64,516.40</b>	<b>1,046,8081.72</b>	<b>249,370.94</b>		<b>12,051,763.77</b>

Note: \* - Part of DILG - PAF2

Source: Provincial Planning and Development Office

Table 6.3.2 shows the 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 summarizes annual sector investments by service level for the period 1995 to 1998). Given priority in the WATSAN are: a) Construction of DW, SW, tank, etc., which appropriated an amount of ₱10.89 million equivalent to 90.36% of the WATSAN allotment for the period 1995 – 1998, and funded mainly by the National Government.



In the AIP of the province, a total investment cost of P12.05 million was planned for water supply and sanitation sector during the period of 1995-1998. But, the actual expenditure for the sector out of the 20% DF of the province was P3.186 million or only 26.44% of the required investments (refer to Table 6.3.4). Further, there is a need to clarify which of the planned investments were implemented and funded from any of the available sources, e.g., local funds (provincial and municipal government) and foreign funds.

The AIP of the province for the years between 1995 and 1998 included the repair and maintenance items of water supply facilities. It is important to consider the budget for repair and maintenance of the facilities.

### **6.3.2 Past and Current Breakdown of 20% Development Fund**

The allocation of the 20% DF is guided by the 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 32.3% of the DF in 1998 (i.e. P15.30 million out of P47.3 million). However, the water supply and sanitation was given low priority with minimal share of only 2.06% of the DF on the average.

The provincial government provides the prioritized WATSAN projects with funds under the social services sector. Actual expenditures on 20% DF as shown in Table 6.2.3 are higher than those in Table 6.3.4 (sectoral disbursements) since the latter's figures may reflect only capital outlays and exclude incidental expenses, etc. In 1997, out of the 20% DF of P 37.743 million, disbursed amount to WATSAN sector was only P1.01 million (2.68% of the actual total disbursements from 20% DF). Likewise, in 1998, the WATSAN sector is allocated a smaller amount of P.97 million which is equivalent to only 2.06 % of both the planned 20% DF and the actual disbursed amount of the 20% DF.

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

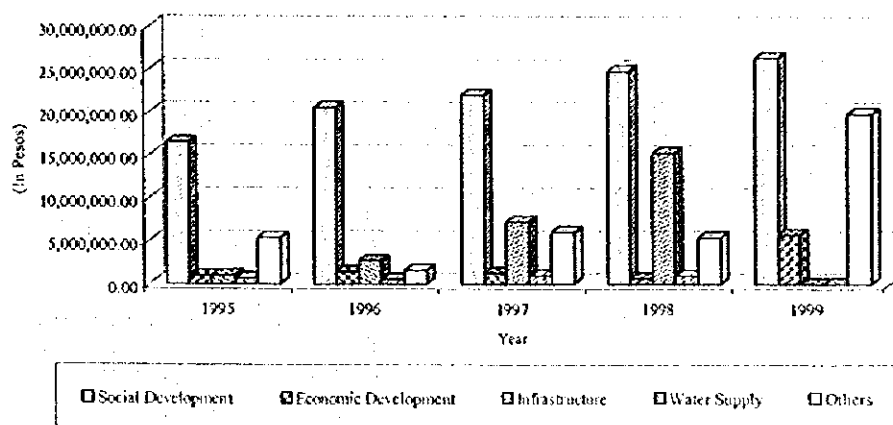
Unit: Pesos

Year	Planned 20% Dev't. Fund	Actual Expenditures					Sub-Total	% of Water Supply to Actual Dis-bursed Amount of 20% DF
		Social De-velopment	Economic De-velopment	Infrastruc-ture	Water Supply	Others		
1995	24,638,552	16,544,637	965,102	1,020,331	656,700	5,451,783	24,638,552	2.67
1996	26,902,538	20,579,482	1,411,772	2,718,758	542,741	1,649,795	26,902,548	2.02
1997	37,743,974	22,079,059	1,303,006	7,290,521	1,011,044	6,060,344	37,743,974	2.68
1998	47,296,881	24,956,441	651,060	15,278,901	976,353	5,464,127	47,296,881	2.06
1999	52,136,258	26,450,000	5,750,258	0	0	19,936,000	52,136,258	0

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

<sup>b</sup> 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**



**(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 through its 20% DF to support capital development at the municipal and barangay levels. 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 de-volved functions.

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

**6.4.1 Cost Sharing Arrangements/Counterpart Funding**

Minimal allocation has been experienced for the WATSAN sector. The financial assistance was obtained from foreign donors such as UNICEF, OECF (Level I) and PAF2 (DILG). The barangays submit the sector projects to the province for funding. The requests however, are granted on a case to case basis, usually if the manpower, materials and budget are available. The PPDO acts as the secretariat of PBAC. The PEO can undertake designing, construction and provide O&M assistance.

Currently, the sector projects receive funds under the allotment for social services sector. According to the AIP, the province allocates part of the 20% development fund of IRA to the prioritized municipalities. The experience of the province on access to other donors is still minimal. 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 the present GOP policy).

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

- a) The PEO-Waterworks 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 – and PPDO (for monitoring)
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.

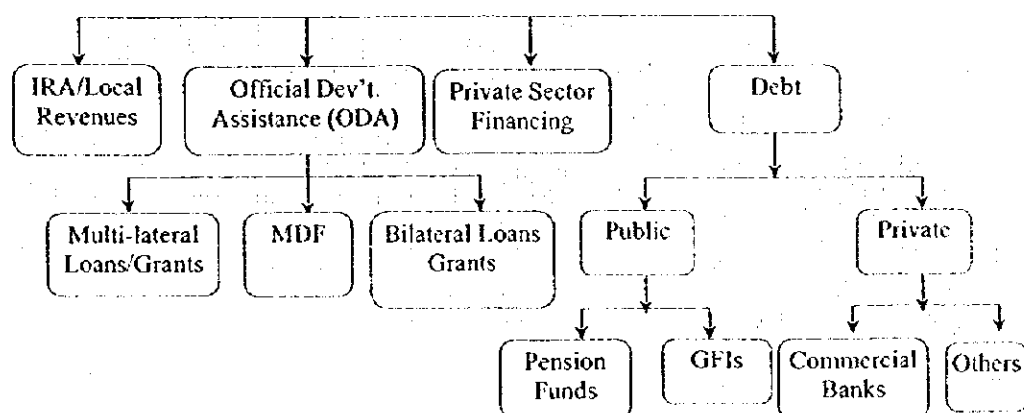
For any central government grants that are provided for the development of Level I water supply systems and sanitation facilities to the limited classes of municipalities, the LGUs and beneficiaries concerned shall share the capital cost required. No subsidies from the central government will be provided 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 or indirectly coursed through the province as in the case of the UNICEF funds (grant), OECF (Level I) and PAF2 (DILG). Water districts in the province likewise avail of funding through loans that are directly obtained from LWUA.

LGUs have thus alternative 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 lent 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 arrearages 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 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, SP for the Province; Sangguniang Panlungsod, 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. 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 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, the local water district 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 estimated cost 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:

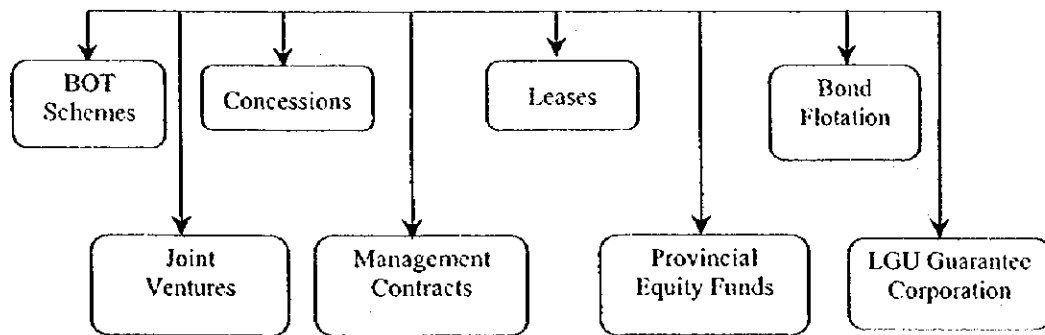
- 1) World Bank funds shall be channelled thru the Development Bank of the Philippines (DBP) which shall relend them as sub-project loans to the LGUs.
- 2) The DBP sub-project loan shall include cost of feasibility study, technical design and construction of the water facility.
- 3) Basic terms of the 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

There are three (3) waterworks in Northern Samar. Catarman WD has 485 metered connections and collection efficiency of 92%. Its average monthly rate is ₱132.75 for an average monthly consumption of 18 cu.m. per household. The WD has an average monthly expenditures amounting to ₱161,750 which exceeds its average monthly revenues of ₱159,000 (refer to Table 6.4.1).

Catarman WD has availed an amount of ₱4.0 million from LWUA and pays a monthly amortization of ₱34,510. It has current loan arrears amounting to ₱4.0 million (refer to Figure 6.4.2).



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

Water works	Description						
	No. of Metered Connections	No. of Flat Rate Connections	Average Monthly Rate	Average Consumption per HH	Average Expenditures	Average Revenues	Collection Efficiency
	Nos.	Nos.	Pesos/cu.m.	Cu.m./mo.	Pesos/mo.	Pesos/mo.	Percent (%)
Catarman WD	485	0	132.75	18	161,750	159,000	92.0
Costa Real WVs	80	0					
San Isidro WD	5	0					

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
Catarman WD	4,053,522.00	300 months	34,510.00	4,008,970.00

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 depository of household toilet is through self-help.

### **6.5.2 Operation and Maintenance Cost**

The operation and maintenance cost for Level I and II water supply system 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 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 for monthly contributions from the users to cover the cost of O & M of WATSAN facilities. There were quite a number of the active BWSAs for Level I water supply, which collected monthly fees of about ₱10.00 per household per month.

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 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 group interview survey results, majority of the respondents indicated a strong interest in BWSA affairs, and they are willing to contribute labor assistance in construction. In the past construction of Level I facilities beneficiaries contributed through provision of labor, materials and donation of site.

Each of the three barangays surveyed has a committee on water and sanitation within the barangay council. It was noted that all barangays were recipients of technical and financial assistance from the provincial and municipal government. The assistance ranged from the provision of toilet bowls and water pumps to the conduct of BWSA training.

Majority of the respondents indicated their willingness to contribute in cash or in kind for the construction of WATSAN facilities in their respective barangays. But, nobody wanted to participate in activities that they have been quite active in the past such as the selection of sites and improving levels of service and in the construction of facilities.

With respect to the construction cost of private toilet, it seems that the cost is relatively expensive as compared with family income. The estimated cost of flush type toilet facility is about 6.63 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, there were common problems on operations and maintenance that were encountered by the respondents – namely, defective pumps due to the lack of funds for the maintenance work. This can be attributed to the lack of sufficient funds to maintain the operations of WATSAN facilities.

Most of the respondents indicated that the residents do not pay for the operation and maintenance of their water supply facilities. Very few residents in Barangay Dale pay a small amount, which is even below ₱10.00 per month. Respondents, however, indicated that people are actually willing to pay for the water. A BWSA collector was responsible for collecting the fees, according to the respondents from Barangay Dale. Further, the barangay councils are willing to participate in sector projects and in the operation and maintenance of WATSAN facilities.

Based on the group interview survey results (Level I services), majority of respondents would want to pay a monthly fee to cover the cost of O & M expenses and the amount ranges from below ₱5.00 per month to ₱20.00 per month. It was also noted by the respondents that their barangay councils indeed provided assistance in the O & M of watersupply systems in terms of training of users/ beneficiaries in the regular maintenance program of WATSAN facilities.

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 very low 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 (%) <sup>4</sup>
Median of Monthly Income <sup>1</sup>	3,468.00		-
Average Level III: Monthly Water Bill <sup>2</sup>	₱30.00	0.87	5.0 or less
Average Level II: Monthly Water Bill	₱10.00	0.29	2.0 - 3.0
Mo. Level I Expenditures	₱5.00	0.14	1.0 or less
Private Toilet Construction Cost – Flush Type Toilet <sup>3</sup>	23,000.00	6.63	

Notes:

<sup>1</sup> 1994 Family Income and Expenditures Survey, NSO. Average mean income is ₱45,485 annually for Northern Samar and median income is ₱29,673. In 1999, average mean income is ₱63,795 and ₱41,617 for the median income. For Region VIII, the mean income and median income in 1994 were ₱49,912 and ₱34,780, respectively and in 1999, the mean income is estimated to be ₱70,004 and median income is ₱48,780.75.

<sup>2</sup> Data from PSPT; It is assumed that 21 cu m. will be consumed per family.

<sup>3</sup> Current prices estimated in this study

<sup>4</sup> Based on the experiences mainly from LWUA, DPWH and DILG.

Chapter

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**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 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 in 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 the 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 4,696 shallow wells, 156 deep wells and 195 developed springs in the province (functional sources). Majority of the wells is shallow wells. About 21% of these water sources are public facilities. Of the total existing wells, 244 shallow wells and 306 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	725	148	195	1,068
b. Privately owned sources	3,971	8	0	3,979
c. Number of water sources	4,696	156	195	5,047
d. % share of different sources	93%	3%	4%	100%
2. Water sources with problems and non-functional facilities				
a. Water quality problems* <sup>1</sup>	1,878	0	0	1,878
b. Non-functional	244	306	0	550
3. Spring source information				
a. Undeveloped	-	-	0	0
b. Untapped	-	-	NA* <sup>2</sup>	NA* <sup>2</sup>

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

Northern Samar shares a common geologic features and history with the other two provinces comprising the Island of Samar. The lithologic units can be classed under two general rock suites: (1) the suite of igneous rocks of Cretaceous-Paleogene periods, comprising the core of Samar Island, and (2) the clastic and non-clastic sequence of rocks dated from Early Miocene to Pleistocene epochs found surrounding the core.

The Samar Central Highlands is a NNW-SSE trending mountain system of moderate to high relief extending from Catarman to Leyte Gulf. The basement complex consists of metamorphic rocks of Cretaceous period. The exposure is limited and might be concealed under Miocene rocks at the southern part of the Samar Central Highlands. The rock units of several

ages are found in the mountainous area. The youngest rock units are marine and terrestrial sediments of Oligocene to Miocene epoch in the surrounding area of mountain range, and volcanic rocks as andesite flow of Oligocene epoch.

The western mountains were formed by submarine andesite and basalt flow. Presently, the islets formed by volcanic and pyroclastic rocks are in the northern and western sides of the mountains. The alluvial deposits are very limited along the seashore.

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. The oldest rocks in the province consist of a sequence of partly metamorphosed andesite and basalt lava flows, agglomerate and tuff with intercalated sedimentary rocks. It is naturally dense and impervious.

This rock unit is partly intercalated with sedimentary rocks. It is overlain by Miocene coralline limestone. It consists mostly of partly altered andesite, dacite, basalt lava flows, agglomerate and tuff. It is dense and is naturally impervious. This massive to thick bodied coralline limestone is characterized by fracture opening and solution channel ways storing and transmitting water from intake solution cavities.

#### (2) Plio-Pleistocene Series

Sedimentary rocks of this series have various range of permeability. The Catbalogan formation, distributed in southern part of the province, includes the less compacted upper sandstone and conglomerate, the deeper more compacted shale, sandstone interbeds, and the tuff and clastic limestone. The less consolidated sandstone is reported to vary from negligible to over 30m thick. The deeper and tighter sequence is estimated to exceed 1,000m in thickness. Youngest age of this series, the rock units, consist of agglomerate (large boulders), tuff, conglomerate, sandstone, shale and local limestone.

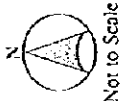


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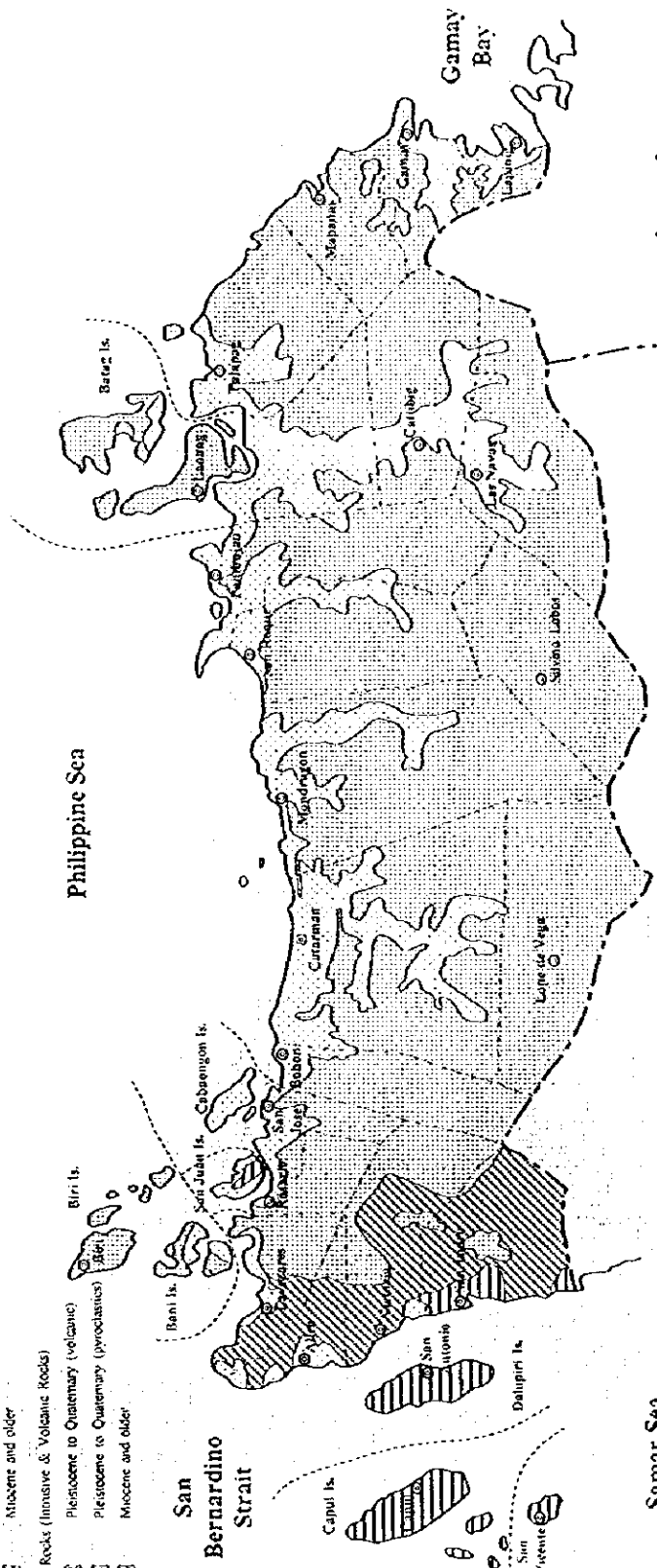
- ⊙ Provincial capital
- ⊙ City
- ⊙ Municipality
- Provincial boundary
- - - Municipal boundary

- Sedimentary & Metamorphic Rocks**
- ▨ Recent (Holocene)
  - ▨ Pleistocene to Pleistocene
  - ▨ Miocene and older

- Igneous Rocks (Intrusive & Volcanic Rocks)**
- ▨ Pleistocene to Quaternary (volcanic)
  - ▨ Pleistocene to Quaternary (pyroclastics)
  - ▨ Miocene and older



Not to Scale



**Figure 7.2.1 Geological Map  
Province of Northern Samar**

### (3) Recent Deposits (Holocene Series)

The Quaternary deposits consist mostly of unconsolidated alluvium and coral reefs. The alluvium is mostly fine sand, silt, mud, clay and minor coral reefs. They are irregular in form with varying thickness, width and length. They occur at the coastal plains, flood plains, beaches, swamplands and offshore areas. The sand deposits are formed, from negligible in the shale areas to over 20m thick at some mouths of the large river flood-plains. The coral reef has a thickness of about 10 meters. The coastal plain and river valley sand deposits are partly confined by a dense clay deposit.

## 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.

In addition to the above classification, the 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 limited at present and shown in the Data Report. The future groundwater development potential areas in the province are summarized below.

#### (1) Solo Shallow Well Area

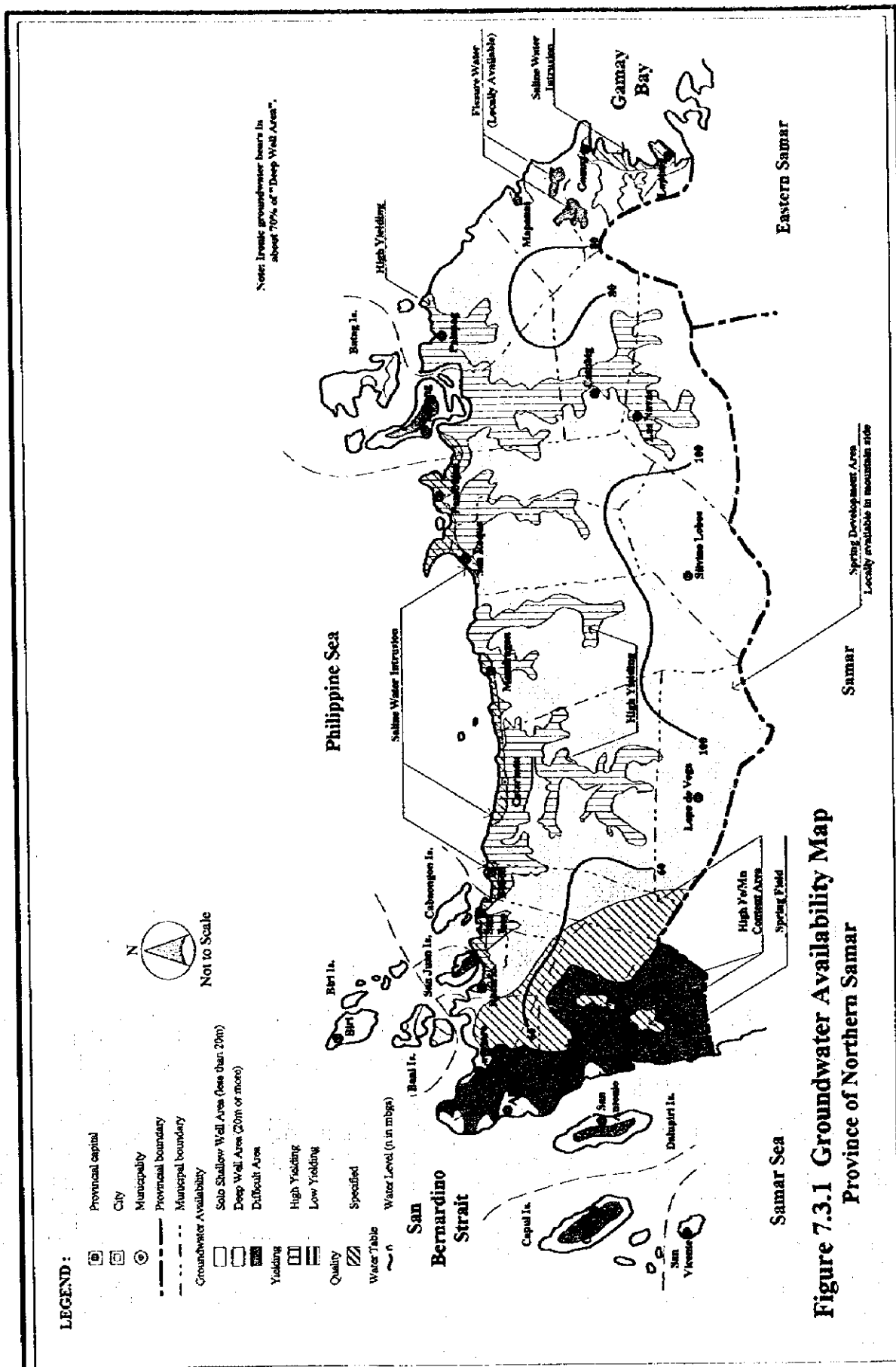
The province has solo shallow well areas in the eastern and western islets, and in the western coast, which cover about 5% of the provincial area. The development of shallow wells is, however, possible in the "Deep Well Area" (recent alluvium and beach deposits), where shallow aquifers usually occur.

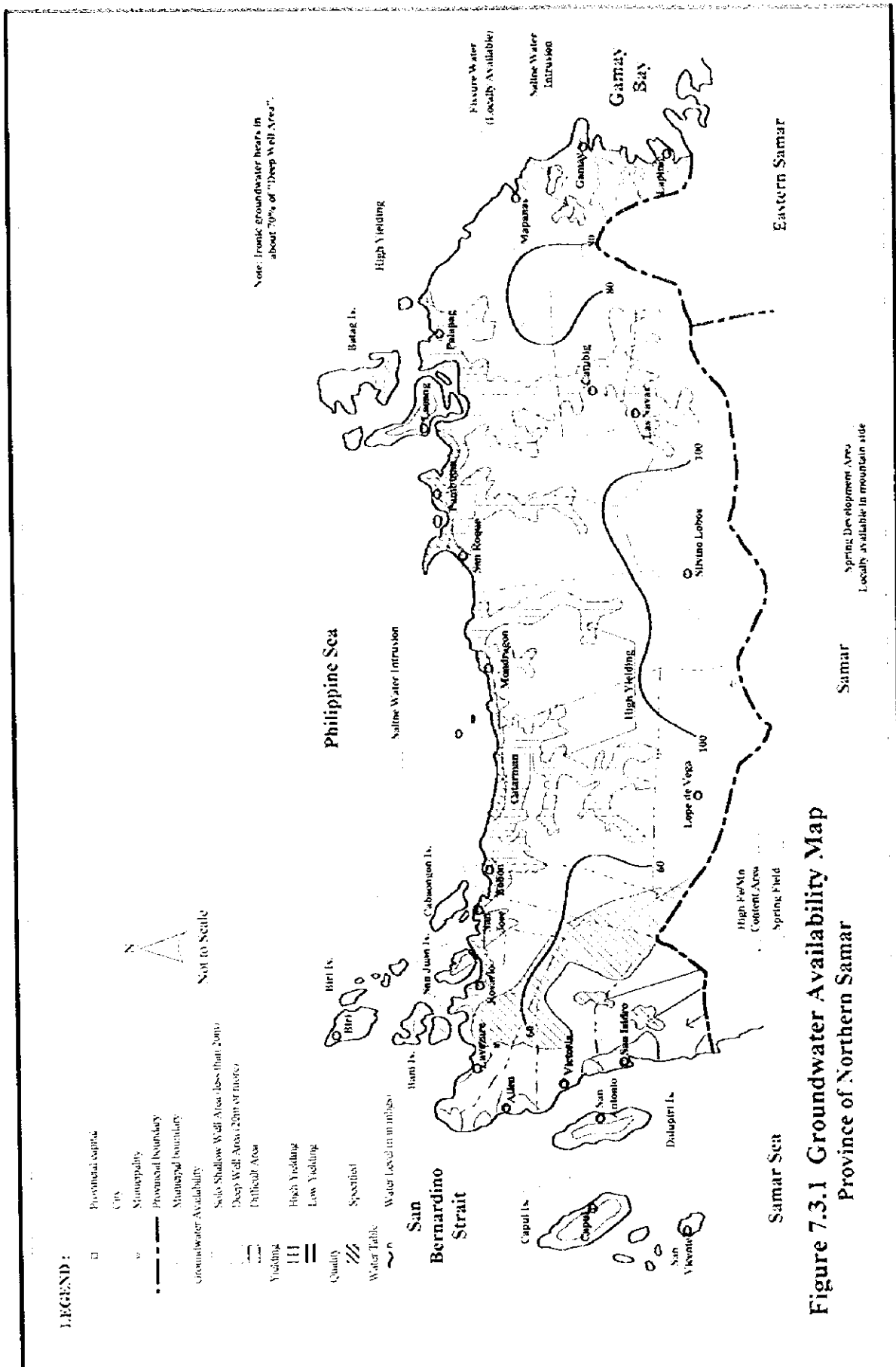
The essential definition of shallow well is to develop an unconfined aquifer. However, it is difficult to classify an aquifer clearly into whether confined or unconfined. In this study, therefore, well classification was derived from well depth of 20m. Hence, the shallow wells in the province are driven to depths ranging from 6.0m to 19.0m. These wells have static water levels from 2.0 mbgs to 6.0 mbgs and specific capacities of about 0.2 lpsm (insufficient detailed data).

#### (2) Deep Well Area

The deep well area covers approximately 85% of the province, widely distributed in central to eastern part of the province. The deep well area is composed of alluvial plain, fluvial terrace and low hills made of sedimentary rocks. The alluvial plain and fluvial terrace are 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 epoch consists of reef limestone, sandstone, conglomerate and pyroclastic in the central to eastern parts of the province.

Considering the geological formation, the alluvial plain and fluvial terrace are categorized as high potential areas for deep well development, while the limestone bodies of





**Figure 7.3.1 Groundwater Availability Map Province of Northern Samar**

Plio-Pleistocene epoch are classified as a medium-yielding area for deep well development. In alluvial plain and fluvial terrace, the average depth of the existing deep wells is 30m with an average water level of 3 mbgs. The average specific capacity is probably about 3 lpsm (insufficient detailed data).

In areas of limestone bodies made of Plio-Pleistocene series, groundwater development is not yet sufficiently achieved due to deeper water level, 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 120m with an average water level of 80 mbgs. The specific capacity will be good for a Level II service.

### (3) Difficult Area

About 10% of the provincial area are classified as a difficult area to exploit groundwater, in which the western mountainous areas belong. These are located in the western portion of the province.

The geology is made up of volcanic and igneous rocks of Oligocene to Miocene epochs. 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

As a general information obtained from DPWH-DEO in the province, there is water quality problem in both shallow and deep wells in central to eastern areas of the province (no available detailed groundwater quality data at present). Major water quality problems are high iron content and saline water intrusion. These areas are widely distributed in surrounding of the Samar Central Highlands. 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, high iron content is serious with a high percentage of affected existing wells (about 70% of the numbers of shallow and deep wells) in highland areas. The problem is extended to most of the areas in the municipalities of Catubig, Las Navas, Lope de Vega and Silvino Lobos. Acidic groundwater is also observed along these municipalities, where volcanic rocks are distributed.

#### 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 195 developed springs currently serving the province. Such spring sources come out from the Samar Central Highlands and from the mountain system area in the western part of the province. Of these springs, 177 have discharge rates of less than 2.0 lps (2.0 lps is enough for Level II water supply with service population about 2,000 and can be applicable for small Level III water supply), while 6 springs exceed discharge rates of 2.0 lps. The other 12 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 0.01 lps to 5.9 lps. The technical information of springs in each municipality is presented in Table 7.4.1 Existing Spring Sources, Supporting Report.

Generally, numerous untapped spring sources may be found in the western mountain areas and islets. However, detailed information on untapped spring source was not available during this study period.

#### 7.5 Surface Water Sources

Major surface water sources in the province are Gamay, Catubig, Pambujan, Bugko, Catarman, Bobon and Mawo Rivers. There are 5 gauging stations at major rivers in the province.

Surface water use in the province totaled to 1.8 m<sup>3</sup>/sec according to the NWRB's water rights registration database as of March 1997. Of this usage, 99.5% of the water rights were registered for irrigation. The diversions for major flume, which are operated by private associations, are located at Catarman, the Catarman River; at Catubig, the Catubig River; and at San

Roque, the Pambujan River. Other surface water rights are lodged to waterworks for domestic uses. For domestic water supply, the municipal government of Catubig had registered an intake amount of 0.01 m<sup>3</sup>/sec from the Catubig River in 1994.

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, while the inflow to and the outflow from the respective municipalities are estimated as the exploitable potential of the major rivers in the province (refer to Tables 7.5.1 and 7.5.2 respectively, Supporting Report).

Water quality analyses at selected rivers were conducted during this study. Except for color, the examined water quality analysis at each river 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 present 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 6.0 mbgs to 19.0 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 occur from 22m to 35m in depth (insufficient detailed data).

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 the Supporting Report. Table 7.6.1 shows the groundwater development potential.



Table 7.6.1 Groundwater Development Potential in the Province

Area	Groundwater Development Potential	Water Quality	Area Feature
Samar Central Highlands Area	<p>Most areas of this district are classified as deep well areas and there are solo shallow well areas in the northeastern islands. There are some difficult areas in the eastern part of the province. Also, there are locally possible areas of fissure groundwater development in Gamay, where limestone bodies are found.</p> <p>High yielding areas (good for Level-III service) with shallow water level are located on recent deposits along the major rivers and coastal belts. Other deep well areas have various depths of aquifers made by limestone bodies with water level of 60 mbgs to 100 mbgs.</p> <p>Springs are also possible sources to develop in the mountain areas. Their yields are generally small and easily affected seasonally by rainfall amount.</p>	<p>Area with high Fe contents is reported in the western mountainside (deep well area). Groundwater with high iron content is also observed locally in most of this area.</p> <p>Acid groundwater is reported. Some cases of high iron contents may be caused by corrosion of hand-pump riser pipe made of GI.</p> <p>Some seashore areas have saline water intrusion problem.</p>	<p>This area primarily consists of a peneplaned surface that has attained a minimum elevation of 600 masl.</p> <p>The major lithologic units are the clastic and non-clastic sequence of rocks dated from Early Miocene to Pleistocene epochs found surrounding the core.</p>
Western Mountain & Coastal Area	<p>This district is generally classified as difficult area including the western islets. There are some solo shallow well areas where small plain is found along the seashore and the coastal line of islets.</p> <p>Springs are very rich (numerous and large yielding) and the only potential source in this district.</p>	<p>Saline water intrusion is reported in solo shallow well areas. Groundwater with high Fe/Mn contents is found in the mountain areas.</p>	<p>The western mountain and coastal areas are characterized by low rolling hills with elevation rarely exceeding 500 masl. Generally, the western coastline is very irregular.</p> <p>The major lithologic unit is the suite of igneous rocks of Cretaceous-Paleogene periods.</p>

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 in the expected municipality area 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 merely at 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. 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 more than 30%.

## (2) Spring

The data/information of identified untapped spring sources were not available during this study period. However, there is a high possibility to present numerous spring sources in areas belonging to the western mountain system and the western islets in the province based on existing springs and geologic background. Untapped spring sources may have enough discharge rates (exceeding 0.5 lps) for Level-II water supply based on data from developed spring sources. Other areas may have few untapped springs. Their discharge rates are small and easily affected seasonally by rainfall.

## (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 Mawo and Catarman 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)		
Allen	Rural	SW	10	18 <D<	-	0.2	Risky DW and Rich SP
		DW	-	- <D<	-	-	
	Urban	SW	80	18 <D<	-	0.2	
		DW	-	- <D<	-	-	
Biri	Rural	SW	100	18 <D<	-	0.2	Fair DW and Rich SP
		DW	-	- <D<	-	-	
	Urban	SW	100	18 <D<	-	0.2	
		DW	-	- <D<	-	-	

Table 7.7.1 Standard Specification of Wells by Municipality

(cont'd)

Municipalities With Classification	Type	Type	Proportion (%)	Standard Specification			Availability of Sources
				Depth Range (m)	SWI. (m)	Sp. Cap. (lpsm)	
Bobon	Rural	SW	-	-	<D<	-	Good DW and Poor SP
		DW	100	80	<D<	0.6	
	Urban	SW	-	-	<D<	-	
		DW	100	40	<D<	0.6	
Capul	Rural	SW	30	18	<D<	0.2	Fair DW and Rich SP
		DW	-	-	<D<	-	
	Urban	SW	80	18	<D<	0.2	
		DW	-	-	<D<	-	
Catarman	Rural	SW	-	-	<D<	-	Good DW and Poor SP
		DW	100	80	<D<	0.6	
	Urban	SW	-	-	<D<	-	
		DW	100	40	<D<	0.9	
Catubig	Rural	SW	-	-	<D<	-	Good DW and Rich SP
		DW	100	120	<D<	0.6	
	Urban	SW	-	-	<D<	-	
		DW	100	80	<D<	0.9	
Gamay	Rural	SW	-	-	<D<	-	Good DW and Few SP
		DW	90	80	<D<	0.6	
	Urban	SW	-	-	<D<	-	
		DW	100	40	<D<	0.9	
Laoang	Rural	SW	40	18	<D<	0.2	Fair DW and Poor SP
		DW	-	-	<D<	-	
	Urban	SW	80	18	<D<	0.2	
		DW	-	-	<D<	-	
Lapinig	Rural	SW	-	-	<D<	-	Good DW and Few SP
		DW	100	80	<D<	0.6	
	Urban	SW	-	-	<D<	-	
		DW	100	40	<D<	0.9	
Las Navas	Rural	SW	-	-	<D<	-	Good DW and Rich SP
		DW	100	120	<D<	0.6	
	Urban	SW	-	-	<D<	-	
		DW	100	80	<D<	0.9	
Lavezares	Rural	SW	10	18	<D<	0.2	Risky DW and Rich SP
		DW	50	80	<D<	0.4	
	Urban	SW	-	-	<D<	-	
		DW	60	40	<D<	0.6	
Lope de Vaga	Rural	SW	-	-	<D<	-	Poor DW and Few SP
		DW	100	120	<D<	0.6	
	Urban	SW	-	-	<D<	-	
		DW	100	120	<D<	0.6	
Mapanas	Rural	SW	-	-	<D<	-	Fair DW and Few SP
		DW	90	80	<D<	0.4	
	Urban	SW	-	-	<D<	-	
		DW	100	40	<D<	0.6	
Mondragon	Rural	SW	-	-	<D<	-	Good DW and Poor SP
		DW	100	80	<D<	0.6	
	Urban	SW	-	-	<D<	-	
		DW	100	40	<D<	0.9	
Palapag	Rural	SW	-	-	<D<	-	Good DW and Poor SP
		DW	100	80	<D<	0.6	
	Urban	SW	-	-	<D<	-	
		DW	100	40	<D<	0.9	

**Table 7.7.1 Standard Specification of Wells by Municipality**

(cont'd)

Municipalities With Classification		Type	Proportion (%)	Standard Specification			SWL (m)	Sp. Cap. (lpsm)	Availability of Sources
				Depth Range (m)					
Pambujan	Rural	SW	-	-	<D<	-	-	-	Good DW and Poor SP
		DW	100	80	<D<	-	-	0.6	
	Urban	SW	-	-	<D<	-	-	-	
		DW	100	40	<D<	-	-	0.9	
Rosario	Rural	SW	10	12	<D<	18	3.0	0.2	Good DW and Poor SP
		DW	80	80	<D<	-	-	0.6	
	Urban	SW	-	-	<D<	-	-	-	
		DW	100	40	<D<	-	-	0.9	
San Antonio	Rural	SW	70	18	<D<	-	-	0.2	Fair DW and Poor SP
		DW	-	-	<D<	-	-	-	
	Urban	SW	80	18	<D<	-	-	0.2	
		DW	-	-	<D<	-	-	-	
San Isidro	Rural	SW	-	-	<D<	-	-	-	Risky DW and Rich SP
		DW	10	80	<D<	-	-	0.6	
	Urban	SW	-	-	<D<	-	-	-	
		DW	-	-	<D<	-	-	-	
San Jose	Rural	SW	-	-	<D<	-	-	-	Good DW and Poor SP
		DW	80	80	<D<	-	-	0.6	
	Urban	SW	-	-	<D<	-	-	-	
		DW	100	40	<D<	-	-	0.9	
San Roque	Rural	SW	-	-	<D<	-	-	-	Good DW and Poor SP
		DW	100	80	<D<	-	-	0.6	
	Urban	SW	-	-	<D<	-	-	-	
		DW	100	40	<D<	-	-	0.9	
San Vicente	Rural	SW	100	18	<D<	-	-	0.2	Fair DW and Few SP
		DW	-	-	<D<	-	-	-	
	Urban	SW	100	18	<D<	-	-	0.2	
		DW	-	-	<D<	-	-	-	
Silvino Lobos	Rural	SW	-	-	<D<	-	-	-	Fair DW and Few SP
		DW	100	120	<D<	-	-	0.6	
	Urban	SW	-	-	<D<	-	-	-	
		DW	100	120	<D<	-	-	0.6	
Victoria	Rural	SW	-	-	<D<	-	-	-	Risky DW and Rich SP
		DW	40	80	<D<	-	-	0.6	
	Urban	SW	50	18	<D<	-	-	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 construction of test wells shall be conducted. 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 Areas	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
Catarman, Mondragon & San Roque	Urban Areas	Test Wells; three deep wells depth of 150 m, diameter of 200 mm and well screen of 40 m target aquifers: limestone formation
		Installation of Test; pumping test & water quality examination time draw-down with maximum discharge of 1,500 m <sup>3</sup> /day recovery test water quality examination to include Fe, Mn, pH, Ca, Mg and Cl
Catubig, Las Navas, Silvino Lobos & Lope de Vega	Rural Areas	Water Quality Examination of Spring Sources to include: Physical; Turbidity, Color & TDS Chemical; pH, TH, Alkalinity & Acidity Major Cation; Na, K, Ca & Mg Major Anion; CO <sub>3</sub> , HCO <sub>3</sub> , Cl & SO <sub>4</sub> Trace Elements; Cu, Fe & Mn Bacteriological; Bacteria & Coliform

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<sup>2</sup> shall be considered. Table 7.7.1, Supporting Report presents reference information on spacing arrangements for planned wells.

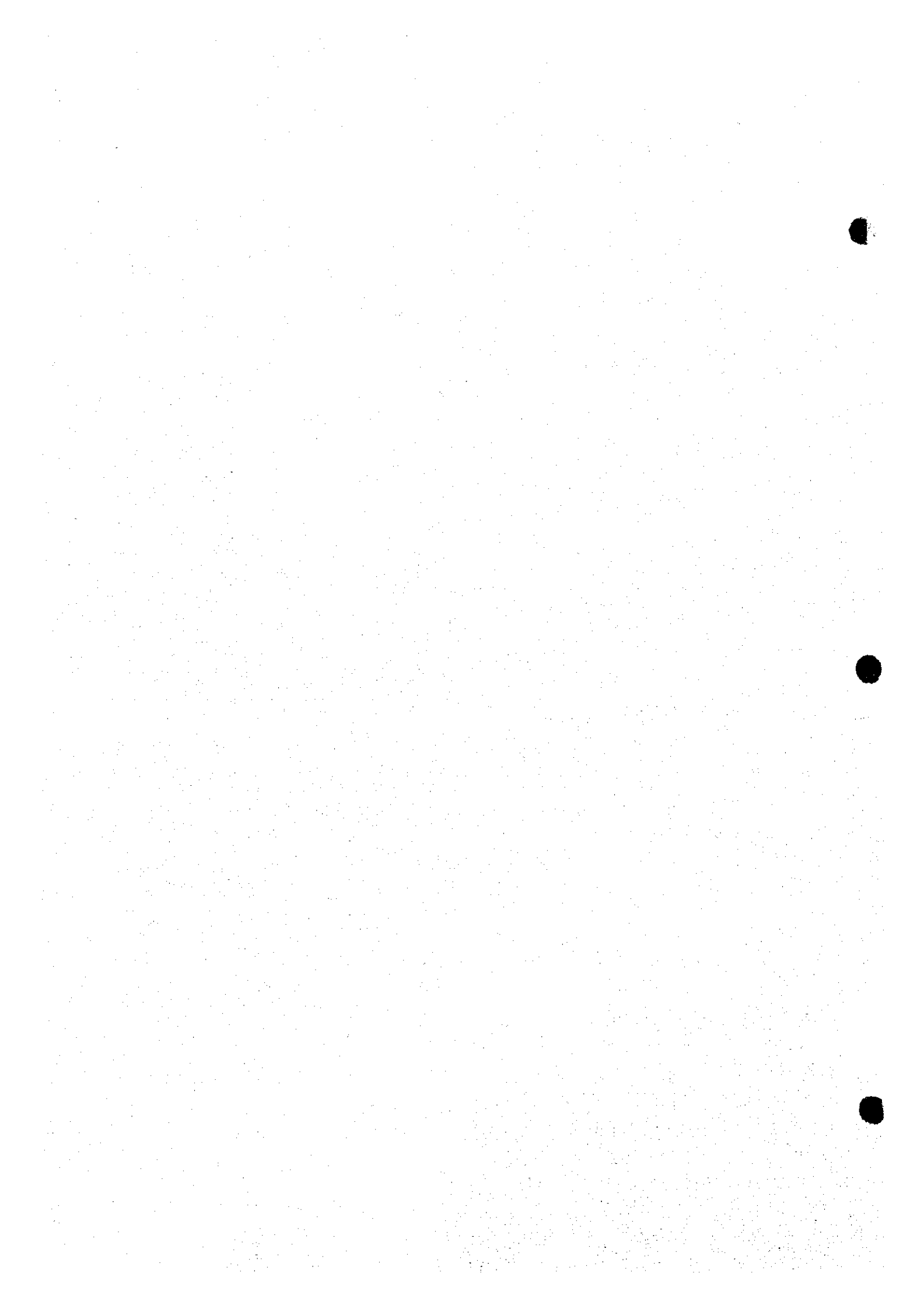
Information on spring sources proposed by barangay level for future development was not provided during the data collection stage. Untapped spring sources shall also be investigated to confirm the development possibility in the following items: (1) location and type of spring sources, (2) fluctuation of discharge rates throughout the year, (3) distance from spring sources and proposed served areas, and (4) relative elevation between the two points.

Chapter

8

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**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 that are not prescribed in the national plan: school and public toilets as well as sewerage are assumed based on 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), the 1995 Census-based National and Regional Population projection prepared by the 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 the 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 below.

### **(1) Water supply**

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

Table 8.2.1 Provincial Sector Targets

Sub-sectors	Base Year Service Coverage	Phase I (2000-2004)		Phase II (2005-2010)	
		Population Coverage (%)	Additional Population to be Served	Population Coverage (%)	Additional Population to be Served
<b>Water Supply</b>	Population Coverage (%)	Population Coverage (%)	Additional Population to be Served	Population Coverage (%)	Additional Population to be Served
<i>Urban Area</i>	65	65	9,317	95	141,615
<i>Rural Area</i>	60	60	21,664	93	145,637
<b>Sanitation</b>	Household Coverage (%)	Household Coverage (%)	Additional Households to be Served	Household Coverage (%)	Additional Households to be Served
<i>Household Toilet</i>					
<i>Urban Area</i>	60	68	4,267	93	19,545
Flush	1	10	1,324	50	17,424
Pour Flush	99	90	2,943	50	2,121
VIP	0	0	0	0	0
<i>Rural Area</i>	58	65	9,376	90	44,760
Flush	0	0	0	10	696
Pour Flush	100	100	9,376	90	44,064
VIP	0	0	0	0	0
<b>School Toilet</b>	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
	34	50	25,497	90	63,239
<b>Public Toilet</b>	Public Utilities Coverage (%)	Public Utilities Coverage (%)	Additional Public Utilities with Sanitary Toilets	Public Utilities Coverage (%)	Additional Public Utilities with Sanitary Toilets
	86	100	6	100	12
<b>Sewerage</b>	Urban Population Coverage (%)	Not Applicable		Urban Population Coverage (%)	Urban Population to be Served
	0			50	41,075
<b>Solid Waste</b>	Urban Household Coverage (%)	Urban Household Coverage (%)	Additional Urban Households to be Served	Not Applicable	
	56	65	8,905		

Table 8.2.2 Estimation of Base Year Service Coverage of Water Supply

Name of Municipality	Area	Population (1998)	Population Served by 1998 Facilities				Percentage Coverage
			Level III	Level II	Level I	Total	
Allen	Urban	8,476			5,012	5,012	59
	Rural	10,336			5,538	5,538	54
	Total	18,812			10,550	10,550	56
Biri	Urban	2,596			1,598	1,598	62
	Rural	6,728			3,974	3,974	59
	Total	9,324			5,572	5,572	60
Bobon	Urban	5,041			3,581	3,581	71
	Rural	11,451			6,903	6,903	60
	Total	16,492			10,484	10,484	64
Capul	Urban	4,286		563	2,880	3,443	80
	Rural	5,827		416	3,562	3,978	68
	Total	10,113		979	6,442	7,421	73
Cataman (Capital)	Urban	31,015	2,567	192	19,799	22,558	73
	Rural	34,205	532		19,196	19,728	58
	Total	65,220	3,099	192	38,995	42,286	65
Carubig	Urban	4,649			2,306	2,306	50
	Rural	21,566		592	8,590	9,182	43
	Total	26,215		592	10,896	11,488	44
Gamay	Urban	2,753			1,426	1,426	52
	Rural	17,913			9,744	9,744	54
	Total	20,666			11,170	11,170	54
Laoang	Urban	11,104			8,137	8,137	73
	Rural	38,098			27,694	27,694	73
	Total	49,202			35,831	35,831	73
Lapinig	Urban	3,701			2,326	2,326	63
	Rural	6,629		172	3,891	4,063	61
	Total	10,330		172	6,217	6,389	62
Las Navas	Urban	6,254		373	2,770	3,143	50
	Rural	19,763		647	6,425	7,072	36
	Total	26,017		1,020	9,195	10,215	39
Lavezares	Urban	3,433			2,231	2,231	65
	Rural	17,528		750	11,530	12,280	70
	Total	20,961		750	13,761	14,511	69
Lope De Vega	Urban	2,514		346	621	967	38
	Rural	10,314		851	1,627	2,478	24
	Total	12,828		1,197	2,248	3,445	27
Mapanas	Urban	2,161			1,208	1,208	56
	Rural	7,813			3,929	3,929	50
	Total	9,974			5,137	5,137	52
Mondragon	Urban	5,491			3,470	3,470	63
	Rural	21,357			16,105	16,105	75
	Total	26,848			19,575	19,575	73

Table 8.2.2 Estimation of Base Year Service Coverage of Water Supply

(Cont'd)

Name of Municipality	Area	Population (1998)	Population Served by 1998 Facilities				Percentage Coverage
			Level III	Level II	Level I	Total	
Palapag	Urban	6,243			3,344	3,344	54
	Rural	20,286			10,187	10,187	50
	Total	26,529			13,531	13,531	51
Pambujan	Urban	9,970			5,999	5,999	60
	Rural	13,414		483	7,818	8,301	62
	Total	23,384		483	13,817	14,300	61
Rosario	Urban	2,412			2,399	2,399	99
	Rural	6,845			4,985	4,985	73
	Total	9,257			7,384	7,384	80
San Antonio	Urban	839			536	536	64
	Rural	7,413		49	5,308	5,357	72
	Total	8,252		49	5,844	5,893	71
San Isidro	Urban	2,834	908	82	1,145	2,135	75
	Rural	21,675	164	3,102	13,384	16,650	77
	Total	24,509	1,072	3,184	14,529	18,785	77
San Jose	Urban	3,088			1,918	1,918	62
	Rural	10,052		181	5,757	5,938	59
	Total	13,140		181	7,675	7,856	60
San Roque	Urban	8,378		91	5,501	5,592	67
	Rural	11,103		182	7,158	7,340	66
	Total	19,481		273	12,659	12,932	66
San Vicente	Urban	1,610			973	973	60
	Rural	4,423			3,680	3,680	83
	Total	6,033			4,653	4,653	77
Silvino Lobos	Urban	2,615		668	502	1,170	45
	Rural	9,053		120	2,701	2,821	31
	Total	11,668		788	3,203	3,991	34
Victoria	Urban	2,700		729	1,337	2,066	77
	Rural	9,327		874	5,478	6,352	68
	Total	12,027		1,603	6,815	8,418	70
Provincial Total	Urban	134,163	3,475	3,044	81,019	87,538	65
	Rural	343,119	696	8,419	195,164	204,279	60
	Total	477,282	4,171	11,463	276,183	291,817	61

The base year service coverage in urban area (65%) is lower than the updated MTPDP sector target (69%) for the year 1998, and in rural area (60%) is much lower than the sector target of 79%. As identified in Chapter 4, both in urban and rural area, the province is still behind compared to the targets of the MTPDP.

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

- i) at least the existing service coverage shall be secured to meet population increase; and
- ii) viable investment using available IRA to be allocated to water supply sector.

Thus, the existing service coverage of 65% for urban and 60% for rural area shall be kept in the medium-term period. These targets are still behind those in the MTPDP.

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 the Supporting Report).

The province has base year service coverage of 59%, which is just below the current national average coverage of 60%. Urban area registers a level of 60% that is equivalent to the national average coverage. Rural area however, has only 58% owing to the presence of numerous unsanitary facilities. By type of sanitary toilet facility, the existing percentage composition to total served households is as follows:

Type	Urban (%)	Rural (%)
Flush	1	0
Pour-flush	99	100
VIP latrine	0	0

To attain sufficiency and equitable access to basic services, provincial target of Phase I for urban household toilets is planned at 68%, while, for rural household toilets, 65% is projected. This is higher than the existing urban 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, 90% is arranged for rural household toilets.

Table 8.2.3 Base Year Service Coverage of Household Toilets

Name of Municipality	Area	1998		Households and Population Using Sanitary Toilets								
		Popula- tion	HITs	Number of Households				Popula- tion	Service Coverage (%)			
				Flush	Pour Flush	VIP/Dry	Total		Flush	Pour Flush	VIP/Dry	Total
Allen	Urban	8,476	1,685	10	986		996	5,001	1	59		59
	Rural	10,336	2,131		1,264		1,264	6,099		59		59
	Total	18,812	3,816	10	2,250		2,260	11,100		59		59
Biri	Urban	2,596	450	4	127		131	753	1	28		29
	Rural	6,728	1,154		320		320	1,884		28		28
	Total	9,324	1,604	4	447		451	2,637		28		28
Bobon	Urban	5,041	964	5	419		424	2,219	1	43		44
	Rural	11,451	2,241		1,315		1,315	6,757		59		59
	Total	16,492	3,205	5	1,734		1,739	8,976		51		54
Capul	Urban	4,286	837	2	416		418	2,143		50		50
	Rural	5,827	1,123		548		548	2,856		49		49
	Total	10,113	1,960	2	964		966	4,999		49		49
Cataraman	Urban	31,015	5,329	35	3,351		3,386	19,850	1	63		64
	Rural	34,205	6,503		4,049		4,049	21,208		62		62
	Total	65,220	11,832	35	7,400		7,435	41,058		63		63
Catubig	Urban	4,649	884	10	786		796	4,185	1	89		90
	Rural	21,566	4,204		3,573		3,573	18,332		85		85
	Total	26,215	5,088	10	4,359		4,369	22,517		86		86
Gamay	Urban	2,753	534	5	248		253	1,294	1	46		47
	Rural	17,913	3,499		1,533		1,533	7,882		44		44
	Total	20,666	4,033	5	1,781		1,786	9,176		44		44
Laoang	Urban	11,104	2,030	17	1,574		1,591	8,662	1	78		78
	Rural	38,098	7,327		5,353		5,353	27,812		73		73
	Total	49,202	9,357	17	6,927		6,944	36,474		74		74
Lapinig	Urban	3,701	616		262		262	1,592		43		43
	Rural	6,629	1,153		430		430	2,453		37		37
	Total	10,330	1,769		692		692	4,045		39		39
Las Navas	Urban	6,254	1,173	3	655		658	3,503		56		56
	Rural	19,763	4,042		2,588		2,588	12,649		64		64
	Total	26,017	5,215	3	3,243		3,246	16,152		62		62
Lavezares	Urban	3,433	654	10	517		527	2,781	2	79		81
	Rural	17,528	3,541		2,702		2,702	13,322		76		76
	Total	20,961	4,195	10	3,219		3,229	16,103		77		77
Lope De Vega	Urban	2,514	436	3	206		209	1,207	1	47		48
	Rural	10,314	1,696		816		816	4,951		48		48
	Total	12,828	2,132	3	1,022		1,025	6,158		48		48
Mapanas	Urban	2,161	400		183		183	995		46		46
	Rural	7,813	1,385		675		675	3,829		49		49
	Total	9,974	1,785		858		858	4,824		48		48
Mondragon	Urban	5,491	1,023	8	478		486	2,636	1	47		48
	Rural	21,357	4,107		2,010		2,010	10,465		49		49
	Total	26,848	5,130	8	2,488		2,496	13,101		48		49
Palapag	Urban	6,243	1,287	5	925		930	4,495		72		72
	Rural	20,286	3,962		2,765		2,765	14,201		70		70
	Total	26,529	5,249	5	3,690		3,695	18,696		70		70

Table 8.2.3 Base Year Service Coverage of Household Toilets

(Cont'd)

Name of Municipality	Area	1998		Households and Population Using Sanitary Toilets								
		Popul ation	ITLs	Number of Households				Popul ation	Service Coverage (%)			
				Flush	Poor Flush	VIP/Dry	Total		Flush	Poor Flush	VIP/Dry	Total
Pambujan	Urban	9,970	1,713	9	753		762	4,387	1	44		44
	Rural	13,414	2,387		955		955	5,366		40		40
	Total	23,384	4,100	9	1,708		1,717	9,753		42		42
Rosario	Urban	2,412	363		221		221	1,472		61		61
	Rural	6,845	1,209		655		655	3,697		54		54
	Total	9,257	1,572		876		876	5,169		56		56
San Antonio	Urban	839	168		107		107	537		64		64
	Rural	7,413	1,522		914		914	4,448		60		60
	Total	8,252	1,690		1,021		1,021	4,985		60		60
San Isidro	Urban	2,834	532	5	258		263	1,389	1	48		49
	Rural	21,675	3,948		1,859		1,859	10,188		47		47
	Total	24,509	4,480	5	2,117		2,122	11,577		47		47
San Jose	Urban	3,088	579	8	359		367	1,946	1	62		63
	Rural	10,052	1,944		1,148		1,148	5,931		59		59
	Total	13,140	2,523	8	1,507		1,515	7,877		60		60
San Roque	Urban	8,378	1,338	10	961		971	6,116	1	72		73
	Rural	11,103	1,882		1,456		1,456	8,550		77		77
	Total	19,481	3,220	10	2,417		2,427	14,666		75		75
San Vicente	Urban	1,610	341		136		136	644		40		40
	Rural	4,423	955		367		367	1,681		38		38
	Total	6,033	1,296		503		503	2,325		39		39
Silvino Lobos	Urban	2,615	401		372		372	2,406		92		92
	Rural	9,053	1,532		252		252	1,449		16		16
	Total	11,668	1,936		624		624	3,855		32		32
Victoria	Urban	2,700	556	7	221		228	1,107	1	40		41
	Rural	9,327	1,923		649		649	3,172		34		34
	Total	12,027	2,479	7	870		877	4,279		35		35
Provincial Total	Urban	134,163	24,296	156	14,521		14,677	81,320	1	60		60
	Rural	343,119	65,370		38,196		38,196	199,182		58		58
	Total	477,282	89,666	156	52,717		52,873	280,502		59		59

Note: Details may not add up to total due to rounding.

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 the 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 (%)
Allen	3,928	560	14			
Biri	2,252	680	30	1	1	100
Bobon	4,228	1,840	44			
Capul	2,870	1,240	43	1	1	100
Catarman (Capital)	13,884	2,160	16			
Catubig	5,693	2,640	46	3	3	100
Gamay	6,230	3,120	50	3	3	100
Laoang	9,837	3,600	37			
Lapinig	2,874	400	14	2		
Las Navas	5,502	1,440	26	1		
Lavezares	5,404	1,400	26	2	2	100
Lope De Vega	2,227	1,080	48	1	1	100
Mapanas	2,548	520	20			
Mondragon	4,528	1,200	27			
Palapag	6,873	960	14	1	1	100
Pambujan	6,243	2,160	35	3	3	100
Rosario	2,391	2,391	100			
San Antonio	2,200	800	36			
San Isidro	5,635	2,800	50			
San Jose	3,132	1,840	59	1	1	100
San Roque	3,652	1,480	41			
San Vicente	1,450	1,360	94			
Silvino Lobos	1,647	680	41	1	1	100
Victoria	3,337	720	22	1	1	100
<b>Provincial Total</b>	<b>108,565</b>	<b>37,071</b>	<b>34</b>	<b>21</b>	<b>18</b>	<b>86</b>

Base year service coverage is 34% applying the standard number of public school students to be served by one (1) unit of toilet facility. The low level is due to a large number of unsanitary or absence of facilities.

In the absence of national targets for school toilets, the existing level of service coverage is the base in setting up the targets. 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, 50% 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 the Supporting Report).

Eighty six percent (86%) of public utilities are served with at least one sanitary toilet giving 100% 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.

About 15% of the total households in the province relied on municipal refuse collection using trucks or a 56% urban household coverage. These municipalities have a total of 9 units of collection truck. No national targets have yet been set. However, considering the present level of coverage, a 65% 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**

Name of Municipality	Total No. of Households	No. of Urban Households	No. of Households Served	Coverage of Households (%)	Coverage of Urban Households (%)
Allen	3,816	1,685			
Biri	1,604	450			
Bobon	3,205	964			
Capul	1,960	837			
Catarman (Capital)	11,832	5,329	5,788	49	100
Catubig	5,088	884			
Ganiay	4,033	534			
Laoang	9,357	2,030	2,099	22	100
Lapinig	1,769	616			
Las Navas	5,215	1,173			
Lavezares	4,195	654	804	19	100

**Table 8.2.5 Base Year Service Coverage of Municipal Solid Waste System**

(Cont'd)

Name of Municipality	Total No. of Households	No. of Urban Households	No. of Households Served	Coverage of Households (%)	Coverage of Urban Households (%)
Lope De Vega	2,132	436			
Mapanas	1,785	400			
Mondragon	5,130	1,023	1,346	26	100
Palapag	5,249	1,287	1,511	29	100
Pambujan	4,100	1,713	1,511	38	90
Rosario	1,572	363	556	35	100
San Antonio	1,690	168			
San Isidro	4,480	532			
San Jose	2,523	579			
San Roque	3,220	1,338			
San Vicente	1,296	311			
Silvino Lobos	1,936	404			
Victoria	2,479	556			
<b>Provincial Total</b>	<b>89,666</b>	<b>24,296</b>	<b>13,675</b>	<b>15</b>	<b>56</b>

### 8.3 Projection of Frame Values

#### 8.3.1 Review of Past Population Development and 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 projections 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 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 projections in 2000 and 2005 are estimated in this study.

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

The provincial population for the year 2002 was projected with a base year 1990. The provincial growth rate of 0.13 % experienced between 1980 and 1990 was basically adopted for the projection. 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 a base year 1990. 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). Minor arrangements on the municipal growth rates were made to meet provincial average growth rate of about 0.14%.

Comparing the census and the projected population in 1995, the provincial population based on the census was about 18% higher than the projected. Regarding the municipal census population in 1995, all municipalities except for San Vicente were higher with a range of 5 - 42% 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 the 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 the 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.

<u>Year</u>	<u>Population</u>	<u>Growth Rate</u>
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 the population growth by province will not drastically

change. Thus, the same manner as adopted by the NEDA projection was employed both for the 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 years 1998, 2004 and 2010 together with the NEDA projection.

**Table 8.3.2 Projected Population of the Provinces**

Province	NEDA Projection				Projected Population		
	Population		Population Increase		1998	2004	2010
	1995	2006	Number	Share			
Biliran	132,209	149,921	17,712	4.55%	136,851	146,561	156,977
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
<b>Region</b>	<b>3,366,917</b>	<b>3,756,193</b>	<b>389,276</b>	<b>100.00%</b>	<b>3,468,938</b>	<b>3,682,348</b>	<b>3,891,501</b>

#### 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. Growth	Percentage Inc' Mun. Pop/ Inc' Pro Pop	1998		2004		2010	
					Population	Growth Rate	Population	Growth Rate	Population	Growth Rate
Allen	15,404	17,972	2,568	3.6%	18,812	1.53%	20,570	1.50%	22,293	1.35%
Biri	7,467	8,866	1,399	2.0%	9,324	1.69%	10,282	1.64%	11,221	1.47%
Bobon	13,687	15,800	2,113	3.0%	16,492	1.44%	17,939	1.41%	19,357	1.28%
Capul	9,510	9,964	454	0.6%	10,113	0.50%	10,424	0.51%	10,729	0.48%
Catarman	50,965	61,705	10,740	15.2%	65,220	1.86%	72,574	1.86%	79,780	1.59%
Catubig	22,057	25,190	3,133	4.4%	26,215	1.34%	28,360	1.32%	30,462	1.20%
Ganay	15,764	19,457	3,693	5.2%	20,666	2.03%	23,194	1.94%	25,672	1.71%
Laoang	42,048	47,438	5,390	7.6%	49,202	1.22%	52,893	1.21%	56,510	1.11%

Table 8.3.3 Census Results and Projected Population of Municipalities

(Cont'd)

Municipality	Census Result				Projected Population					
	1990	1995	Pop. Growth	Percentage Inc' Mun. Pop/ Inc' Pro Pop	1998		2004		2010	
					Population	Growth Rate	Population	Growth Rate	Population	Growth Rate
Lapinig	8,232	9,813	1,581	2.2%	10,330	1.73%	11,412	1.67%	12,473	1.49%
Las Navas	22,017	25,031	3,014	4.3%	26,017	1.30%	28,080	1.28%	30,102	1.17%
Lavezares	19,058	20,492	1,434	2.0%	20,961	0.76%	21,943	0.77%	22,905	0.72%
Lope De Vega	9,254	11,917	2,693	3.8%	12,828	2.40%	14,672	2.26%	16,479	1.95%
Mapanas	7,553	9,377	1,824	2.6%	9,974	2.08%	11,223	1.99%	12,447	1.74%
Mondragon	21,399	25,504	4,105	5.8%	26,848	1.73%	29,658	1.67%	32,412	1.49%
Palapag	20,114	24,947	4,833	6.9%	26,529	2.07%	29,838	1.98%	33,081	1.73%
Pambujan	18,389	22,152	3,763	5.3%	23,381	1.82%	25,960	1.76%	28,485	1.56%
Rosario	6,699	8,626	1,927	2.7%	9,257	2.38%	10,576	2.24%	11,869	1.94%
San Antonio	7,164	7,984	820	1.2%	8,252	1.11%	8,813	1.10%	9,363	1.01%
San Isidro	18,353	22,991	4,638	6.6%	24,509	2.15%	27,684	2.05%	30,796	1.79%
San Jose	10,773	12,556	1,783	2.5%	13,140	1.53%	14,361	1.49%	15,557	1.34%
San Roque	13,856	18,094	4,238	6.0%	19,481	2.49%	22,382	2.34%	25,226	2.01%
San Vicente	5,777	5,970	193	0.3%	6,033	0.35%	6,165	0.36%	6,294	0.35%
Silvino Lobos	9,071	11,028	1,957	2.8%	11,668	1.90%	13,008	1.83%	14,321	1.62%
Victoria	9,043	11,291	2,248	3.2%	12,027	2.13%	13,566	2.03%	15,074	1.77%
Province	383,65	454,19	70,541	100.0%	477,28	1.67%	525,57	1.62%	572,90	1.45%

Note: Growth rates in 1998, 2004 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 23.4% and 35.4%, while it decreased to 28.1% in 1995. The provincial growth rate of 4.36% between 1980 and 1990 decreased to -1.20% in 1995. While, the rural population by municipality was increased from -1.55% (1980 - 1990) to 5.65% (1990 - 1995) as a provincial average.

##### 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 targets: 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 Allen, Catubig, Mondragon, Pambujan, San Isidro, San Jose and San Roque.

In addition, some modifications were made as follows:

- Lapinig municipality: The provincial average growth rate of 2.47% (1980 - 1995) was used, since the growth rate of the municipality between 1990 and 1995 indicated a very high rate of about 13%.
- The municipalities of Biri, Laoang, Lavezares, Rosario, San Vicente and Victoria: The population in 1995 was fixed for short/medium-term to avoid a negative growth.
- Long-term target: 2010  
For long-term projection, the adopted share of urban/rural population in 2004 may be applied to municipal population for year 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 the urban population for the year 2010 was arrived at 28.4%, higher than the figures in 1995 (24.7%) and 1990 (20.5%). 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.

### 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 2010.



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	Biri	9,324	2,596	0.00%	27.8%	10,282	2,596	0.00%	25.2%	11,221	2,833	1.17%	25.2%
	Bobon	16,492	5,041	3.47%	30.6%	17,939	6,185	3.47%	31.5%	19,357	6,674	1.28%	34.5%
	Capul	10,113	4,286	0.77%	12.4%	10,424	4,487	0.77%	43.0%	10,729	4,618	0.48%	43.0%
	Cataman	65,220	31,015	0.74%	47.6%	72,574	32,421	0.71%	41.7%	79,780	35,640	1.59%	44.7%
	Catubig	26,215	1,649	0.56%	17.7%	28,360	4,807	0.56%	16.9%	30,162	5,163	1.20%	16.9%
	Gamay	20,666	2,753	0.72%	13.3%	23,194	2,876	0.73%	12.4%	25,672	3,181	1.70%	12.4%
	Laoang	49,202	11,104	0.00%	22.6%	52,893	11,104	0.00%	21.0%	56,510	11,863	1.11%	21.0%
	Lapinig	10,330	3,701	2.47%	35.8%	11,412	4,285	2.47%	37.5%	12,473	4,683	1.49%	37.5%
	Las Navas	26,017	6,254	5.43%	24.0%	28,080	8,587	5.43%	30.6%	30,102	9,205	1.17%	30.6%
	Lavezares	20,961	3,433	0.00%	16.4%	21,943	3,433	0.00%	15.6%	22,905	3,584	0.72%	15.6%
	Lope De Vega	12,828	2,514	3.31%	19.6%	14,672	3,057	3.31%	20.8%	16,479	3,433	1.95%	20.8%
	Mapanas	9,974	2,161	4.35%	21.7%	11,223	2,788	4.34%	24.8%	12,417	3,692	1.74%	24.8%
	Mondragon	26,848	5,491	3.30%	20.5%	29,658	6,671	3.30%	22.5%	32,412	7,290	1.49%	22.5%
	Palapag	26,529	6,243	1.74%	23.5%	29,838	6,924	1.74%	23.2%	33,081	7,677	1.74%	23.2%
	Pambujan	23,384	9,970	2.82%	42.6%	25,960	11,779	2.82%	45.4%	28,485	12,925	1.56%	45.4%
	Rosario	9,257	2,412	0.00%	26.1%	10,576	2,412	0.00%	22.8%	11,869	2,707	1.94%	22.8%
	San Antonio	8,252	839	0.00%	10.2%	8,813	839	0.00%	9.5%	9,363	891	1.01%	9.5%
	San Isidro	24,509	2,834	1.62%	11.6%	27,684	3,119	1.61%	11.3%	30,796	3,470	1.79%	11.3%
	San Jose	13,140	3,088	0.53%	23.5%	14,361	3,188	0.53%	22.2%	15,557	3,454	1.34%	22.2%
	San Roque	19,481	8,378	1.64%	43.0%	22,382	9,239	1.64%	41.3%	25,226	10,413	2.01%	41.3%
	San Vicente	6,033	1,610	0.00%	26.7%	6,165	1,610	0.00%	26.1%	6,294	1,611	0.35%	26.1%
Silvino Lobos	11,668	2,615	4.81%	22.4%	13,008	3,468	4.82%	26.7%	14,321	3,818	1.62%	26.7%	
Victoria	12,027	2,700	0.00%	22.4%	13,566	2,700	0.00%	19.9%	15,074	3,600	1.77%	19.9%	
Province	472,282	134,163	1.66%	28.1%	525,577	149,006	1.76%	28.4%	572,908	162,565	1.46%	28.4%	
Rural Area	Allen	18,812	10,336	0.01%	54.9%	20,570	10,139		49.3%	22,293	10,988	1.35%	49.3%
	Biri	9,324	6,728	2.38%	72.2%	10,282	7,686	2.24%	74.8%	11,221	8,388	1.47%	74.8%
	Bobon	16,492	11,451	0.60%	69.4%	17,939	11,754	0.44%	65.5%	19,357	12,683	1.28%	65.5%
	Capul	10,113	5,827	0.30%	57.6%	10,424	5,937	0.31%	57.0%	10,729	6,111	0.48%	57.0%
	Cataman	65,220	34,205	2.93%	52.4%	72,574	40,153	2.71%	55.3%	79,780	44,140	1.59%	55.3%
	Catubig	26,215	21,566	1.51%	82.3%	28,360	23,553	1.48%	83.1%	30,162	25,299	1.20%	83.1%
	Gamay	20,666	17,913	2.24%	86.7%	23,194	20,318	2.12%	87.6%	25,672	22,489	1.71%	87.6%
	Laoang	49,202	38,098	1.59%	77.4%	52,893	41,789	1.55%	79.0%	56,510	44,647	1.41%	79.0%
	Lapinig	10,330	6,629	1.32%	64.2%	11,412	7,127	1.21%	62.5%	12,473	7,790	1.49%	62.5%
	Las Navas	26,017	19,763	0.12%	76.0%	28,080	19,493		69.4%	30,102	20,897	1.17%	69.4%
	Lavezares	20,961	17,528	0.91%	83.6%	21,943	18,510	0.91%	84.4%	22,905	19,321	0.72%	84.4%
	Lope De Vega	12,828	10,314	2.18%	80.4%	14,672	11,615	2.09%	79.2%	16,479	13,046	1.96%	79.2%
	Mapanas	9,974	7,813	1.49%	78.3%	11,223	8,435	1.28%	75.2%	12,417	9,355	1.74%	75.2%
	Mondragon	26,848	21,357	1.34%	79.5%	29,658	22,987	1.23%	77.5%	32,412	25,422	1.49%	77.5%
	Palapag	26,529	20,286	2.17%	76.5%	29,838	22,914	2.03%	76.8%	33,081	25,404	1.73%	76.8%
	Pambujan	23,384	13,414	1.10%	57.4%	25,960	14,181	0.93%	54.6%	28,485	15,560	1.56%	54.6%
	Rosario	9,257	6,845	3.28%	73.9%	10,576	8,164	2.98%	77.2%	11,869	9,162	1.94%	77.2%
	San Antonio	8,252	7,413	1.23%	89.8%	8,813	7,974	1.22%	90.5%	9,363	8,472	1.01%	90.5%
	San Isidro	24,509	21,675	2.23%	88.4%	27,684	24,565	2.11%	88.7%	30,796	27,326	1.79%	88.7%
	San Jose	13,140	10,052	1.84%	76.5%	14,361	11,173	1.78%	77.8%	15,557	12,103	1.34%	77.8%
	San Roque	19,481	11,103	3.15%	57.0%	22,382	13,143	2.85%	58.7%	25,226	14,813	2.01%	58.7%
San Vicente	6,033	4,423	0.48%	73.3%	6,165	4,555	0.49%	73.9%	6,294	4,650	0.34%	73.9%	
Silvino Lobos	11,668	9,053	1.11%	77.6%	13,008	9,540	0.88%	73.3%	14,321	10,503	1.62%	73.3%	
Victoria	12,027	9,327	2.78%	77.6%	13,566	10,866	2.58%	80.1%	15,074	12,074	1.77%	80.1%	
Province	472,282	313,119	1.67%	71.9%	525,577	376,571	1.56%	71.6%	572,908	410,343	1.44%	71.6%	

Note: G.R. - Growth Rate

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 2% from the 2004 rate in 2010 (details are referred to the Supporting Report). It should be noted that some municipalities have participation rates in 1998 of over 100%, an indication that a number of school enrollees are over-aged.

Table 8.3.5 shows the projected number of public school students by municipality, by target year. About 125,133 and 139,760 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
Allen	3,928	4,647	5,036	1	2	2
Biri	2,252	2,593	2,996	1	1	1
Bobon	4,228	4,434	4,519	1	1	1
Capul	2,870	2,805	2,887	1	1	1
Cataman (Capital)	13,884	17,789	19,555	1	2	2
Catubig	5,693	6,698	7,618	1	2	2
Gamay	6,230	6,508	6,843	1	1	2
Laoang	9,837	11,032	13,358	1	1	2
Lapinig	2,874	3,300	3,607	1	1	2
Las Navas	5,502	6,283	7,157	1	1	2
Lavezares	5,404	5,687	5,936	1	1	1
Lope De Vega	2,227	2,794	3,363	1	1	1
Mapanas	2,548	2,963	3,468	1	1	2
Mondragon	4,528	5,765	6,721	1	1	2
Palapag	6,873	8,087	8,966	1	1	2
Pambujan	6,243	7,006	7,687	1	1	1
Rosario	2,391	2,927	3,285			2
San Antonio	2,200	2,108	2,128	1	1	1
San Isidro	5,635	6,539	7,679	3	3	4
San Jose	3,132	3,623	3,924	1	1	1
San Roque	3,652	4,481	5,411	1	1	1
San Vicente	1,450	1,530	1,484			2
Silvino Lobos	1,647	1,994	2,395			
Victoria	3,337	3,540	3,737	1	1	1
<b>Provincial Total</b>	<b>108,565</b>	<b>125,133</b>	<b>139,760</b>	<b>23</b>	<b>26</b>	<b>38</b>

### 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 3 public markets, bus/jeepney terminals and parks/playgrounds are planned for construction by year 2004 and another 12 by the year 2010. Refer to Table 8.3.5 for the number of public utilities by target year (details are referred to the 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.

Five (5) municipalities with a total urban population of about 41,075 are considered (refer to Table 8.5.5).

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

The number of urban households 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, the 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 first 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.