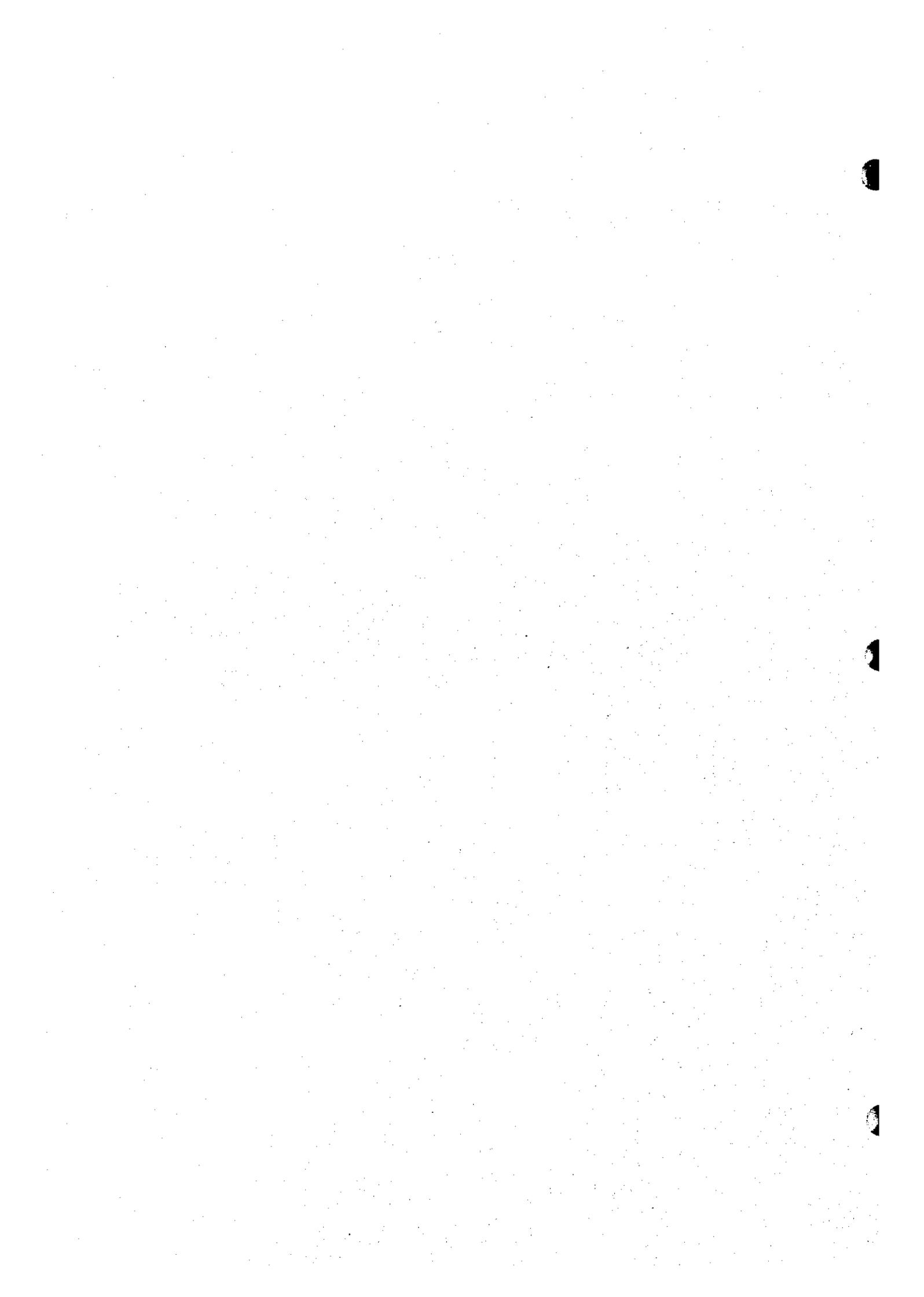


Chapter

6

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



6. PAST FINANCIAL PERFORMANCE IN WATER SUPPLY AND SANITATION

6.1 General

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

The financial arrangements conducted, 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 is the basis to seek for appropriate financial arrangements for the medium term development. The essential study components are: (1) LGUs' past financial performance; (2) past public investment and present plans; (3) LGUs' present financing sources and management participation in the sector, (4) existing practices by the LGUs on cost recovery and (5) affordability by users.

6.2 LGU's Past Financial Performance

The provincial government's past financial performance during the period from 1994 to 1998 was investigated. Actual financial data were obtained for the years 1994 to 1997, while the financial figures in 1998 are only budgetary estimates. Likewise, the municipalities' past financial performance in the same period (1994-1998) is included in the Supporting Report.

6.2.1 Sources and Uses of Funds

1) Sources of Funds in the Province

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

- (a) IRA -- the amount allotted by the National Government to different provinces, municipalities and barangays. A standard formula is used, which considers parameters such as population, land area, number of barangays, cost of devolved national functions, and other factors.

(b) Tax Revenues -- mainly consist of real property tax, accounting for 3.9% of the total income of the province.

(c) Grants, Aids, Subsidies -- assisted by JICA, UNDP, UNICEF, etc. and the NDCC (Calamity Fund from the Central Government during floods or whenever the province is declared as calamity area)

Based on the Local Government Code of 1991, 40% of the national internal revenue taxes of the 3rd fiscal year preceding the current year (from 1994 onwards) is allocated to the LGUs nationwide, specifically to the administrative units of (1) province (23%); (2) city (23%); (3) municipality (34%), and barangay (20%). Further, respective IRAs in different administrative levels are allotted to all administrative units concerned.

Table 6.2.1 presents the income and expenditures of Davao del Sur during the period of 1994-1998. Local tax revenues, which were 3.9% of the total income of the province, consist of real property tax, business taxes and licenses, and miscellaneous taxes. IRA's share to total income in annual average was 90.9% during the period 1994-1997. It is noted that the share of IRA to total income decreased from 94.3% in 1994 to only 88.4% in 1997. In 1998, IRA is projected to contribute to total income with a share of 88%. Despite the decline in the share of IRA, the province has historically been dependent on the IRA with its low tax and non-tax revenue collections.

Table 6.2.1 Income and Expenditures between 1994 and 1998

| Item | 1994 | 1995 | 1996 | 1997 | 1998 |
|-------------------------------------|-----------------------|-----------------------|------------------------|-----------------------|-----------------------|
| Income | | | | | |
| Tax Revenue | 7,484,258.87 | 5,762,335.86 | 7,348,758.77 | 9,952,695.11 | 16,416,691.00 |
| IRA | 145,704,588.00 | 161,179,426.00 | 173,271,846.00 | 223,274,049.00 | 229,338,240.00 |
| Operating and Miscellaneous Revenue | 958,979.75 | 9,920,797.87 | 11,397,117.03 | 14,511,869.46 | 15,800,000.00 |
| Others | 339,793.49 | 562,449.52 | 796,498.04 | 4,878,200.65 | - |
| Total Income | 154,487,620.11 | 177,425,009.25 | 192,814,219.84 | 252,616,814.22 | 261,554,931.00 |
| Expenditures | | | | | |
| Recurrent Expenditures | 143,153,978.50 | 167,086,419.70 | 188,098,284.69 | 218,627,401.51 | N.A |
| Capital Expenditures | 19,593,745.62 | 9,121,109.87 | 16,779,583.54 | 13,235,543.73 | N.A |
| Total Expenditures | 162,747,719.12 | 176,207,529.57 | 204,877,867.58 | 231,862,945.24 | N.A |
| Net Income | (8,260,099.00) | 1,217,479.70 | (12,063,647.70) | 20,753,869.00 | N.A |

Note: // Recurrent expenditures include personnel and MOOE. Capital expenditures consist of capital outlays.
N.A. : no information available

(2) Uses of Funds in the Province

Actual expenditures of the provincial government during the period from 1994 to 1997 show that recurrent expenses (personnel and MOOE) were major parts with an average of 92.2% to total revenue. In addition, the province has a capital outlay with an average share of 7.8% to total revenue. The water supply sector's actual expenditures were minimal, which comprise only 7.8 % of the 20% DF of the province.

In 1997, the province had a net surplus from its operations of ₱20.75 million. In 1998, total income is projected to reach up to ₱261.50 million, but there are no projected expenditures.

6.2.2 Availability of Funds

As previously noted, IRA comprises more than 88% 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 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 1994 and budget year 1998. As shown, the IRA of the province was 1.25 % of the provincial IRA nationwide in the period 1994-1997 and only 1.14% for the budget year 1998. While, the total amount of IRA allotted to all its municipalities in the years 1994-1997 was 1.28% in annual average, but in 1998, this share decreased to only 1.18% to the municipal IRA nationwide which is ₱28.24 billion. 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 firstly deducted from the pooled income (75% IRA + all other income) before other appro-

priations are made. It is noted that the available funds of the province are mainly spent to cover personnel salaries, benefits and the MOOE. These recurrent expenditures were 92.8 %

Table 6.2.2 Past Internal Revenue Allotment to the Province

| Item | | 1994 | 1995 | 1996 | 1997 | 1998 |
|----------------------------------|--|-------------------|-------------------|-------------------|-------------------|-------------------|
| National | I. National Total of IRA | 46,753,000,000.00 | 55,202,800,000.00 | 58,022,990,000.00 | 71,049,000,000.00 | 80,990,763,000.00 |
| | (a) IRA to all Provinces | 11,498,994,198.00 | 12,696,604,000.00 | 13,755,011,803.00 | 17,813,547,246.00 | 20,054,018,925.00 |
| | (b) IRA to all Municipalities* | 16,325,288,074.00 | 18,768,952,000.00 | 19,607,715,553.00 | 24,848,688,251.00 | 28,245,875,434.00 |
| Province | II. IRA to Davao del Sur Province | | | | | |
| | (1) Total: (2) + (3) | 355,539,254.00 | 393,898,042.00 | 424,109,148.00 | 545,830,393.00 | 561,967,259.00 |
| | (2) Provincial Government | 145,704,588.00 | 161,179,426.00 | 173,271,846.00 | 223,274,049.00 | 229,338,240.00 |
| | Percentage against (a) | 1.27% | 1.27% | 1.26% | 1.25% | 1.14% |
| | (3) Municipalities | 209,834,666.00 | 232,668,616.00 | 250,837,302.00 | 322,551,344.00 | 332,629,019.00 |
| | Percentage against (b) | 1.28% | 1.24% | 1.28% | 1.30% | 1.18% |
| | III. Total Income of the Provincial Government | 154,487,620.11 | 177,425,009.25 | 192,814,219.84 | 252,616,814.22 | 261,558,931.00 |
| | Percentage of IRA | 94% | 91% | 90% | 88% | 88% |
| | IV. Total Income of Municipalities | 78,747,890.47 | 316,718,390.63 | 349,150,698.10 | 4,317,147.16 | 324,281,502.20*** |
| | Percentage of IRA | 75% | 73% | 72% | 75% | 67% |
| V. IRA to Municipalities** Total | 209,834,666.00 | 232,668,616.00 | 250,837,302.00 | 322,551,344.00 | 332,629,019.00 | |
| Municipality | Dansalan | 13,343,870.00 | 14,854,836.00 | 16,068,722.00 | 20,797,703.00 | 21,362,499.00 |
| | Digos | 22,633,058.00 | 25,321,876.00 | 27,474,262.00 | 35,290,763.00 | 36,156,638.00 |
| | Don Marcelino | 14,176,987.00 | 15,579,005.00 | 16,671,200.00 | 20,956,540.00 | 21,989,296.00 |
| | Hagonoy | 10,980,891.00 | 12,240,534.00 | 13,261,185.00 | 16,938,558.00 | 17,283,838.00 |
| | Jose Abad Santos | 20,242,107.00 | 22,277,122.00 | 23,851,456.00 | 29,511,630.00 | 30,028,756.00 |
| | Kiblawan | 9,300,433.00 | 10,371,767.00 | 11,244,147.00 | 14,865,727.00 | 15,175,328.00 |
| | Magsaysay | 11,254,206.00 | 12,534,411.00 | 13,568,299.00 | 20,091,933.00 | 20,760,749.00 |
| | Malalag | 13,212,028.00 | 14,532,724.00 | 15,569,615.00 | 21,197,680.00 | 22,166,202.00 |
| | Malita | 31,443,031.00 | 34,688,261.00 | 37,196,070.00 | 45,469,220.00 | 47,804,145.00 |
| | Matanao | 11,880,735.00 | 13,191,964.00 | 14,253,861.00 | 18,403,651.00 | 18,654,393.00 |
| | Padada | 7,656,443.00 | 8,498,923.00 | 9,186,705.00 | 11,762,966.00 | 12,010,921.00 |
| | Sta. Cruz | 16,347,002.00 | 18,185,780.00 | 19,649,930.00 | 25,199,901.00 | 26,055,513.00 |
| | Sta. Maria | 12,192,852.00 | 13,567,460.00 | 14,670,708.00 | 18,298,323.00 | 18,832,237.00 |
| | Sarangani | 6,710,448.00 | 7,434,284.00 | 8,025,199.00 | 10,428,795.00 | 10,719,095.00 |
| Sulop | 8,460,575.00 | 9,389,669.00 | 10,145,943.00 | 13,337,954.00 | 13,629,409.00 | |

Sources:

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

Notes:

* IRA to Barangays is not included.

** Figures in bracket are shares (%) in the total of all municipalities in the province.

*** Computed for 10 months only. In assumption of uniform distribution of the income through the year, percentage of IRA on an annual basis is more than 80%.

of the total income in annual average during the period 1994-1997. The provincial government's combined income from IRA and its tax, and non-tax revenues is just sufficient for its operating, capital and non-office expenses. Thus, there is little surplus income that can be tapped for additional capital expenditures.

For the planned capital expenditures of the province, 20% Development Fund (DF) of the IRA is appropriated. The percentage allotted as the DF is the minimum requirement that should be arranged for capital projects as stated in the memorandum circulars of the DILG. Table 6.2.3 shows past performance in use of the DF.

Table 6.2.3 Available Funds for Capital Expenditures (20% DF), 1994-1998

Unit: Pesos

| Year | IRA of the Province (a) | 20% DF (b) | Actual/Projected Capital Expenditures (c) | Surplus/(Shortfall) in % (d)=(b)/(c) |
|------|----------------------------|---------------|---|--|
| 1994 | 145,704,588.00 | 29,140,917.60 | 19,593,745.62 | 9,547,171.96 |
| 1995 | 161,179,476.00 | 32,235,885.20 | 9,121,109.87 | 23,114,775.33 |
| 1996 | 173,271,846.00 | 34,654,369.20 | 16,779,583.54 | 17,874,785.66 |
| 1997 | 223,274,079.00 | 44,654,809.80 | 13,235,543.73 | 31,419,266.07 |
| 1998 | 229,338,240.00 | 45,867,648.00 | N.A. | N.A. |

Note: Data Source: Table 6.2.2. Capital expenditures in 1998 are projected figures.

N.A. : no information available.

Referring to the amount of actual capital expenditures of the province from 1994 to 1997, the allotted DFs were sufficient. Thus, there were no borrowings or debts incurred by the province for its capital expenditures. The province received grants in 1997 with an amount of P4.8 million. While, the lower amounts of P0.34 million, P0.56 million and P0.796 million were received annually from 1994 to 1996.

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 was employed. It takes into account the regular income of the LGU referring to revenues (real property and business taxes), receipts from economic enterprises, and fees and charges that are collected regularly. Receipts from borrowings, grants and inter-fund transfers are not considered as regular income.

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

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

Where:

DSC = debt servicing capacity of the LGU

RINC = regular income

AGR = average growth rate

IRA = internal revenue allotment AMORT = amortization of the LGU's outstanding loan

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

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 ₱49.15 million for the year 1998. This figure reflects the maximum loan amount that the provincial government can borrow from the MDF. It is noted that MDF is a potential funding source for the province in the implementation of its sector plan. The IRA for the year 1998 is projected to be ₱229.3 million, while regular income is estimated at ₱16.4 million.

6.3 Past Public Investment and Present Plans

This Section presents past public investments in the WATSAN sector, and the provincial government's plans at present and in the future for the further development of the sector.

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 mainly undertaken by the DPWH, DOH and the provincial government. The sector investments by these agencies between 1995 and 1998 are shown in Table 6.3.1.

Table 6.3.1 Previous Sector Investment to the Province by Concerned Agencies

Unit: '000 Pesos

| Funding Category | | 1995-1998 | | | | Sanitation |
|------------------|-----------------------|-----------|----------|-----------|-----------|------------|
| Agency | Funds | Level I | Level II | Level III | Sub-Total | |
| DIUG | | | | | | |
| DPWH | Foreign Fund 1) | | | | | |
| | Local Fund 2) | 1,001.00 | 427.50 | 13,556.50 | 14,985.00 | |
| LWUA | | | | | | |
| DOH | | | | | | 7,080.00 |
| PROVINCE | Provincial Government | 12,008.00 | 1,530.00 | | 13,538.00 | |
| | Municipal Government | | | | | |
| MUNICIPALITY | | | | | | |
| Total | | 13,009.00 | 1,957.50 | 13,556.50 | 28,523.00 | 7,080.00 |

Sources: Each Central Agency and the Provincial Government

The largest investment registered so far is that for Level III water supply with P13.56 million. The DPWH financed 100% of the total investments, source from both foreign and local funds.

The aggregate investments for Level I water supply amounted at P13.0 million mostly financed by the provincial government. Thus, DPWH and the provincial government played major roles in financing water supply systems, while DOH is the sole agency for sanitation, which appropriated P7.1 million in a total during the said period. A total of P35.6 million were invested to the WATSAN sector, P13.5 million or 38% of which were provided by the province.

(1) Budgetary Allocation to the Sector

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

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

(2) Capital Expenditures in the Sector

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

Table 6.3.2 shows annual activities in the water supply sector; the corresponding funding sources and the amount of investment from 1995 to 1998, while Table 6.3.3 summarizes annual sector investments by service level. Construction of DW, SW, reservoir, etc. for Level I had the largest fund allocation with the amount of P13.0 million, mainly through local financing.

Table 6.3.2 Annual Activities in the Water Supply Sector

| Item | 1995 | | | 1996 | | | 1997 | | | 1998 | | |
|--|------|-------------|-----------------|------|------------------------------------|---------------------|------|------------------------------------|---------------------|------|------------------------|-----------------|
| | IA | Fund Source | Amount (P '000) | IA | Fund Source | Amount (P '000) | IA | Fund Source | Amount (P '000) | IA | Fund Source | Amount (P '000) |
| Construction (DW, SW, Spring Box, Reservoir, Tank) Various Foreign Assisted National Various Local Funding | | 20%DF/FAW | 2,152 | | DPWH/CDF 20%DF/FAW 20%DF/PDF | 285 2,294 174 | | DPWH/CDF 20%DF/FAW 20%DF/PDF | 716 3,000 258 | | 20%DF/FAW 20%DF/PDF | 4,000 130 |
| Construction of Rain Collectors/Water Tanks | | | | | | | | | | | | |
| Develop Spring Sources Various Foreign Assisted National Various Local Funding | | | | | | | | | | | | |
| Spring Development with L2 Various Foreign Assisted National National/Local Funding Various Local Funding | | | | | DPWH/CDF | 428 | | | | | | |
| Spring Development with L3 | | | | | | | | | | | | |
| Spring Development with pipes, water tank Construction Level 2/3 Various Foreign Assisted National Various Local Funding Loan | | | | | DPWH/CDF | 1,235 | | DPWH/CDF | 1,274 | | | |
| Maintains/Rehab/Improve L1/L2/L3 & SD | | | | | DPWH/CDF | 585 | | DPWH/CDF 20%DF/SRA | 1,238 1,530 | | | |
| Expansion L2/L3 | | | | | | | | DPWH/CDF | 9,225 | | | |
| Construction of Health Center/Stations-Barangays | | | | | | | | | | | | |
| Water disinfection/chlorination of water sources Barangay Sanitation | | 20%DF | 28 | | 20%DF | 30 | | 20%DF | 40 | | 20%DF | 15 |
| Construction of School/Public Toilet | | FW4SP | 2,080 | | FW4SP | 2,500 | | FW4SP | 2,500 | | | |

Source: Damp del Sur PWDO.

Table 6.3.3 Sector Allocation in the Annual Investment Plan

Unit: '000 Pesos

| Item | 1995 | 1996 | 1997 | 1998 | Total |
|--------------------------------------|-----------------|-----------------|------------------|-----------------|------------------|
| Level 1 | | | | | |
| Foreign Assisted | | | | | |
| National | | 285.00 | 716.50 | | 1,001.50 |
| Local | 2,152.00 | 2,468.00 | 3,258.00 | 4,130.00 | 12,008.00 |
| Level 2/3 | | | | | |
| Foreign Assisted | | | | | |
| National | | 427.50 | | | 427.50 |
| Local | | | | | |
| Expansion | | | 9,225.00 | | 9,225.00 |
| Repair/Maintenance | | 585.00 | 2,767.50 | | 3,352.50 |
| Health Centers | | | | | |
| Water Quality | 28.00 | 30.00 | 40.00 | 15.00 | 113.00 |
| Construction of School/Public Toilet | 2,080.00 | 2,500.00 | 2,690.00 | | 7,270.00 |
| Total-Water Supply | 2,152.00 | 3,765.50 | 15,967.00 | 4,130.00 | 26,014.50 |
| Total-Sanitation (Health) | 2,108.00 | 2,530.00 | 2,730.00 | 15.00 | 7383.00 |
| Grand Total | 4,260.00 | 6,295.50 | 18,697.00 | 4,145.00 | 33,397.50 |

In the AIP, water supply and sanitation sector required P33.4 million as a cumulative investment cost in the last 4 years from 1995 to 1998. However, the provincial government provided only P13.5 million. (refer to Table 6.3.1). Of the provincial investment, P10.6 million (78.5%) were financed from the 20% DF. The rest might have been provided by the other agencies (no information was available during this study).

There is a further need to clarify which of the planned investments were implemented and funded from any of the available sources such as local funds (provincial and municipal governments) and/or foreign funds.

6.3.2 Past and Current Breakdown of 20% Development Fund

The allocation of the 20% DF is guided by DILG Memorandum Circular No.95-215 as amended by Memorandum Circular No. 96-263 issuing 'the Policies and Guidelines on the Utilization of the DF and Other related Matters'. Based on these guidelines, the LGUs appropriate the DF for human and ecological security concerns.

As presented in Table 6.3.4, the social development sector obtained 65.7 % of the DF in 1998 (i.e. P81.6 million out of P157.2 million). Water supply and sanitation sector's share was very minimal with 8.5% of the DF (based on cumulative figures between 1995 and 1998).

6.3.3 Existing Plans of the LGUs for the Sector

The Provincial Government has been undertaking various programs and has allotted funds to the water supply and sanitation sector.

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

Unit: Pesos

| Year | 20% Dev't. Fund | Social Development | Economic Development | Infrastructure | Water Supply/Sanitation 1/ |
|-------|-----------------|--------------------|----------------------|----------------|----------------------------|
| 1995 | 32,235,885.20 | 588,911.00 | 652,087.63 | 67,600.00 | 504,147.74 |
| 1996 | 34,654,369.20 | 18,253,694.00 | 7,595,070.50 | 7,424,768.29 | 2,869,864.50 |
| 1997 | 44,654,809.80 | 30,731,301.90 | 10,365,000.00 | 6,703,105.82 | 3,200,000.00 |
| 1998 | 45,687,648.10 | 32,035,000.00 | 7,445,000.00 | 5,175,809.80 | 4,020,000.00 |
| Total | 157,232,712.30 | 81,608,906.90 | 26,057,158.13 | 1,937,1283.91 | 10,594,012.24 |

Note: 1/ A part of Economic Development.

Source: Provincial Planning Development Office (PPDO)

(1) Budgetary Allocation to the Sector

The province has appropriated ₱3.0 million for WATSAN sector (for Levels I and II water supply) in 1997 and ₱4.0 million in 1998. While, ₱1.0 million was appropriated in the 1998 budget for its health promotions program. The DOH has supplemented to the meager resources of the sanitation sector by distributing materials such as toilet bowls to rural barangays. At present, there are no specific projects to be implemented.

(2) O&M Assistance

The AIP of the province for the years 1995, 1997 and 1998 included the repair and maintenance item for water supply facilities, while no such item in 1996. The budget for repair and maintenance of water supply facilities shall be considered to make the water supply facilities efficient.

A considerable number of wells constructed by DPWH was abandoned and/or provided no appropriate maintenance. Even so, the Municipal Engineering Office (MEO) directly consults with the District Engineers' Office for assistance on WATSAN problems/projects. Some municipalities are extending assistance to the users.

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

6.4.1 Cost Sharing Arrangements / Counterpart Funding

The implementation of water supply projects was previously undertaken by DPWH (construction through OECF loan assistance up to 1995) and DILG (BWP - institutional building, UNDP -WATSAN projects and CIDA - capability building). The DPWH, through its DEOs, still receive requests for assistance from barangay people. This is due to the lack of aware-

ness on the part of the people regarding the new institutional arrangement and this proved the DEOs' technical ability. The requests, however, are granted on a case-to-case basis, usually if the manpower and budget are available.

The new cost-sharing scheme was authorized in 1998 in accordance with the policy of 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.

The provincial government encourages the users to be self-reliant for the Level I water supply services in terms of handling minor repairs purchasing and replacing some worn-out materials such as gaskets, etc. The labor and materials are usually arranged by the province, while the labor cost is charged to the municipal government. Some municipalities and even beneficiaries may donate land/right of way and contribute labor. The cost-sharing scheme among the province, municipality and barangay includes the use of equipment. Some barangays shoulder the cost of lodging for the well drilling crew to operate the equipment.

6.4.2 ODA Assisted Projects and Grant Aid

In the past, the province has obtained a loan from the Land Bank of the Philippines for the purchase of a drilling machine/ road building equipment. The province has been a beneficiary of CIDA through the Local Government Support Program.

(I) Arrangement Through Conduits

1) Municipal Development Fund (MDF)

The MDF is a revolving fund created under Presidential Decree No. 1914 to provide LGUs with access to foreign loans, assistance or grants. Operations of the MDF, as well as the evaluation and control of local government transactions of the fund, are

guided by the financial policies defined in the Joint Circular No. 6-87 of the DOF, COA and DBM. The policies include, among others, the following:

- On-lending terms for local governments or government corporations to be in accordance with the terms and conditions of the international agreements with foreign financial institutions;
- Loan repayments to conform with the terms and conditions of the corresponding Loan and Project Agreements;
- Annual debt service liabilities to all creditors to be at least 120 per cent of total net annual revenues from all sources after operating costs, unless otherwise provided in a mutual agreement among all parties concerned;
- Repayment to MDF to take precedence over all subsequent borrowings incurred;
- Payment of additional interest, charges and fees on amounts to be relented to local governments may be required by the Secretary of Finance in consultation or agreement with foreign lending institutions and LGUs/Project Cities to cover 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 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. If payment is to be made from JRA, the bank imposes penalty charges.

3) Foreign Lending Agencies

Other external assistance to the Sector in the province comes from foreign assisted projects. In the past, participation of the province in foreign project funded was minimal or even nil. But with the devolution of the Sector to the LGUs, the participation of the LGUs has been given importance. Before the devolution of the sector, the province was a beneficiary of UNICEF and JICA health services projects through the DOH. After the devolution, the province became the direct recipient of foreign grants.

6.4.3 LGU-Financed and Managed Waterworks/Water District.

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

There are four (4) water districts, which are currently managed in the province: Bansalan WD, Digos WD, Kiblawan WD and Hagonoy WD. Table 6.4.1 and Table 6.4.2 show financial indicators and loan status of WDs in 1998, respectively. All the WDs indicated that they have high collection efficiencies, which range from 81% to 94%. Water rates are from as low as ₱6.80 per cum. in Davao City to as high as ₱12.00 per cum. in the average, which is being charged by Bansalan WD. In Hagonoy WD, the minimum charge is ₱95.00 for a minimum consumption of 10 cum. All WDs except for Hagonoy WD have outstanding loans with LWUA with Digos WD having the highest existing loan at ₱22.29 million.

Table 6.4.1 Financial Indicators of Provincial/Municipal Networks System

| Waterworks | Description | | | | | | |
|----------------------|----------------------------|------------------------------|----------------------|------------------------------------|------------------|-----------------|-----------------------|
| | No. of Metered Connections | No. of Flat Rate Connections | Average Monthly Rate | Average Consumption per Connection | Average O&M Cost | Average Revenue | Collection Efficiency |
| | Nos. | Nos. | Pesos/cum. | cum/mo. | Pesos/mo. | Pesos/mo. | Percent (%) |
| Bansalan Wd | 2,554 | -None- | 12.00 | 16.00 | 31,531.20 | P 44,130.00 | 81.00 |
| Digos | 6,386 | -None- | 9.40 | 20.00 | 184,983.00 | 128,650.00 | 94.00 |
| Kiblawan | 405 | -None- | 8.25 | 17.55 | 4,685.30 | 6,455.00 | 93.11 |
| Davao City | 95,946 | -None- | 6.80 | 31.54 | 1,633,695.00 | 2,263,534.00 | 100.00 |
| Hagonoy ^L | 62 | -None- | 95.00 | 10.00 | n.a. | n.a. | 90.00 |

Note: ^L - 10m³ = P95.00 (for minimum consumption)

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

| Waterworks | Description | | | |
|-------------|-------------------------------|--------------------------|---|----------------------------|
| | Total Loan Availed (in Pesos) | Remaining Payment Period | Average Monthly Amortization (in Pesos) | Current Arrears (in Pesos) |
| Bansalan | 8,066.41 | 290.00 | 24,281.33 | 6,655.84 |
| Digos Wd | 26,342.01 | 267.00 | 42,101.33 | 22,291.34 |
| Kiblawan Wd | 5,050.00 | 304.00 | 23,217.00 | 2,759.60 |
| Hagonoy Wd | - | - | - | - |

Source: Local Water Utilities Administration

6.5 Existing Practices by the LGU on Cost Recovery

6.5.1 Capital Cost

In the previous arrangement, the capital cost for Level I systems 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 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 the last couple of years.

For Level III system, WDs or RWSAs bear the entire capital cost financed by LWUA through loans with concessional terms of 8.5%-12.5% interest rate and repayment period extending up to 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 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 the part of DF and other financial sources (borrowing and aids).

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

6.5.2 Operation and Maintenance Cost

The cost recovery practices at the user level determine the sustainability of the water facilities. The operation and maintenance of Level I and II water supply facilities is envisioned to be the responsibility of the users.

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

Although the DPWH has no budget for operations and maintenance, it extends assistance in the form of materials (such as gaskets or joint pipes) from their supplies, if these items are available. Because of this situation, the emphasis was placed on the need of monthly contributions from the users for the O&M of the facilities. In addition, a certain amount of collected water charges shall be set aside to finance for the rehabilitation/upgrading of the existing facilities in the future. While, there are a few active BWSAs, which collect monthly fees ranging from ₱5.00 to ₱15.00 per household.

Cost recovery in Level III services, particularly for those covered by Water Districts, is managed through different systems. The households covered by the Water District can be disconnected in case no payment was made by users. The water rate structure is based on LWUA's guidelines for water rate setting. The rates are socialized, based on O&M, operating expenses and capital expenditures requirements of the system, and it should not exceed 5% of the low-income household group. Water rates are kept minimal, since the Water District should be service-oriented and not profit-oriented. In case of LGU's operating Level III system, O&M cost is also collected as the water charge, although the LGU may extend a support to a certain extent of requirements in the initial stage of operation. Water rates are established by the

province to finance the O&M costs of water supply facilities and public hearings are conducted before the increase of water rates.

There is a need of MOA between the DOH and the province where users should pay a certain amount for the maintenance of public toilets. Municipalities are encouraged to do in the same manner. For the maintenance of sanitation facilities in schools, the parent-teacher associations in each school are responsible for the maintenance cost required.

6.6 Affordability of Users

This sub-section discusses on the affordability of users by sector service level. However, base information for the analysis is limited to that gathered from barangay surveys and from the water districts in the province.

6.6.1 Capital Cost Contribution

In the implementation of Level I and II water supply projects, very minimal financial contribution to the construction of facilities was made by the beneficiaries, due to insufficient levels of income. Under these conditions, the central government agencies and LGUs covered most of the construction cost.

Even under the above mentioned situation, based on the results of the group interview in the selected barangays, majorities of the respondents are willing to participate in the water supply projects in the future. It is indicated that they (59 of 74 respondents or 80%) are willing to be involved in the formation of BWSAs, formulation of water rates, selection of sites as well as determining service level. The same number of respondents showed their willingness to participate in the construction work in some form (free labor) and 20 female respondents were willing to contribute cash amounting to ₱10.00 to ₱20.00 per month.

With regard to the sanitation improvement, construction cost of private toilet facilities seems to be expensive as compared with the family income. The estimated cost of flush type toilet facilities is as high as 5.5 times of the median monthly family income in the province. The subsidy from LGU may be required.

6.6.2 Operation and Maintenance Cost

In the said barangay survey results, 54% of respondents indicated that they are not presently paying for their water supply services, while the remaining are paying for water (majority pay ₱50.00). Although survey sample size is limited, they have experience of paying ₱50 (1.29 % of the median family income). It can be assumed that the users can well afford to pay the amounts being currently charged by the BWSAs.

Further, the survey results noted that only the female respondents were willing to pay/contribute in the operation and maintenance of any water supply project in the future. Male respondents were not willing to pay for the O&M of the facilities.

Of the 38 female respondents showed their willingness to pay, 52.6% answered that they are willing to pay ₱11.00 to ₱20.00, while the rest indicated that they can not afford to pay any water fee.

For the water districts or Level III waterworks, O&M expenses are mainly covered by the user fees, which are usually charged on a per cum. basis by water consumption category. The 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 by different level of services. At present the current water bills in the province seem to be within an affordable range based on experience, although the actual income varies from municipality to municipality and barangay to barangay (urban barangay households have higher income than those in rural barangays because of more varied economic activities).

Table 6.6.1 Affordability in Water and Sanitation Services

| Income/ Level of Service | Amount (Pesos) | % to Monthly Income | Affordable Range (%) 5/ |
|--|-----------------|---------------------|----------------------------|
| Median of Monthly Income 1/ | ₱ 3,872.00 | 100 | - |
| Average Level III: Monthly Water Bill 2/ | 100.00 - 150.00 | 2.6-3.9 | 5.0 or less |
| Average Level II: Monthly Water Bill 3/ | 60.00 | 1.5 | 2.0-3.0 |
| Mo. Level I Expenditures | 10.00-50.00 | 0.3-1.3 | 1.0-less |
| Private Toilet Construction Cost - Flush Type Toilet 4/ | 21,300.00 | 5.5 | - |

Notes:

1/ 1994 Family Income and Expenditures Survey, NSO

2/ Data from PSPT. It is assumed that 2) cum. will be consumed per family.)

3/ Common figures in the province.

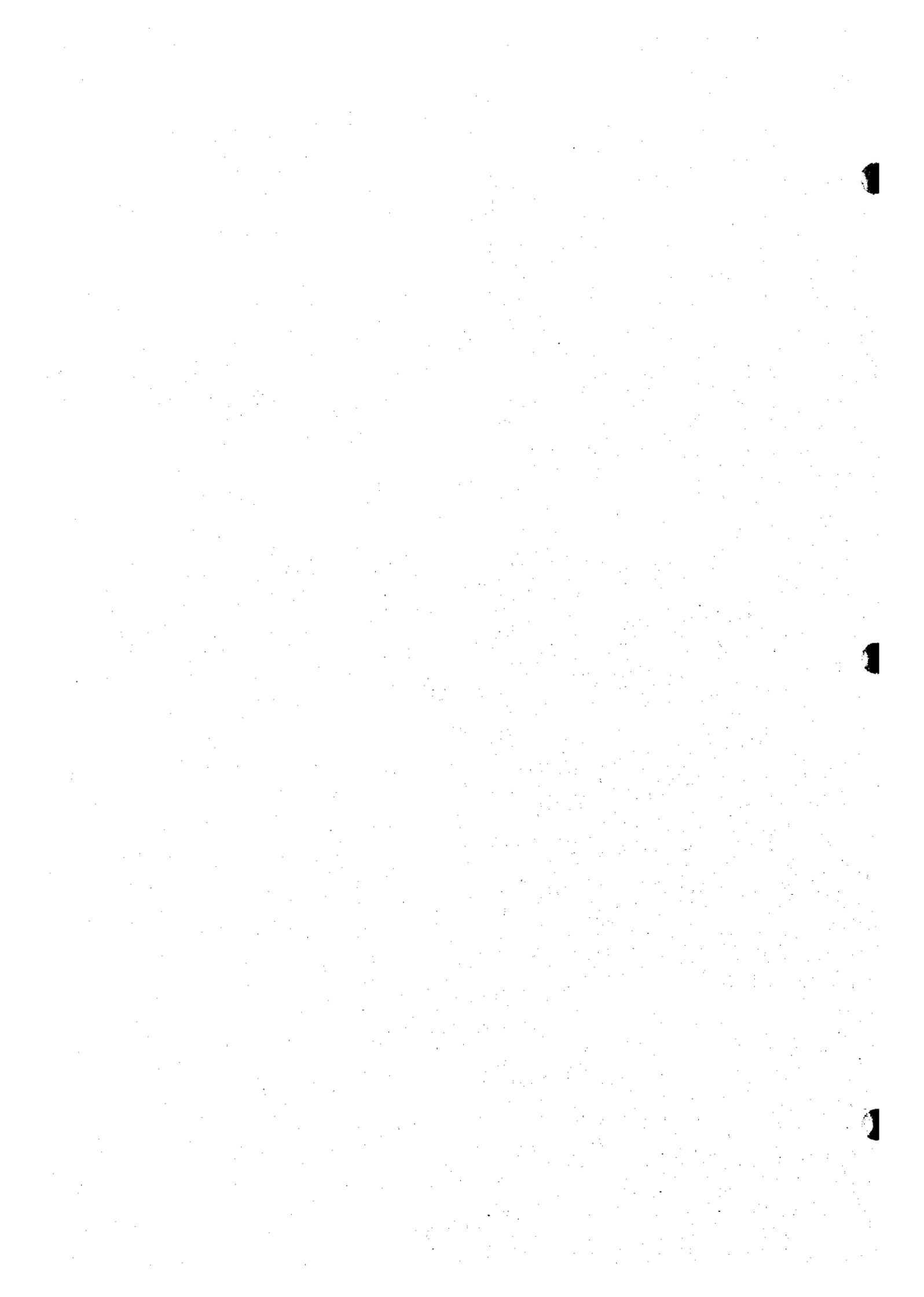
4/ Current prices estimated in this study.

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

Chapter

WATER SOURCE DEVELOPMENT

7



7. WATER SOURCE DEVELOPMENT (Davao del Sur)

7.1 General

The study on water source development covers the entire province to come up with water source potential exploitable for mainly domestic water supply. An emphasis is placed on the 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, surface water potential of major rivers was studied in terms of quantity (return period flow rate) and quality to provide information for LGU's future use, if necessary.

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 geological and groundwater conditions and (2) preparation of Groundwater Availability Map to show groundwater potential areas under three kinds of categorized areas. Furthermore, standard well specifications by municipality were also established to reflect in the medium-term sector development plan. A groundwater quality map was also prepared to supplement the information on the groundwater development for drinking purpose.

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 effectively 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 salt water intrusion, and classification of groundwater potential areas, respectively.

The Groundwater Availability Map may be used for provincial level master plan and feasibility study at present. However, the recommendations on the required investigations were presented for the specific areas with scope of survey, as a reference for LGUs, to conduct them 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.

The overview on current groundwater use with the conditions is summarized in Table 7.1.1 (Well data collected from each municipality are presented in Table 7.1.1, Water Source Information, Data Report). There are 1,927 shallow wells, 2,073 deep wells and 436 developed springs in the province (functional sources). Majorities of the wells are deep wells. About 80% of these water sources are public facilities. Of the total existing wells, 76% remains functional at present. In addition to the above sources, 29 untapped springs are accounted.

Table 7.1.1 Existing Groundwater Sources in the Province

| Category and Classification | Shallow Well | Deep Well | Spring | Total |
|---|--------------|-----------|--------|-------|
| 1. Water source being availed | | | | |
| a. Public sources | 1,116 | 2,073 | 436 | 3,625 |
| b. Privately owned sources | 811 | 0 | 0 | 811 |
| c. Number of water sources | 1,927 | 2,073 | 436 | 4,436 |
| b. Profile of different sources | 43% | 47% | 10% | 100% |
| 2. Water sources with problems and non-functional wells | | | | |
| a. Water quality problems* | 1,008 | 0 | 0 | 1,008 |
| b. Non-functional | 469 | 824 | | 1,293 |
| 3. Spring source information | | | | |
| a. Undeveloped | | | N.A. | N.A. |
| b. Untapped | | | 29 | 29 |

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 and abandoned wells.

3: Number of springs availed, but not adequately protected; and those as candidate sources to be developed.

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

N.A.: Data not available

7.2 Geology

The rock units in the province are classified into four (4) main groups based on the ages of the rock formation. These are, from the oldest to youngest, the Miocene and Older rocks, the Pliocene to Pleistocene Rocks, the Pliocene to Recent igneous rocks, and the Recent Deposits. The grouping of the rocks is related to their potential as groundwater sources. The younger rocks are considered the most important to groundwater because of their porosity and permeability relative to the older rocks. The distribution of these rock groups is shown in Figure

7.2.1 Geological Map of the Province and their geological features are described below.

(1) Miocene and Older rocks

The older rocks cover the southern, central, and western portions of the province. Most of the rock units are sediments of Miocene to Pliocene age, consisting of cemented tuffaceous conglomerate formations, sandstone, shales, graywacke, quartzite and schistose marble. The older igneous rocks are also distributed along the seashore in the south-central area. The rocks are made up of well-compacted sediments consisting of andesite, basalt lava with agglomerate, fine and coarse and density cemented conglomerate, sandstone, siltstone and shale.

(2) Pliocene to Pleistocene rocks

The volcanic sediments are distributed in the mountain foot and in the southwestern side to Mt. Apo. The sediments consist of fine to coarse tuff, volcanic ash, tuff and minor lava, and agglomerate flow. Other sedimentary formations are distributed on the west-central side and are made up of conglomerate, sandstone, siltstone, shale, tuff and thin limestone. The geologic unit area has moderate groundwater development potential and can be developed as a deep well area.

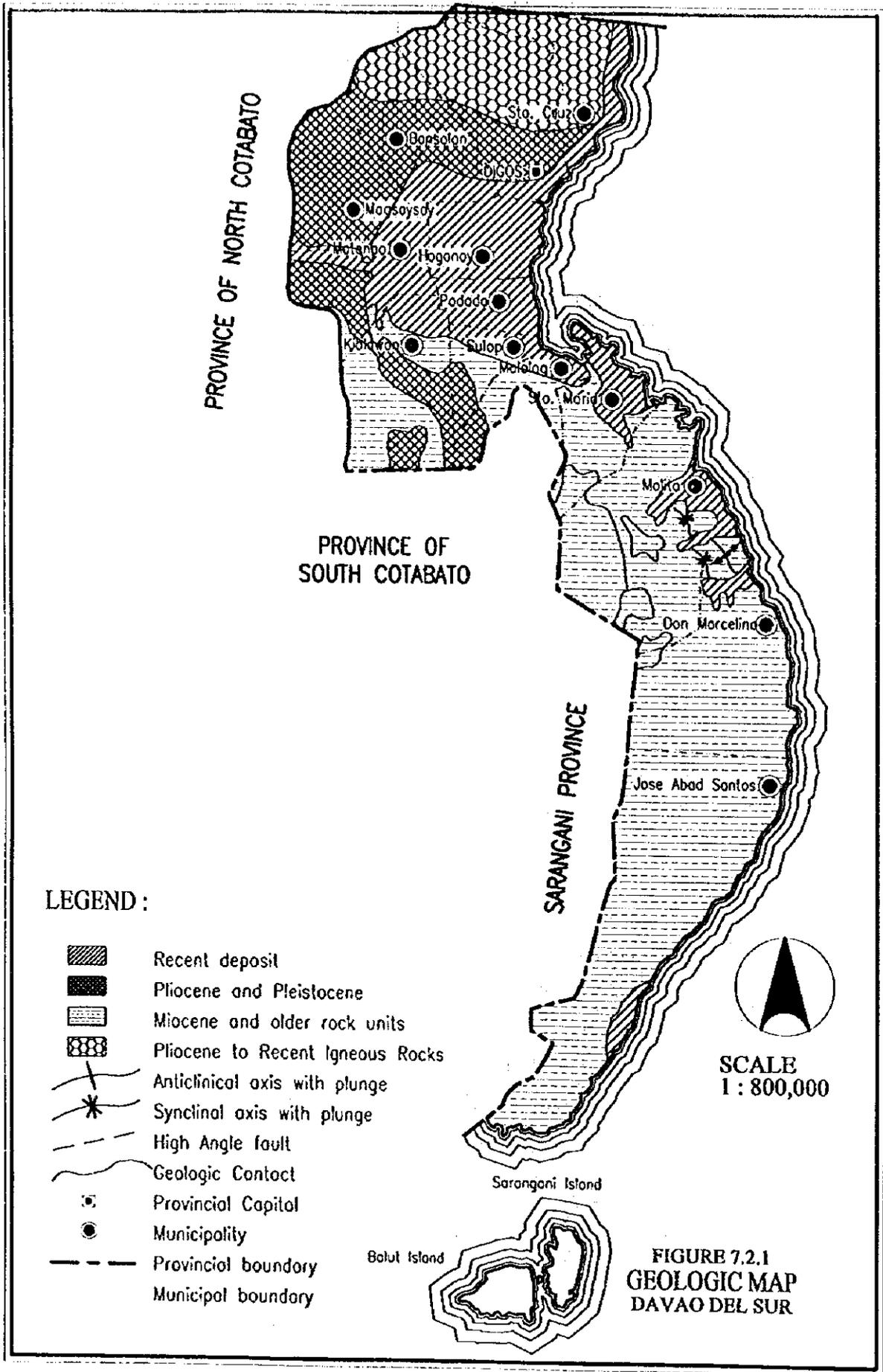
(3) Pliocene to Recent Igneous rocks

This rock unit covers the northern part of the province, and forms Mt. Apo and adjacent volcanoes. They are mainly made up of andesite, basalt lava with agglomerate, fine and coarse and density cemented conglomerate, sandstone, siltstone and shale.

(4) Recent deposits

Recent deposits (alluvium) are widely distributed in the north-central area. However, these deposits are very limited, in places where there are small streams discharging into the sea, like Sta. Maria and Malita municipalities. The deposits are composed of clay, silt, sand and gravel in an unconsolidated condition. The deposits form several formations of some aquifers and aquicludes in alluvial plains. The areas covered by the deposits have large potential for groundwater development and can be developed both by shallow and deep wells.

DISK NAME : DAVAO DEL SUR(DISK1)
 FILENAME : DAVAO-DELSUR(GEOLOGIC)



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) Shallow well area

These are areas having water-bearing rock formations extending not more than 20 m in depth from the ground surface. Shallow well areas are usually located in alluvial and coastal plains, where Recent unconsolidated materials overlie impervious rocks at shallow depth. The extent of a completely shallow well area is limited, because most of the Recent formations are thick or deposited on the Late Pliocene to Pleistocene rocks that usually have multiple aquifers located at greater depths.

(2) Deep well area

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

(3) Difficult area

These are areas not suitable for well development. The areas under this category largely consist of rock formations older than Miocene in age. 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, 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, Supporting Report. Technical information on the wells by municipality is also shown in the same report. The groundwater development potential in the province through the future are summarized below:

(1) Shallow well area

The province has no shallow well 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 shallow wells in the province are driven to an average depth of 13.14 m (4.26 m to 19.82 m). These wells have average static water level of 4.81 mbgl (0.61 m to 17.38 m) and average specific capacity of 1.34 l/sec/m of drawdown (0.03 to 5.60 l/sec/m).

(2) Deep well area

The deep well area covers approximately 40 % of the province. The alluvial plains and the sediment area of Pliocene to Pleistocene mostly coincide with deep well area. The alluvial plain is widely distributed in northern central part of the province where Digos, Hagonoy, and Padada municipalities are located. The alluvial formations consist of clay, silt, sand, and gravel and form a groundwater basin which has several aquifers and impervious layers. In the hinterland, the sedimentary formations of Pliocene to Pleistocene age, made up of limestone, conglomerate, sandstone, siltstone, tuff, volcanic ash, are widely distributed.

These areas are categorized as high potential areas for deep well development. The average depth of existing deep wells is 42.6 mbgl with average water level of 20.9 mbgl, and average specific capacity of 3.4 cu. m/hr/m.

(3) Difficult area

About 60 % of the provincial area is classified as difficult area to exploit groundwater. The geological formations of this area consist of well-consolidated sedimentary igneous and metamorphic rocks of Cretaceous to Recent age, and cemented older sedimentary rocks of Oligocene to Miocene age. The igneous and metamorphic rocks are made up of diorite, andesite and basaltic lava, and metamorphosed rocks.

On the other hand, the sedimentary rocks are composed of cemented tuffaceous conglomerate, sandstone, and graywacke. These formations are distributed in the mountainous areas in the northern, southwestern and most southern parts of the province.

These rocks and formations are dense, massive, consolidated and impervious. Groundwater occurs only in fissures or fault fracture zones.

7.3.3 Groundwater Quality

Groundwater is generally potable except in some areas with high iron content and salt water intrusion. A Water resources investigation for the province conducted by NWRB and general information from DPWH-DEO revealed the problem areas as shown in the Groundwater Quality Map in Figure 7.3.2. The following are summary of the findings.

(1) High iron content problem area

Groundwater with high iron content mainly occurs in the alluvial plain in such places as Hagonoy, Magsaysay, Malalag, and Sulop municipalities. High iron content occurs both in shallow and deep groundwater. The well depths range from 9 m to 50 m. The problem areas with high iron content are distributed in the alluvial plains of Malita and Sta. Maria municipalities. The depths of the wells range from 18 m to 50 m. High iron content has also been observed in deep wells with depths of about 36 m in Balut Island.

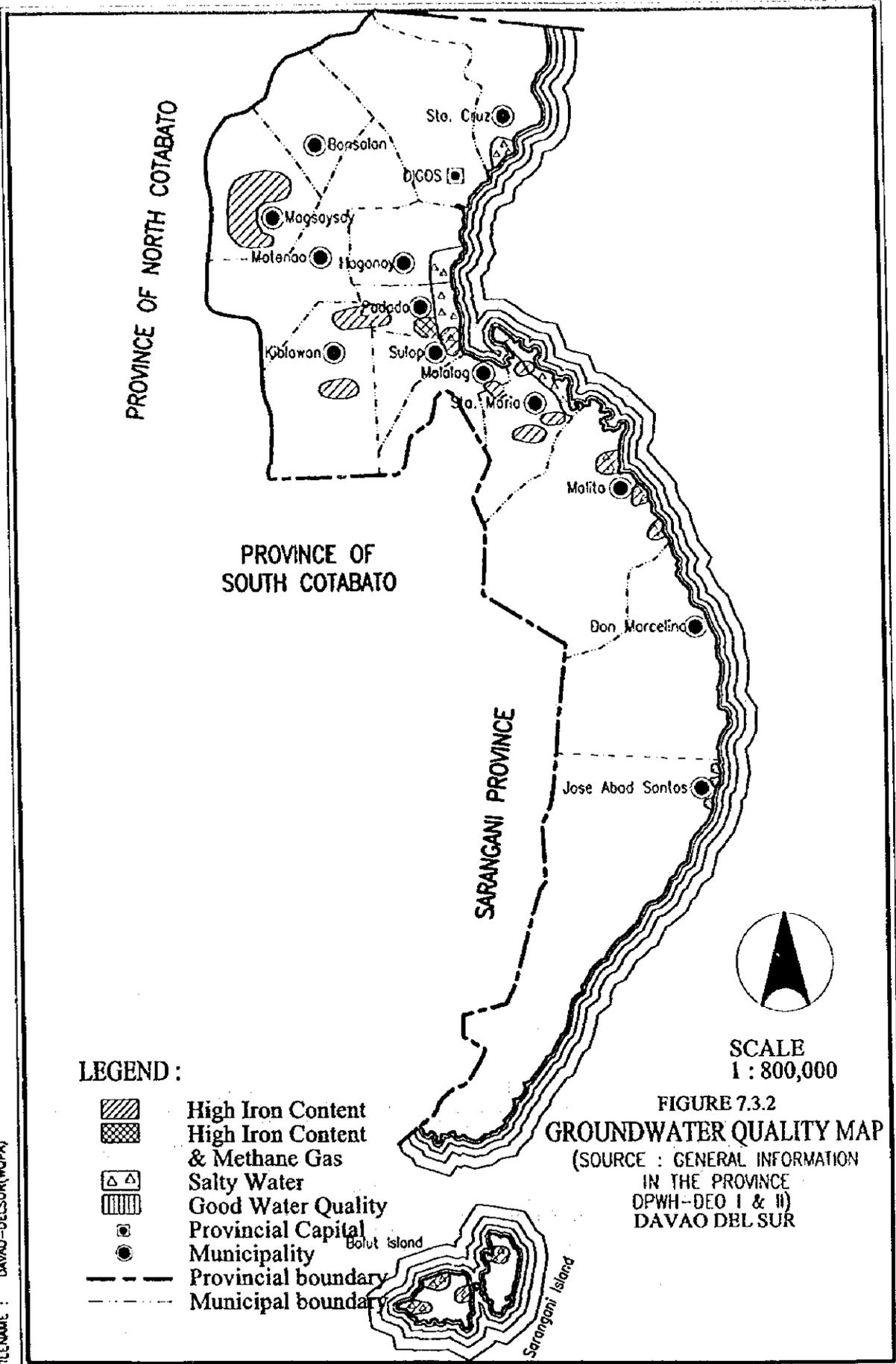
(2) Salt water intrusion

Deep groundwater in the alluvial plains formed by the Padada, the Sibuyan, and the Mal Rivers, have been affected by salt water intrusion at depths ranging from 21 m to 36 m near the shorelines of Padada municipality. Sta. Cruz municipality, located at the foot of the Apo volcano group, experiences salt water in shallow and deep wells at depths of 9 m to 24 m. In the southern area of the province such as the municipalities of Sta. Maria, Malita, and Jose Abad Santos, salt water intrusion occurs in shallow and deep wells at depths of 18 m to 42 m but on a small scale. Moreover, Balut Island has saline water in deep wells with depths of about 36 m in the areas along the seashore.

7.4 Spring Sources

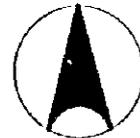
Spring is a natural outlet of groundwater at the ground surface. It occurs when water table intersects the ground surface, usually along the contacts of pervious and impervious rock formation and through rock features. Because of the intense fracturing, particularly older formation, and the presence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

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LEGEND :

-  High Iron Content
-  High Iron Content & Methane Gas
-  Salty Water
-  Good Water Quality
-  Provincial Capital
-  Municipality
-  Provincial boundary
-  Municipal boundary



SCALE
 1 : 800,000

FIGURE 7.3.2
GROUNDWATER QUALITY MAP
 (SOURCE : GENERAL INFORMATION
 IN THE PROVINCE
 DPWH-DEO I & II)
 DAVAO DEL SUR

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

Based on the inventory of water sources prepared through the study, the province has 436 developed springs currently serving the province, which issue from high mountainous areas. The province is mostly covered by mountainous areas. The mountain slope often directly rises up from the seashore. The alluvial areas are small in scale.

A total of 29 untapped springs are reported in the municipalities of Sta. Cruz, Bansalan, Mantanao, Malalag, Kiblawan, Sta. Maria, Don Marcelino, Jose Abad Santos, and Sarangani. Most of these springs do not dry up even during a draught period. Yields vary from 1.6 to 94.6 l/sec. The technical information of springs in each municipality is presented in Table 7.4.1 Existing Spring Sources, Supporting Report.

7.5 Surface Water Sources

The major surface water sources in the province are the Sibulan River, the Digos River, the Hagonoy River and the Padada River. There are three gauging stations in the province.

Surface water use in the province totals 20.18 cu.m/sec, based on NWRB's water rights registration database as of March 1997. Of this usage, 94.3% of the water rights were registered for irrigation. Other surface water uses were for domestic and fisheries by water supply systems and several private companies. For domestic water supply, the Bansalan water supply service (private) has registered 30 cu.m/day water from the Ylang and the Miral Rivers (tributaries of the Mantanao stream) since 1980. The Davao City WD has registered 34,400 cum/day water from the Lipadas River in Davao City. This surface water development for the Davao City WD is now an ongoing project under a BOT scheme.

Data on river flow, maintenance flow and water use of the major rivers and stream systems, based on available runoff records from the gauging stations are given in Table 7.5.2, Supporting Report. The inflows to and the outflows from the respective municipalities are estimated as the exploitable potential of the major rivers in the province.

Water quality analyses were conducted through this study. The results of the water quality analyses at the selected streams met the Class A limitation of "DENR Fresh Water Quality

Criteria" within the tested parameters.

7.6 Future Development Potential of Water Sources

(1) Groundwater

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

Shallow wells are the possible source for Level I service. Considering the existing wells in the province, the potential aquifers for shallow wells occur between 6 and 20 mbgl. 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 that 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 Pliocene to Pleistocene sediments, good aquifers apparently occur from 20 to 190 mbgl.

Additional wells can still be developed to meet the 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 data: well depth, static water level, and specific capacity, and aquifer formation as shown in Table 7.6.2, Supporting Report. The groundwater development potential in the province is shown in Table 7.6.1.

(2) Spring

A total of 29 untapped spring sources for future development in barangay level are listed in Table 7.6.3 Untapped Spring Source Identification, Supporting Report. The list includes detailed data on the barangay name, owner, discharge rate in dry season, transmission line length and elevation difference between spring source and served area.

Table 7.6.1 Groundwater Development Potential in the Province

| Area | Groundwater Development Potential | Water Quality | Area Feature |
|---|--|--|---|
| 1. Sta. Cruz and Digos Area | Alluvial plains and areas with Pliocene to Pleistocene formations are classified as deep well area. Well depth: 7 to 20 mbgl. 24 to 107 mbgl. Water table: 0.3 to 95 mbgl. Specific capacity: 0.04 to 3.10 l/s/m. | Salt water intrusion: in Sta. Cruz area, shallow well water is potable but deep groundwater in depth of 24 m is salty. In Padada area, deep wells from 36 m to 21 m have salty groundwater. Deeper groundwater at 48 m depth often contains methane gas. | In northern area, the foots of Mt. Apo and adjacent volcano group are covered by volcano eruptions and lava. In the periphery area of Digos, alluvial plains, formed by the streams issuing from the volcanoes, are widely distributed. |
| 2. Bansalan Area | Volcanic eruptions generally form good aquifers. The areas belong to deep well area. Well depth: 6 to 19 mbgl, and 20 to 114 mbgl. Water table: 1.22 to 89 mbgl. Specific capacity: 0.07 to 3.13 mbgl. | Potable | Bansalan municipality is located at the foot of Mt. Apo and adjacent volcano group. |
| 3. Alluvial Plain Distributed in Padada and Hagonoy | Alluvial plain has shallow aquifer in unconfined condition and deep aquifers at least 50 m in artesian condition. Deep wells in San Isidro of Hagonoy are free flowing condition with depth of 54 m. Well depth: 4 to 20 mbgl, and 20 to 108 mbgl. Water table: 1 to 33 mbgl. Specific capacity: 0.18 to 5.16 mbgl. | High iron content; groundwater in the alluvial plains in the periphery of Magsaysay, comparatively shallow well with depth: 9 m to 24 m; groundwater east of Sulop. Well depth from 18 m to 54 m; the periphery area of Kiblawan contains high iron content. Comparatively deeper well with depth: 478 m to 54 m. Salt water intrusion: in Padada area, deep wells from 21 m to 36 m. In Sulop area, shallow and deep wells from 9 m to 48 m | Alluvial plain, formed by the Padada and Mainit areas, is widely distributed. |
| 4. Malalag and Malita Areas | Groundwater development potential areas are limited in narrow and small alluvial areas. Well depth: 4 to 20 mbgl, and 20 to 81 mbgl. Water table: 0.6 to 35 mbgl. Specific capacity: 0.06 to 2.9 mbgl. | High iron content; eastern area of Malalag, well depth from 48 m to 54 m. shallow and deep groundwater from 18 m to 48 m in Sta. Maria and Malita. Salt water intrusion: free flowing well water in Malalag is salty. Well depth: 48 m. | Alluvial plains formed by small streams is very small in scale. The plains are surrounded by comparatively low mountains. |
| 5. Southern Area of the Province | Area mostly belongs to difficult area for groundwater development. Groundwater development areas are limited in the areas along the seashore in Jose Abad Santos and Balur Island. Well depth: 9 to 16 mbgl, and 32 to 55 mbgl. Water table: 2 to 29 mbgl. Specific capacity: 0.14 to 2.53. (However, no available data for Balur Island). | High iron content; Balur Island, deep groundwater at 48 m. Salt water intrusion: in Jose Abad Santos, shallow and deep wells ranging from 9 m to 42 m, and in deep groundwater of Balur Island, depth of about 36 m. | Area mostly mountainous. |

Such springs are located on the northern, western, and southern mountainous areas. The springs are mainly owned by public organizations. Discharge ranges from 1.6 l/sec to 94.6 l/sec.

(3) Surface Water

The potential surface water volume exploitable from major rivers for domestic water supply was estimated by municipality. The resulting figure is negative within the Hagonoy River and the Marber-Mantanao stream of the Padada River basin. This means that the maintenance flow could not be maintained within the 10-year return period as a dependable domestic water supply, if the present water rights are fully utilized during a serious drought season. The Padada River has sufficient potential for the future development of domestic water supply (in terms of river flow quantity). On the other hand, the river flow potential of the Sibulan and the Digos Rivers are limited (about 1.2 cu. m/sec or less). Surface water development for the latter two rivers would therefore require a more detailed investigation of river flow measurement.

The calculation results are shown in Table 7.5.2, Supporting Report. In particular, the municipalities situated in the Padada River basin are privileged to use a larger amount of river water. However, the municipalities of Jose Abad Santos, Malalay, Malita, Santa Maria, Sulop, Sarangani and Don Marcelino have no major and sustainable surface water source.

7.7 Water Source Development for Medium-Term Development Plan

For 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 well depth, static water level and specific capacity are shown in Table 7.7.1, which were established using well information from NWRB and the province (detailed data base is included in Table 7.1.1, Data Report) and hydrogeological assessment presented in Table 7.6.2, Supporting Report.

Shallow wells are currently used in some municipalities. The municipal areas are categorized into deep well and shallow areas considering the practices. The proportions (%) of shallow and deep wells are determined with reference to groundwater development potential in the Groundwater Availability Map. Furthermore, the well locations are assumed in terms

Table 7.7.1 Standard Specification of Wells by Municipality

| Municipality | Type | Proportion (%) | Standard Specification | | | Remarks | |
|-------------------|-------|----------------|------------------------|----------|-----------------------------|---------|--|
| | | | Depth Range (m) | SWI. (m) | Specific Capacity (l/sec/m) | | |
| Bansalan | Rural | SW | 0 | 10<D<20 | 5 | 1.5 | |
| | | DW | 50 | 20<D<115 | 40 | 1.5 | |
| | Urban | SW | 0 | 10<D<20 | 5 | 1.5 | |
| | | DW | 100 | 20<D<115 | 40 | 1.5 | |
| Digos | Rural | SW | 0 | 10<D<15 | 3 | 0.5 | |
| | | DW | 30 | 25<D<110 | 35 | 0.5 | |
| | Urban | SW | 0 | 10<D<15 | 3 | 0.5 | |
| | | DW | 100 | 25<D<110 | 35 | 0.5 | |
| Don Marcelino | Rural | SW | 0 | 10<D<20 | 2 | 0.5 | |
| | | DW | 5 | 35<D<50 | 10 | 0.5 | |
| | Urban | SW | 0 | 10<D<20 | 2 | 0.5 | |
| | | DW | 100 | 35<D<50 | 10 | 0.5 | |
| Hagonoy | Rural | SW | 0 | 10<D<20 | 5 | 1.0 | |
| | | DW | 80 | 25<D<55 | 15 | 1.0 | |
| | Urban | SW | 0 | 10<D<20 | 5 | 2.0 | |
| | | DW | 100 | 25<D<55 | 15 | 2.0 | |
| Jose Abado Santos | Rural | SW | 0 | 10<D<20 | 5 | 1.5 | |
| | | DW | 5 | 35<D<55 | 30 | 1.5 | |
| | Urban | SW | 0 | 10<D<20 | 5 | 1.5 | |
| | | DW | 100 | 35<D<55 | 30 | 1.5 | |
| Kiblawan | Rural | SW | 0 | 15<D<20 | - | 0.5 | |
| | | DW | 40 | 50<D<55 | - | 0.5 | |
| | Urban | SW | 0 | 15<D<20 | - | 1.0 | |
| | | DW | 100 | 50<D<55 | - | 1.0 | |
| Magsaysay | Rural | SW | 0 | 10<D<15 | - | 1.0 | |
| | | DW | 80 | 25<D<50 | - | 1.0 | |
| | Urban | SW | 0 | 10<D<15 | - | 1.0 | |
| | | DW | 100 | 25<D<50 | - | 1.0 | |
| Malalag | Rural | SW | 0 | 5<D<20 | 3 | 0.5 | |
| | | DW | 85 | 20<D<85 | 10 | 0.5 | |
| | Urban | SW | 0 | 5<D<20 | 3 | 1.0 | |
| | | DW | 100 | 20<D<85 | 10 | 1.0 | |
| Malita | Rural | SW | 0 | 10<D<20 | 5 | 1.5 | |
| | | DW | 15 | 20<D<70 | 15 | 1.5 | |
| | Urban | SW | 0 | 10<D<20 | 5 | 1.5 | |
| | | DW | 100 | 20<D<70 | 15 | 1.5 | |
| Matanao | Rural | SW | 0 | 15<D<20 | 10 | 1.0 | |
| | | DW | 60 | 20<D<110 | 30 | 1.0 | |
| | Urban | SW | 0 | 15<D<20 | 10 | 1.0 | |
| | | DW | 100 | 20<D<110 | 30 | 1.0 | |
| Padada | Rural | SW | 0 | 5<D<20 | 3 | 1.5 | |
| | | DW | 90 | 20<D<110 | 4 | 1.5 | |
| | Urban | SW | 0 | 5<D<20 | 3 | 2.5 | |
| | | DW | 100 | 20<D<110 | 4 | 2.5 | |
| Sta. Cruz | Rural | SW | 0 | 10<D<20 | 5 | 1.5 | |
| | | DW | 20 | 25<D<55 | 15 | 1.5 | |
| | Urban | SW | 0 | 10<D<20 | 5 | 1.5 | |
| | | DW | 100 | 25<D<55 | 15 | 1.5 | |

Table 7.7.1 Standard Specification of Wells by Municipality (Cont'd)

| Municipality | Type | Proportion (%) | Standard Specification | | | Remarks | |
|--------------|-------|----------------|------------------------|---------|-----------------------------|---------|--|
| | | | Depth Range (m) | SWL (m) | Specific Capacity (l/sec/m) | | |
| Sta. Maria | Rural | SW | 0 | 15<D<20 | - | 0.5 | |
| | | DW | 85 | 35<D<50 | - | 0.5 | |
| | Urban | SW | 0 | 15<D<20 | - | 0.5 | |
| | | DW | 100 | 35<D<50 | - | 0.5 | |
| Sulop | Rural | SW | 0 | 15<D<20 | 3 | 1.5 | |
| | | DW | 90 | 25<D<50 | 20 | 1.5 | |
| | Urban | SW | 0 | 15<D<20 | 3 | 1.5 | |
| | | DW | 100 | 25<D<50 | 20 | 1.5 | |
| | Rural | SW | | | | | |
| | | DW | | | | | |
| | Urban | SW | | | | | |
| | | DW | | | | | |
| | Rural | SW | | | | | |
| | | DW | | | | | |
| | Urban | SW | | | | | |
| | | DW | | | | | |
| | Rural | SW | | | | | |
| | | DW | | | | | |
| | Urban | SW | | | | | |
| | | DW | | | | | |
| | Rural | SW | | | | | |
| | | DW | | | | | |
| | Urban | SW | | | | | |
| | | DW | | | | | |
| | Rural | SW | | | | | |
| | | DW | | | | | |
| | Urban | SW | | | | | |
| | | DW | | | | | |
| | Rural | SW | | | | | |
| | | DW | | | | | |
| | Urban | SW | | | | | |
| | | DW | | | | | |

of rural and urban areas by municipality referring to the classification of rural and urban barangays. For the municipalities without any well data, the well parameters are appropriated using those in adjoining towns, provided they have similar hydrogeologic features.

For the furtherance in collecting accurate information to design the concrete specification of the planned wells, the following recommendations are made. Prior to the detailed design or pre-construction stages, additional detailed groundwater investigations entailing electric resistivity survey and the construction of test wells in the municipalities of Kiblawan and Sulop shall be conducted. Of the two municipalities, the Kiblawan area has not existing well information enough to design the water source facilities in the entire areas. Therefore, the electric resistivity survey shall be proposed to be carried out both in the urban and rural areas and a test well shall be constructed in the urban area. While, the Sulop area has fairly much well information in the rural area. Therefore, the survey and a test boring are recommended to be carried out in the urban area. Table 7.7.2 summarizes the requirements.

The groundwater development for water supply in urban areas (Level II and III systems) will require the construction of deep wells with larger casing diameters of 6" or more, which expect 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 simultaneously pump up during long period. This results in the intermittent pump operation with excess electric consumption. Thus, appropriate spacing interval and number of wells to be constructed per sq. Km were estimated as shown in Table 7.7.1 Spacing Arrangements for Planned Wells, Supporting Report.

Spring sources, proposed by barangay level, for future development are shown in Table 7.6.3, Supporting Report. However, the information is not enough to design water supply system. Therefore, they shall also be investigated to confirm the development possibility in the following items: (1) locations and type of spring sources (2) fluctuation of discharge rates through the year, (3) distances from spring sources and proposed served areas and (4) elevation differences between the two point.

Table 7.7.2 Additional Groundwater Investigation

| Municipality | Survey Area | Survey Activities and Specifications | |
|--------------|-------------|---|--|
| | | Electric Resistivity Survey | Test Well Construction |
| Kiblawan | Urban | Survey area: one site Measuring lines: 4 Measuring interval: 200 m Length of a measuring line: 1 km Prospecting depth: 100 m | Number of test well: one/each municipality Casing diameter: 200 mm Well depth: 100 m Including pumping test, electric logging, and water quality analysis |
| | Rural | Survey area: two sites Measuring lines: 2/each site, 4 in total Measuring interval: 200 m Length of a measuring line: 1 km Prospecting depth: 100 m | N.A. |
| Sulop | Urban | Measuring lines: 4 Measuring interval: 200 m Length of a measuring line: 1 km Prospecting depth: 100 m | Number of test well: one/each municipality Casing diameter: 200 mm Well depth: 100 m Including pumping test, electric logging, and water quality analysis |

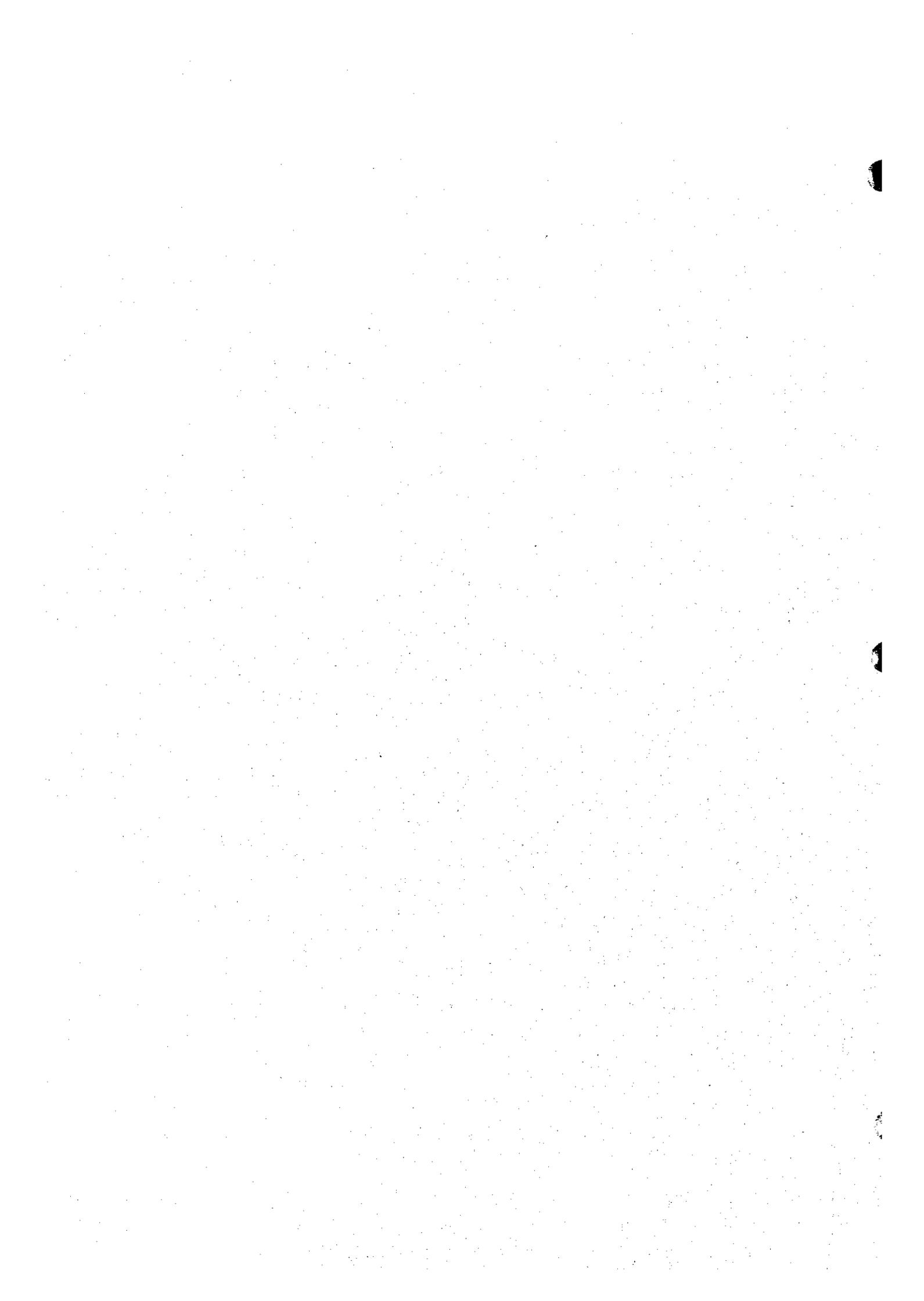
Note: N.A. Not Applicable



Chapter

8

**FUTURE REQUIREMENTS IN WATER
SUPPLY AND SANITATION IMPROVEMENT**



8. FUTURE REQUIREMENTS IN WATER SUPPLY AND SANITATION IMPROVEMENT

8.1 General

Phased investments for provincial sector development are planned in almost the same manner as adopted in the 1998 Philippine National Development Plan (PNDP) and the National Sector Master Plan (NSMP); Medium-Term Investment covering the years 1999 to 2003 and Long-Term Development covering the period 2004 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 (1997) and national sector targets indicated in the NSMP and the updated Medium-Term Philippine Development Plan, 1996 – 1998 (MTPDP) are the bases of the study. Sector targets which are not prescribed in the national plan; school and public toilets as well as sewerage are assumed based on the current conditions. In addition, preliminary discussions on solid waste management are included as a vital component of sanitation sector.

Projection of frame values by municipality is undertaken for respective sub-sectors; future population by urban and rural area, the number of student enrollment to public schools and the number of public utilities. Reference base figures for the study of framework are the 1995 Census of Population and Housing, the statistical data of the province and information from relevant agencies. Provincial population by target year and the base year (1997) is estimated by adopting the projection method being used at NSO. While, the population distribution to urban and rural areas prepared by NSO in 1995 is modified to meet actual conditions in the classification of the areas.

Types of required facilities and their implementation criteria according to service level standards are referred to the NSMP and the NEDA Board Resolution No. 12 (s. 1995). Some planning conditions and assumptions not prescribed in the national plan are conferred to the relevant standards of sector agencies and provincial government. For sewerage requirements, the deficit in sanitation must first be addressed. Partial upgrading of on-site disposal to a sewerage system (off-site disposal) is envisaged in the final target year.

In estimating future requirements by municipality, additional population (or number of students/public utilities) to be served by sub-sector is first calculated as a shortfall at target years in comparison between each target and its base year service coverage. In this regard,

planned/on-going projects to be completed by respective base years are considered as part of existing services for each target year. Required number of facilities by sector component is then estimated corresponding to the said additional population (or number of students/public utilities) to be served. Rehabilitation work for Level I facilities limited to new deep wells to be constructed under PW4SP is taken into account. Generally, rehabilitation of deep wells and shallow wells constructed by means of conventional method is difficult.

Logistic support is considered as a minimum requirement of LGUs for community development and training, and other relevant activities along with the implementation of PW4SP. The types and number of well drilling/rehabilitation equipment and supporting vehicle for Level I facilities are also suggested as reference information. Also, minimum requirements for setting up a provincial laboratory to support drinking water quality surveillance and monitoring are described. This will include building, instrument/equipment and reagent/chemical requirements. The 1993 Philippine National Standards for Drinking Water (PNSDW) requires that initial examination 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 2003 and 2010 are determined as the provincial average of the desirable minimum level for each sub-sector. Table 8.2.1 summarizes the target percentages to be served by sub-sector. Details by sub-sector are discussed in this subsection.

(1) Water supply

The base year service coverage was calculated as a total of those in 1997 and expected by planned/on-going projects scheduled to be completed by the end of 1998. Table 8.2.2 shows service coverage for the planning purpose (details are referred to Supporting Report).

The base year service coverage in urban area (70%) is almost same with the update MTPDP sector target (68.8%) for the year 1998, while rural area (54%) is far behind the sector target of 79%. As identified in Chapter 4, the lower service coverage in rural area is caused by the presence of a large number of unsafe sources/facilities or no provision of water supply facilities.

Table 8.2.1 Provincial Sector Targets

| Sub-sectors | Existing Service Coverage | Phase I (1999-2003) | | Phase II (2004-2010) | |
|---------------------------|------------------------------------|------------------------------------|---|------------------------------------|---|
| | | Population Coverage (%) | Population Coverage (%) | Additional Population to be Served | Population Coverage (%) |
| Water Supply | Population Coverage (%) | Population Coverage (%) | Additional Population to be Served | Population Coverage (%) | Additional Population to be Served |
| <i>Urban Water Supply</i> | 70 | 80 | 29,307 | 95 | 73,769 |
| <i>Rural Water Supply</i> | 54 | 65 | 108,764 | 93 | 203,810 |
| Sanitation | Households Coverage (%) | Households Coverage (%) | Additional Households to be Served | Households Coverage (%) | Additional Households to be Served |
| <i>Household Toilet</i> | | | | | |
| <i>Urban Household</i> | 67 | 80 | 7,403 | 93 | 15,920 |
| Flush | 11 | 25 | 3,690 | 40 | 10,333 |
| Pour Flush | 48 | 65 | 2,861 | 60 | 5,587 |
| VIP | 8 | 10 | 852 | 0 | 0 |
| <i>Rural Household</i> | 84 | 90 | 18,260 | 95 | 48,387 |
| Flush | 1 | 5 | 2,202 | 10 | 5,624 |
| Pour Flush | 68 | 80 | 14,098 | 90 | 42,763 |
| VIP | 14 | 15 | 1,960 | 0 | 0 |
| School Toilet | Public School Student Coverage (%) | Public School Student Coverage (%) | Additional Public School Students to be Served | Public School Student Coverage (%) | Additional Public School Students to be Served |
| | 39 | 60 | 44,656 | 80 | 52,435 |
| Public Toilet | Public Utilities Coverage (%) | Public Utilities Coverage (%) | Additional Public Utilities with Sanitary Toilets | Public Utilities Coverage (%) | Additional Public Utilities with Sanitary Toilets |
| | 69 | 100 | 22 | 100 | 8 |
| Sewerage | Urban Population Coverage (%) | Not Applicable | | Urban Population Coverage (%) | Urban Population to be Served |
| | 0 | | | 50 | 58,549 |
| Solid Waste | Urban Household Coverage (%) | Urban Household Coverage (%) | Additional Households to be Served | Not Applicable | |
| | 36 | 50 | 6,757 | | |

Table 8.2.2 Estimation of Base Year Service Coverage of Water Supply

| Name of Municipality | Area | Population (1997) | Population Served by 1997 facilities | | | | Percentage Coverage |
|-----------------------------|-------|-------------------|--------------------------------------|----------|---------|---------|---------------------|
| | | | Level III | Level II | Level I | Total | |
| Bansalan | Urban | 6,697 | 6,247 | | | 6,247 | 93 |
| | Rural | 42,918 | 7,513 | 2,965 | 15,184 | 25,662 | 60 |
| | Total | 49,615 | 13,760 | 2,965 | 15,184 | 31,909 | 64 |
| Digos (Capital) | Urban | 41,886 | 30,498 | | 6,778 | 37,276 | 89 |
| | Rural | 68,436 | 3,735 | 2,830 | 47,067 | 53,632 | 78 |
| | Total | 110,322 | 34,233 | 2,830 | 53,845 | 90,908 | 82 |
| Don Marcelino | Urban | 11,181 | | 934 | 4,469 | 5,403 | 48 |
| | Rural | 20,227 | | 1,318 | 879 | 2,197 | 11 |
| | Total | 31,408 | | 2,252 | 5,348 | 7,600 | 24 |
| Hagonoy | Urban | 6,751 | 3,239 | 1,672 | 1,684 | 6,595 | 98 |
| | Rural | 36,595 | | 150 | 33,793 | 33,943 | 93 |
| | Total | 43,346 | 3,239 | 1,822 | 35,477 | 40,538 | 94 |
| Jose Abad Santos (Trinidad) | Urban | 5,167 | | | 963 | 963 | 19 |
| | Rural | 43,642 | | | 8,795 | 8,795 | 20 |
| | Total | 48,809 | | | 9,758 | 9,758 | 20 |
| Kiblawan | Urban | 5,925 | 2,049 | | 290 | 2,339 | 39 |
| | Rural | 32,006 | | 2,423 | 10,681 | 13,104 | 41 |
| | Total | 37,931 | 2,049 | 2,423 | 10,971 | 15,443 | 41 |
| Magsaysay | Urban | 6,737 | 1,578 | | 3,355 | 4,933 | 73 |
| | Rural | 36,393 | 967 | 3,376 | 21,502 | 25,845 | 71 |
| | Total | 43,130 | 2,545 | 3,376 | 24,857 | 30,778 | 71 |
| Matalag | Urban | 4,599 | 918 | | 1,735 | 2,653 | 58 |
| | Rural | 27,124 | 1,150 | 353 | 14,190 | 15,693 | 58 |
| | Total | 31,723 | 2,068 | 353 | 15,925 | 18,346 | 58 |
| Malita | Urban | 12,897 | 5,623 | | 150 | 5,773 | 45 |
| | Rural | 72,123 | 2,342 | 3,536 | 20,006 | 25,884 | 36 |
| | Total | 85,020 | 7,965 | 3,536 | 20,156 | 31,657 | 37 |
| Matanao | Urban | 4,010 | 2,141 | | 451 | 2,592 | 65 |
| | Rural | 40,615 | 94 | 2,781 | 24,523 | 27,398 | 67 |
| | Total | 44,625 | 2,235 | 2,781 | 24,974 | 29,990 | 67 |
| Padada | Urban | 9,297 | 6,492 | | 1,860 | 8,352 | 90 |
| | Rural | 13,704 | 1,570 | 1,025 | 4,202 | 6,797 | 50 |
| | Total | 23,001 | 8,062 | 1,025 | 6,062 | 15,149 | 66 |
| Santa Cruz | Urban | 20,787 | 8,475 | | 5,568 | 14,043 | 68 |
| | Rural | 40,326 | 1,026 | 4,065 | 16,630 | 21,721 | 54 |
| | Total | 61,113 | 9,501 | 4,065 | 22,198 | 35,764 | 59 |
| Santa Maria | Urban | 6,738 | 1,883 | | 1,554 | 3,437 | 51 |
| | Rural | 36,264 | | 938 | 14,111 | 15,049 | 41 |
| | Total | 43,002 | 1,883 | 938 | 15,665 | 18,486 | 43 |
| Sarangani | Urban | 2,746 | | 1,300 | | 1,300 | 47 |
| | Rural | 14,447 | | | 4,213 | 4,213 | 29 |
| | Total | 17,193 | | 1,300 | 4,213 | 5,513 | 32 |
| Sulop | Urban | 5,792 | 900 | | 2,289 | 3,189 | 55 |
| | Rural | 20,565 | 1,000 | | 10,856 | 11,856 | 58 |
| | Total | 26,357 | 1,900 | | 13,145 | 15,045 | 57 |
| PW4SP Study Area | Urban | 151,210 | 70,043 | 3,906 | 31,146 | 105,095 | 70 |
| | Rural | 545,385 | 19,397 | 25,760 | 246,632 | 291,789 | 54 |
| | Total | 696,595 | 89,440 | 29,666 | 277,778 | 396,884 | 57 |

For Phase I development, targets of service coverage for water supply by urban and rural area are established in consideration of about 10% increase from the base year. 80% and 65% is adopted for urban and rural area, respectively. 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 1998 (details are referred to Supporting Report).

The province has base year service coverage of 80%, which is a little above the current national average coverage of 60%. Urban area registers a level of 67% that is above the national average coverage. On the other hand, rural area, has a high 84% owing to the concentration of toilet bowls distribution in this area. By type of sanitary toilet facility, the existing percentage composition to total households is as follows:

| <u>Type</u> | <u>Urban (%)</u> | <u>Rural (%)</u> |
|-------------|------------------|------------------|
| Flush | 16 | 1 |
| Pour-flush | 72 | 82 |
| VIP latrine | 11 | 17 |

To attain sufficiency and equitable access to basic services, provincial target of Phase I for urban household toilets is planned at 80%, while, for rural household toilets, 90% is projected. This is pursued to lessen the gap of the coverage between the urban and rural areas in order 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, 95% is arranged for rural household toilets.

The existing composition of the 3 facility types serves as an indicator in the distribution for Phase I, while for Phase II, VIP and sanitary pit privy/latrine (dry-type) is phased-out.

Table 8.2.3 Base Year Service Coverage of Household Toilets

| Name of Municipality | Area | 1997 | | Households and Population Using Sanitary Toilets | | | | | | | | |
|-----------------------------|-------|------------|---------|--|------------|---------|---------|------------|----------------------|------------|---------|-------|
| | | Population | Hills | Number of Households | | | | Population | Service Coverage (%) | | | |
| | | | | Flush | Pour Flush | VIP/Dry | Total | | Flush | Pour Flush | VIP/Dry | Total |
| Bansalan | Urban | 6,697 | 1,395 | 32 | 861 | 103 | 996 | 4,755 | 2 | 62 | 7 | 71 |
| | Rural | 42,918 | 8,705 | 82 | 6,716 | 973 | 7,771 | 38,198 | 1 | 77 | 11 | 89 |
| | Total | 49,615 | 10,100 | 114 | 7,577 | 1,076 | 8,767 | 42,953 | 1 | 75 | 11 | 87 |
| Digos (Capital) | Urban | 41,886 | 8,513 | 2,278 | 4,813 | 197 | 7,288 | 36,022 | 27 | 57 | 2 | 86 |
| | Rural | 68,436 | 13,687 | 397 | 11,685 | 1,361 | 13,443 | 67,068 | 3 | 85 | 10 | 98 |
| | Total | 110,322 | 22,200 | 2,675 | 16,498 | 1,558 | 20,731 | 103,090 | 12 | 74 | 7 | 93 |
| Don Marcelino | Urban | 11,181 | 2,154 | 42 | 767 | 29 | 838 | 4,361 | 2 | 36 | 1 | 39 |
| | Rural | 20,227 | 3,838 | 13 | 1,972 | 950 | 2,935 | 15,373 | | 51 | 25 | 76 |
| | Total | 31,408 | 5,992 | 55 | 2,739 | 979 | 3,773 | 19,734 | 1 | 46 | 16 | 63 |
| Hagonoy | Urban | 6,751 | 1,358 | 38 | 602 | 166 | 806 | 3,984 | 3 | 44 | 12 | 59 |
| | Rural | 36,595 | 7,304 | 38 | 5,091 | 1,040 | 6,169 | 30,740 | 1 | 70 | 14 | 84 |
| | Total | 43,346 | 8,662 | 76 | 5,693 | 1,206 | 6,975 | 34,724 | 1 | 66 | 14 | 81 |
| Jose Abad Santos (Trinidad) | Urban | 5,167 | 992 | 28 | 471 | 195 | 694 | 3,617 | 3 | 47 | 20 | 70 |
| | Rural | 43,642 | 8,474 | 34 | 4,698 | 1,129 | 5,861 | 30,113 | | 55 | 13 | 69 |
| | Total | 48,809 | 9,466 | 62 | 5,169 | 1,324 | 6,555 | 33,730 | 1 | 55 | 14 | 69 |
| Kiblawan | Urban | 5,925 | 1,232 | 42 | 553 | 186 | 781 | 3,733 | 3 | 45 | 15 | 63 |
| | Rural | 32,006 | 6,155 | 33 | 3,988 | 1,130 | 5,151 | 26,886 | 1 | 65 | 18 | 84 |
| | Total | 37,931 | 7,387 | 75 | 4,541 | 1,316 | 5,932 | 30,619 | 1 | 61 | 18 | 80 |
| Magsaysay | Urban | 6,737 | 1,298 | 26 | 604 | 128 | 758 | 3,908 | 2 | 47 | 10 | 58 |
| | Rural | 36,393 | 7,150 | 31 | 4,424 | 1,208 | 5,663 | 28,751 | | 62 | 17 | 79 |
| | Total | 43,130 | 8,448 | 57 | 5,028 | 1,336 | 6,421 | 32,659 | 1 | 60 | 16 | 76 |
| Matalag | Urban | 4,599 | 948 | 30 | 658 | 145 | 833 | 4,048 | 3 | 69 | 15 | 88 |
| | Rural | 27,124 | 5,308 | 42 | 4,282 | 850 | 5,174 | 26,311 | 1 | 81 | 16 | 97 |
| | Total | 31,723 | 6,256 | 72 | 4,940 | 995 | 6,007 | 30,359 | 1 | 79 | 16 | 96 |
| Malita | Urban | 12,897 | 2,499 | 110 | 1,404 | 202 | 1,716 | 8,899 | 4 | 56 | 8 | 69 |
| | Rural | 72,123 | 14,310 | 278 | 10,411 | 1,525 | 12,214 | 61,305 | 2 | 73 | 11 | 85 |
| | Total | 85,020 | 16,809 | 388 | 11,815 | 1,727 | 13,930 | 70,204 | 2 | 70 | 10 | 83 |
| Matanao | Urban | 4,010 | 804 | 174 | 247 | 171 | 592 | 2,968 | 22 | 31 | 21 | 74 |
| | Rural | 40,615 | 7,826 | 48 | 4,867 | 1,150 | 6,065 | 31,274 | 1 | 62 | 15 | 77 |
| | Total | 44,625 | 8,630 | 222 | 5,114 | 1,321 | 6,657 | 34,242 | 3 | 59 | 15 | 77 |
| Padada | Urban | 9,297 | 1,819 | 120 | 542 | 84 | 746 | 3,812 | 7 | 30 | 5 | 41 |
| | Rural | 13,704 | 2,814 | 45 | 2,545 | 90 | 2,680 | 13,019 | 2 | 90 | 3 | 95 |
| | Total | 23,001 | 4,633 | 165 | 3,087 | 174 | 3,426 | 16,831 | 4 | 67 | 4 | 74 |
| Santa Cruz | Urban | 20,787 | 4,076 | 220 | 1,553 | 356 | 2,129 | 10,810 | 5 | 38 | 9 | 52 |
| | Rural | 40,326 | 8,001 | 73 | 5,643 | 1,341 | 7,057 | 35,487 | 1 | 71 | 17 | 88 |
| | Total | 61,113 | 12,077 | 293 | 7,196 | 1,697 | 9,186 | 46,297 | 2 | 60 | 14 | 76 |
| Santa Maria | Urban | 6,738 | 1,306 | 40 | 738 | 91 | 869 | 4,515 | 3 | 57 | 7 | 67 |
| | Rural | 36,264 | 6,960 | 37 | 4,693 | 1,116 | 5,846 | 30,462 | 1 | 67 | 16 | 84 |
| | Total | 43,002 | 8,266 | 77 | 5,431 | 1,207 | 6,715 | 34,977 | 1 | 66 | 15 | 81 |
| Sarangani | Urban | 2,746 | 519 | 16 | 256 | 153 | 425 | 2,252 | 3 | 49 | 29 | 82 |
| | Rural | 14,447 | 2,690 | 12 | 786 | 525 | 1,323 | 7,080 | | 29 | 20 | 49 |
| | Total | 17,193 | 3,209 | 28 | 1,042 | 678 | 1,748 | 9,332 | 1 | 32 | 21 | 54 |
| Sulop | Urban | 5,792 | 1,177 | 116 | 499 | 112 | 727 | 3,592 | 10 | 42 | 10 | 62 |
| | Rural | 20,565 | 4,155 | 23 | 1,543 | 1,026 | 2,591 | 12,751 | 1 | 37 | 25 | 62 |
| | Total | 26,357 | 5,332 | 138 | 2,042 | 1,138 | 3,318 | 16,343 | 3 | 38 | 21 | 62 |
| PW4SP Study Area | Urban | 151,210 | 30,090 | 3,312 | 14,568 | 2,318 | 20,193 | 101,276 | 11 | 48 | 8 | 67 |
| | Rural | 545,385 | 107,377 | 1,185 | 73,344 | 15,414 | 89,943 | 454,818 | 1 | 68 | 14 | 84 |
| | Total | 696,595 | 137,467 | 4,497 | 87,912 | 17,732 | 110,141 | 556,094 | 3 | 64 | 13 | 80 |

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 1998 (details are referred to Supporting Report).

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

| Name of Municipality | Public School Toilets | | | Public Toilets | | |
|-------------------------|---|--|----------------------|--|--|----------------------|
| | Total Number of Public School Students (1997) | Std. No. of Public School Student that can be Served by Sanitary Toilets in Base Year (1997) | Service Coverage (%) | Number of Public Utilities with Toilets In Base 1997 | Number of Public Utility with Sanitary Toilets In Base Year (1997) | Service Coverage (%) |
| Bansalan | 10,287 | 3,600 | 35 | 2 | 2 | 100 |
| Digos (Capital) | 26,738 | 6,240 | 23 | 2 | 2 | 100 |
| Don Marcelino | 5,561 | 2,640 | 47 | 1 | 1 | 100 |
| Hagonoy | 9,066 | 3,360 | 37 | 1 | 1 | 100 |
| Jose Abad Santos | 6,339 | 2,880 | 45 | 1 | 1 | 100 |
| Kiblawan | 6,650 | 2,400 | 36 | 1 | 1 | 100 |
| Magsaysay | 9,749 | 3,360 | 34 | 1 | 1 | 100 |
| Malalag | 6,766 | 2,640 | 39 | 1 | 1 | 100 |
| Malita | 16,878 | 9,120 | 54 | 3 | 1 | 33 |
| Matanao | 10,270 | 4,320 | 42 | 5 | 1 | 20 |
| Padada | 4,236 | 1,920 | 45 | 1 | 1 | 100 |
| Santa Cruz | 15,498 | 6,240 | 40 | 2 | 1 | 50 |
| Santa Maria | 9,744 | 5,280 | 54 | 2 | 1 | 50 |
| Sarangani | 7,290 | 3,120 | 43 | 1 | 1 | 100 |
| Sulop | 6,515 | 2,640 | 41 | 2 | 2 | 100 |
| PW4SP Study Area | 151,587 | 59,760 | 39 | 26 | 18 | 69 |

Base year service coverage is 39% 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, 60% and 80% are set, respectively.

3) Public toilets

The base year service coverage considering expected additional coverage by 1998 is shown in Table 8.2.4 (details are referred to Supporting Report).

Only 69% of the existing public utilities is served with at least one sanitary toilet. This can be attributed by the fact that majority of the public utilities (mostly public markets) are not 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 1997 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 8% of the total households in the province relied on municipal refuse collection using trucks or a 36% urban household coverage. These municipalities have a total of 14 units of collection truck.

No national targets have yet been set. Considering the present level of coverage, a 50% urban household coverage is applied for the medium-term period (1999-2003).

8.3 Projection of Frame Values

8.3.1 Population Projection

Future population for all municipalities by urban and rural area was projected for the target years of 2003 and 2010 together with the present population in 1997 as a planning base year.

Regional population in the future is published by the NSO, while projection at provincial and municipal levels was not available during the time of study. As a local based projection, the Study on the Davao Integrated Development Program (DIDP) Master Planning is currently implemented under the technical cooperation of JICA, however, the population projection has not been completed yet. The future population of LGUs was therefore projected in the fol-

Table 8.2.5 Base Year Service Coverage of Municipal Solid Waste System in 1997

| Name of Municipality | Total No. of Households | No. of Urban Households | No. of Households Served | Coverage of Households (%) | Coverage of Urban Households (%) |
|-----------------------------|-------------------------|-------------------------|--------------------------|----------------------------|----------------------------------|
| Bansalan | 10,100 | 1,395 | 1,000 | 10 | 72 |
| Digos (Capital) | 22,200 | 8,513 | 1,900 | 9 | 22 |
| Don Marcelino | 5,992 | 2,154 | 150 | 3 | 7 |
| Hagonoy | 8,662 | 1,358 | 750 | 9 | 55 |
| Jose Abad Santos (Trinidad) | 9,466 | 992 | | | |
| Kiblawan | 7,387 | 1,232 | 550 | 7 | 45 |
| Magsaysay | 8,448 | 1,298 | 910 | 11 | 70 |
| Malalag | 6,256 | 948 | 800 | 13 | 84 |
| Malita | 16,809 | 2,499 | 1,300 | 8 | 52 |
| Matanao | 8,630 | 804 | 880 | 10 | 100 |
| Padada | 4,633 | 1,819 | 850 | 18 | 47 |
| Santa Cruz | 12,077 | 4,076 | 950 | 8 | 23 |
| Santa Maria | 8,266 | 1,306 | 500 | 6 | 38 |
| Sarangani | 3,209 | 519 | | | |
| Sulop | 5,332 | 1,177 | 430 | 8 | 37 |
| PW4SP Study Area | 137,467 | 30,090 | 10,970 | 8 | 36 |

following manner (details are included in the Supporting Report). Reference information/data used for the study are:

- Population census data of 1980, 1990 and 1995 on different administrative levels
- National and Regional population projection by the NSO based on 1995 census results
- "Ratio method" generally used by the NSO for population projection (details are shown in 8.3.1, Supporting Report)
- Classification of urban and rural barangays by NSO statistic information, and
- The 1995 Philippine Yearbook.

The past population development at different administrative levels was first reviewed to come up with the demographic characteristics of the region and province. Then, through review of NSO regional population projection and the 1995 Philippine Yearbook, the behavior of population development through the future was analyzed. Referring to these demographic studies, population projection of the region by target year was confirmed to be reasonable.

Population projection of the province was carried out in application of "ratio method" The projected figures were studied by means of declining annual growth rates employing a simple compounded formula $(1+r)^n$. Present population of the province in 1997 was also estimated in the same manner. Likewise, municipal population was projected. Major study procedures and their results are presented below.

- (1) Review of past population development in the province and population distribution in 1995 to urban and rural areas.

The past population development during the census periods from 1980 to 1990 and from 1990 to 1995 revealed that:

- The province (including Davao City) recorded an average annual growth rate of 2.72% (1980-1990) which was slightly lower than that of the region at 2.91%, while the growth rate of 2.58% (1990-1995) showed almost the same as the region's rate at 2.53%.
- Percentage of provincial population to the regional population was almost unchanged between 1980 and 1995.

The classification of urban and rural areas compiled in 1995 population census was reviewed the PPDO. As a result, the classification prepared by NSO was confirmed as shown in table 8.3.2, Section 8.3.1, Supporting Report.

- (2) Manner of population projection

The regional population projected by the NSO based on 1995 census results was employed. The following are the projection procedures.

- 1) Adoption of regional population projected by the NSO for the years 1995 to 2020

Annual growth rates of regional population projected by NSO were analyzed using a simplified formula. The conservative growth rates were calculated reflecting demographic characteristics of moderate decline of fertility and mortality rates described in the 1995 Philippine Yearbook.

- 2) Application of ratio method for population projection of the province and municipalities

Adopted formula is:
$$R(k) = R(0) \prod_{i=1}^k (1 + r - kr / 50)$$

where: R(k) = ratio in "k"th year from 1995 of the population to that of the region or of the population of the municipality to that of the province

R(0) = ratio in 1995 of the population of the province to that of the region or of the population of the municipality to that of the province

r = initial rate of change of the ratio

k = "k"th year from 1995

The initial rate of change is derived based on the levels and trends of the ratio observed in the 1970, 1980, 1990 and 1995 censuses.

3) Categorization of the province and municipalities to set initial rate (r)

Four standard types are prepared based on the trends of the rate (r) as observed in the censuses of 1970, 1980, 1990 and 1995. Initial rate to be used for each type of province or municipality is determined using a set criteria (refer to Section 8.3.1, Supporting Report).

The province was classified as Type I and an initial rate of change (r) was estimated at -0.0052.

(3) Present provincial population (1975) including its municipalities (further broken down to urban and rural areas) was estimated applying the initial rates of change as mentioned above, assuming that the behaviors of past population development prevailed up to the present.

(4) Household size in 1997 was also assumed to be the same as that in 1995.

Population by target year and the year 1995 is presented in Table 8.3.1 covering all municipalities broken down to urban and rural areas. Number of households by target year was also studied and included in Table 8.3.5, Supporting Report.

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.

Table 8.3.1 Future Population by Urban and Rural Area by Municipality

| Municipality | 1995 | | | 1997 | | | 2003 | | | 2010 | | |
|-----------------------------|---------|---------|-----------|---------|---------|-----------|---------|-----------|-----------|-----------|-----------|-----------|
| | Urban | Rural | Total | Urban | Rural | Total | Urban | Rural | Total | Urban | Rural | Total |
| Bansalan | 6,600 | 42,294 | 48,894 | 6,697 | 42,918 | 49,615 | 7,039 | 45,110 | 52,149 | 7,384 | 47,317 | 54,701 |
| Digos (Capital) | 40,460 | 66,105 | 106,565 | 41,886 | 68,436 | 110,322 | 46,518 | 76,002 | 122,520 | 51,542 | 84,212 | 135,754 |
| Don Marcelino | 2,170 | 27,798 | 29,968 | 11,181 | 20,227 | 31,408 | 12,845 | 23,235 | 36,080 | 14,719 | 26,627 | 41,346 |
| Hagonoy | 14,864 | 26,888 | 41,752 | 6,751 | 36,595 | 43,346 | 7,556 | 40,959 | 48,515 | 8,437 | 45,736 | 54,173 |
| Jose Abad Santos (Trinidad) | 7,450 | 40,383 | 47,833 | 5,167 | 43,642 | 48,809 | 5,515 | 46,578 | 52,093 | 5,874 | 49,606 | 55,480 |
| Kiblawan | 3,851 | 32,524 | 36,375 | 5,925 | 32,006 | 37,931 | 6,712 | 36,262 | 42,974 | 7,587 | 40,985 | 48,572 |
| Magsaysay | 6,557 | 35,422 | 41,979 | 6,737 | 36,393 | 43,130 | 7,327 | 39,579 | 46,906 | 7,951 | 42,950 | 50,901 |
| Malalag | 4,455 | 26,278 | 30,733 | 4,599 | 27,124 | 31,723 | 5,066 | 29,881 | 34,947 | 5,568 | 32,843 | 38,411 |
| Malita | 12,660 | 70,797 | 83,457 | 12,897 | 72,123 | 85,020 | 13,702 | 76,627 | 90,329 | 14,528 | 81,242 | 95,770 |
| Matanao | 3,905 | 39,550 | 43,455 | 4,010 | 40,615 | 44,625 | 4,356 | 44,113 | 48,469 | 4,720 | 47,808 | 52,528 |
| Padada | 9,048 | 13,336 | 22,384 | 9,297 | 13,704 | 23,001 | 10,116 | 14,909 | 25,025 | 10,981 | 16,185 | 27,166 |
| Santa Cruz | 20,116 | 39,023 | 59,139 | 20,787 | 40,326 | 61,113 | 22,971 | 44,560 | 67,531 | 25,325 | 49,128 | 74,453 |
| Santa Maria | 6,568 | 35,351 | 41,919 | 6,738 | 36,264 | 43,002 | 7,297 | 39,272 | 46,569 | 7,885 | 42,437 | 50,322 |
| Sarangani | 2,659 | 13,989 | 16,648 | 2,746 | 14,447 | 17,193 | 3,029 | 15,936 | 18,965 | 3,334 | 17,539 | 20,873 |
| Sulop | 5,707 | 20,261 | 25,968 | 5,792 | 20,565 | 26,357 | 6,092 | 21,630 | 27,722 | 6,395 | 22,703 | 29,098 |
| PW4SP Study Area | 147,070 | 529,999 | 677,069 | 151,210 | 545,385 | 696,595 | 166,141 | 594,653 | 760,794 | 182,230 | 647,318 | 829,548 |
| Davao City | 665,887 | 340,953 | 1,006,840 | 701,732 | 359,306 | 1,061,038 | 818,421 | 419,055 | 1,237,476 | 952,151 | 487,528 | 1,439,679 |
| Province | 812,957 | 870,952 | 1,683,909 | 852,942 | 904,691 | 1,757,633 | 984,562 | 1,013,708 | 1,998,270 | 1,134,381 | 1,134,846 | 2,269,227 |

From the school age population, the number of children who would attend either private or public school, by target year is computed using the projected participation rate. The participation rate by target year varies depending on the socio-economic condition of the province. Generally, an improved economy will result to a higher participation rate. For the province, an increase in the participation rate in both private and public schools is foreseen by year 2010.

The number of public school students by target year is then derived from the projected number of children who will attend school. A participation rate for public school enrollment is established based on the existing participation rate of public school students to the total school age population. An increase of 4% from the 1997 rate is foreseen in 2003 and another 3% from the 2003 rate in 2010 (details are referred to Table 8.3.6, Supporting Report).

Table 8.3.2 shows the projected number of public school students by municipality, by target year. About 174,000 and 196,000 public school students are estimated to enroll for years 2003 and 2010, respectively.

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

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

| Name of Municipality | Number of Public School Student | | | Number of Public Utilities | | |
|-----------------------------|---------------------------------|----------------|----------------|----------------------------|-----------|-----------|
| | 1997 | 2003 | 2010 | 1997 | 2003 | 2010 |
| Bansalan | 10,287 | 11,473 | 12,475 | 2 | 3 | 4 |
| Digos (Capital) | 26,738 | 31,379 | 34,768 | 2 | 4 | 6 |
| Don Marcelino | 5,561 | 6,875 | 8,485 | 1 | 2 | 2 |
| Hagonoy | 9,066 | 10,826 | 12,532 | 1 | 2 | 3 |
| Jose Abad Santos (Trinidad) | 6,339 | 7,550 | 8,740 | 1 | 1 | 1 |
| Kiblawan | 6,650 | 8,196 | 9,976 | 1 | 2 | 2 |
| Magsaysay | 9,749 | 11,207 | 12,877 | 1 | 2 | 2 |
| Malalag | 6,766 | 7,910 | 9,123 | 1 | 2 | 2 |
| Malita | 16,878 | 19,375 | 21,105 | 3 | 4 | 6 |
| Matanao | 10,270 | 11,817 | 13,098 | 5 | 6 | 6 |
| Padada | 4,236 | 4,956 | 5,738 | 1 | 2 | 3 |
| Santa Cruz | 15,498 | 18,024 | 19,871 | 2 | 3 | 3 |
| Santa Maria | 9,744 | 11,274 | 13,053 | 2 | 3 | 3 |
| Sarangani | 7,290 | 7,919 | 8,716 | 1 | 1 | 2 |
| Sulop | 6,515 | 5,247 | 5,508 | 2 | 3 | 3 |
| PW4SP Study Area | 151,587 | 174,028 | 196,065 | 26 | 40 | 48 |

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 14 public markets, bus/jeepney terminals and parks/playgrounds are planned for construction by year 2003 and another 8 by the year 2010. Refer to Table 8.3.2 for the number of public utilities by municipality by target year (details are referred to Supporting Report).

8.3.4 Planning Area and Its Projected Population for Sewerage

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

Five (5) municipalities with a total urban population of 59,000 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 2003 is the potential households for the planning (refer to Table 8.3.5, Supporting Report).

8.4 Types of Facilities and Implementation Criteria

In principle, types of facilities and their implementation criteria as prescribed in the NSMP and the NEDA Board Resolution No. 12 (s. 1995) are adopted to this PW4SP.

8.4.1 Water Supply

The following are 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 on PW4SP 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 of possibility to utilize untapped spring sources. Recommendations stemmed from these studies were also incorporated for furtherance of water supply development.

Aforementioned studies were carried out by the following sequence:

- Review of existing water supply systems and water sources,
- Review of planned/on-going projects,
- Establishment of planning conditions covering service level, utilization of existing facilities, water sources, and number of systems
- Recommendations for furtherance of water supply development.

1) Review of existing water supply systems and water sources

Majority of the existing Level III and II systems in urban areas is utilizing spring sources. The municipalities of Digos, Hagonoy, Kiblawan are served by WD with spring and deep well sources, while the municipalities of Bansalan, Magsaysay, Malalag, Malita, Matanao, Padada, Santa Cruz, Santa Maria and Sulop have Level III systems operated by either the municipality or the local community.

Only the remaining three municipalities, namely; Don Marcelino, Jose Abad Santos and Sarangani, do not have Level III system and are served by Level II system and/or Level I facilities.

Population served by Level III systems ranges from about 900 persons in Malalag and Sulop to 30,500 persons in Digos. The average size of served population per Level III system is about 5,800 persons.

Preference is made to utilize spring sources owing to less O&M activities and cost compared to deep well with electric motor pump.

2) Review of planned/on-going projects

There is an on-going pre-feasibility study on the Malalag Bay Alliance Water Supply (MBAWS) Project under the assistance from CIDA. This pre-F/S covers a total of ten (10) municipalities to include Digos, the provincial capital and the municipalities of Bansalan, Hagonoy, Kiblawan, Magsaysay, Malalag, Matanao, Padada, Santa Maria and Sulop. An inter-municipal water supply network has been envisaged as shown in Figure 8.4.1. The proposed development plan will entail to utilize spring and deep well sources. In this respect, the municipalities included in this plan, all of which has existing WD or Level III system, are classified as an expansion of the existing system in this PW4SP.

The rest of municipalities do not have any plan at this moment.

3) Establishment of planning conditions

a. Service level

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

b. Utilization of existing facilities

The existing Level I and II facilities are considered to be utilized during the Phase I period. However, the population served by these facilities are assumed to be absorbed by Level III service in Phase II.

c. Water sources

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

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

Water source development study revealed that most of the municipalities in the planning area have high potential of spring development. Among various identified untapped springs, only two municipalities, Bansalan and Santa Cruz, so far have very favorable spring sources suitable for Level III system (details are referred to in Supporting Report).

Table 8.4.1 presents summary of potential water source together with water supply conditions of the existing systems. Magnitude of water supply coverage varies from about 1,000 persons to 30,000 persons by municipality.

With regard to deep well development, the groundwater productivity was assumed based on the study results of water sources in Chapter 7 and presented in Table 8.4.2.

d. Number of systems

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

Table 8.4.1 Potential Water Source for Urban Water Supply

| Name of Municipality | Served Population in Base Year | | | Existing Source in Municipality | | Potential Water Source | | Remarks |
|----------------------|--------------------------------|--------|--------|---------------------------------|-----------|------------------------|-----------|------------------------------------|
| | Level III | Others | Total | Spring | Deep Well | Spring | Deep Well | |
| Bansalan | 6,247 | 0 | 6,247 | ☐ | ☐ | ☐ | ☐ | Existing Level III, Proposed MBAWS |
| Digos (Capital) | 30,498 | 6,778 | 37,276 | ☐ | ☐ | × | ☐ | Existing WD, Proposed MBAWS |
| Don Marcelino | 0 | 5,403 | 5,403 | ☐ | | × | ☐ | |
| Hagonoy | 3,239 | 3,356 | 6,595 | | ☐ | × | ☐ | Existing WD, Proposed MBAWS |
| Jose Abad Santos | 0 | 963 | 963 | | ☐ | ☐ | ☐ | |
| Kiblawan | 2,049 | 290 | 2,339 | ☐ | ☐ | × | ☐ | Existing WD, Proposed MBAWS |
| Magsaysay | 1,578 | 3,355 | 4,933 | ☐ | ☐ | × | ☐ | Existing Level III, Proposed MBAWS |
| Malalag | 918 | 1,735 | 2,653 | ☐ | ☐ | × | ☐ | Existing Level III, Proposed MBAWS |
| Malita | 5,623 | 150 | 5,773 | ☐ | ☐ | ☐ | ☐ | Existing Level III |
| Matanao | 2,141 | 451 | 2,592 | ☐ | ☐ | × | ☐ | Existing Level III, Proposed MBAWS |
| Padada | 6,492 | 1,860 | 8,352 | | ☐ | × | ☐ | Existing Level III, Proposed MBAWS |
| Santa Cruz | 8,475 | 5,568 | 14,043 | ☐ | | × | ☐ | Existing Level III |
| Santa Maria | 1,883 | 1,554 | 3,437 | ☐ | ☐ | × | ☐ | Existing Level III, Proposed MBAWS |
| Sarangani | 0 | 1,300 | 1,300 | ☐ | | ☐ | ☐ | |
| Sulop | 900 | 2,289 | 3,189 | ☐ | ☐ | × | ☐ | Existing Level III, Proposed MBAWS |

Note: MBAWS - Malalag Bay Alliance Water Supply
 ☐ - Available
 × - Not available.

Table 8.4.2 Groundwater Productivity

| Name of Municipality | Specific Capacity (liter/sec/m) | Well Depth (meter) | Groundwater Productivity per Deep Well (cu.m/16 Hr) |
|-----------------------------|---------------------------------|--------------------|---|
| Bansalan | 1.14 | 70 | 656 |
| Digos (Capital) | 0.71 | 70 | 409 |
| Don Marcelino | 0.88 * | 30 | 507 |
| Hagonoy | 1.58 | 50 | 910 |
| Jose Abad Santos (Trinidad) | 0.88 | 50 | 507 |
| Kiblawan | 1.14 * | 50 | 657 |
| Magsaysay | 1.14 * | 50 | 657 |
| Malalag | 0.79 | 70 | 455 |
| Malita | 0.83 | 50 | 478 |
| Matanao | 1.14 | 70 | 657 |
| Padada | 2.01 | 70 | 1,158 |
| Santa Cruz | 1.29 | 50 | 743 |
| Santa Maria | 0.79 * | 50 | 455 |
| Sarangani | 0.79 * | 50 | 455 |
| Sulop | 0.85 | 50 | 490 |

Note: * Based on estimation

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

- water source constraints, and

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

Since the municipalities taken up in this PW4SP are generally scattered throughout the province, an individual system by municipality was recommended. However, Digos and its surrounding municipalities in the northern part of the province are situated relatively close to each other and these major 10 municipalities are included in the proposed MBAWS Project to form an integrated water supply system.

In addition to the above, any rural barangay/s being served by the existing urban Level III system are considered to continue throughout the future.

c. Rehabilitation

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

4) Recommendations for future water supply development

The province has high potential of spring development and various untapped spring sources suitable for urban water supply were identified during the course of PW4SP preparation. However, further survey to evaluate appropriate development of spring sources is prerequisite in the course of feasibility study and detailed design. Among others, confirmation of possible/dependable yield throughout the year, elevation and distance from the potential service area as well as topographic conditions to allow gravity flow of supply is indispensable.

Aside from MBAWS Project, further study on system merging shall be made for the municipalities with reference to water source arrangements.

(2) Rural water supply

1) Service level

Level I systems are generally planned for rural areas where houses are scattered. In the PW4SP, public investment for Level I facilities is considered 85% of the total number of required facilities, considering the existing share of population served by public (94%) and private facilities (6%).

Level II systems are considered where houses are clustered and suitable untapped spring is available.

Service level standards are set forth as 15 households per source for Level I and 5 households per communal faucet for Level II, as defined in the national plan.

Application of Level III systems in rural areas may be considered in a case to case basis in actual implementation.

2) Utilization of existing facilities

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

3) Water source

For Level I facilities, deep well construction is given priority wherever applicable in view of safety against possible contamination and stable water supply. Standard specifications of shallow and deep wells are summarized in Table 8.4.3 based on the water source evaluation results presented in Chapter 7. Conventional construction method (driven well) may be employed under the favorable substrata or hydrogeological conditions. The standard structure of wells in application of “open-hole drilling and gravel pack” and “open-hole drilling and natural gravel pack” is presented in Figure 8.4.1, Supporting Report.

Table 8.4.3 Standard Specifications of Level I Wells

| Specification | Shallow Well | Deep Well |
|----------------------|------------------------------------|-----------|
| Construction Method | Open-hole drilling and gravel pack | |
| Casing Diameter | 50 mm | 100 mm |
| Borehole Diameter | 150mm | 200 mm |
| Ranges of Well Depth | Standard Depth | |
| 0 - 20 m | 20 m | N.A. |
| 21 - 40 m | N.A. | 30 m |
| 41 - 60 m | N.A. | 50 m |
| 61 - 80 m | N.A. | 70 m |

Spring development is also included in Level I planning, adopting its share of 15%. This takes into account the existing percentage of developed springs (15%) among public Level I facilities as safe water sources.

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

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

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

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

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

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

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

4) Number of systems/facilities

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

5) Rehabilitation

Rehabilitation of existing Level I wells is not considered, since most of the existing wells constructed by driving method is not suitable for rehabilitation to recover their functions. However, minor repair works for handpump and concrete apron are requisite.

8.4.2 Sanitation

The conditions and assumptions are established for the different sanitation components to serve as guides in the implementation of projects.

(1) Household toilets

Three types of sanitary toilet facilities for individual houses are considered for Phase I; flush, pour-flush and VIP/sanitary pit privy (dry-type). While for Phase II, flush and pour-flush are planned considering the improvement of living standard.

The type of toilet facilities is dependent on the existing or planned service level of water supply in the community. In urban and rural areas with Level I or II water supply facilities, only pour-flush and/or VIP are considered, while in urban areas with Level III water supply systems, flush type toilets requiring a piped water connection are included. Isolated rural areas where there is dearth of water supply, sanitary pit privy (dry type) is considered.

(2) School toilets

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

The standard toilet facility (1 building) with 5 units of toilet bowl to serve for 200 students is adopted for the planning purpose, which is modified from FW4SP design to provide a shallow well as a water source.

(3) Public toilets

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

The standard FW4SP design with 6-units of toilet bowl for the market is adopted. In this design, it is assumed that water supply will be tapped from the existing system, hence an elevated water tank is provided.

8.4.3 Urban Sewerage

The commencement of staged implementation of the sewerage program is planned in Phase II for the limited urban area (50% of urban population served by Level III system for the municipalities with urban population of more than 10,000). It is practical to start the program fully using the existing facilities to allow for lower initial investment cost than starting at once a conventional sewerage system (refer to Figure 8.4.2 Staged Improvement in Sewage Collection Method, Supporting Report).

Low cost off-site technologies such as small bore sewer for collection of effluent from septic tank are to be adopted. Improvement of sewage collection method may be gradually achieved from combined sewer to separate sewerage system.

Sewage treatment facilities may range from community scale septic tank or imhoff tank to aerated lagoon systems and to a more advanced treatment process such as oxidation ditch. For this PW4SP, aerated lagoons are assumed as a representative treatment facility for planning purpose. Daily average wastewater quantity is assumed to be 100 liters per capita per day.

8.4.4 Solid Waste

In terms of facility requirements, this PW4SP only studied the number of refuse collection trucks required for the year 2003. A rated capacity of 5 cu.m truck/vehicle is considered for calculation of required units of truck. Disposal of solid waste shall be studied in detail through investigations, F/S and D/D. Unit solid waste generation for urban area is assumed to be 0.418 kg. per capita per day.

8.5 Service Coverage by Target Year

8.5.1 Water Supply

The service coverage in terms of population to be served by target year was estimated by urban and rural area by municipality. The service coverage in rural area was further

subdivided by service level (Level I & Level II) to finally come up with physical requirements.

Base figures applied to estimate the future service coverage and the additional population to be served are:

- provincial sector targets,
- population projection by target year, and
- base year service coverage (served population) by existing facilities.

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

(1) Phase I requirements

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

The utilization of untapped springs for Level II systems was given priority during Phase I period for rural water supply. At the time of this plan preparation, twenty-eight (28) untapped springs in nine (9) municipalities were identified.

(2) Phase II requirements

Additional service coverage was estimated as a shortfall of the population to be served in Phase II comparing with the population served in Phase I. In this regard, existing facilities in rural area were assumed to be utilized through the two Phases, while urban population served by Level I and II facilities in base year was assumed to be absorbed by Level III service during Phase II period.

Table 8.5.1 exhibits the population to be served by target year (details are referred to Supporting Report).

Through the Phase I development, approximately 138,100 persons in the province will be served by additional water supply services, of which 29,300 persons or 21% of the total will be urban population and 108,800 persons or 79% will be rural population.

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

| Name of Municipality | Area | Phase I Coverage (2005) | | | | | | | | | | Phase II Coverage (2010) | | | | | | | | | | | | | | |
|-----------------------------|-------|-------------------------|-----------|----------|---------|--------|------------------|----------|---------|---------|-----------|------------------------------------|---------|---------|-----------|----------|------------------|---------|-----------|----------|---------|------------------------------------|---------|---------|--|--|
| | | Total Population | | | | | Service Coverage | | | | | Additional Population to be Served | | | | | Service Coverage | | | | | Additional Population to be Served | | | | |
| | | Total | Level III | Level II | Level I | Total | Level III | Level II | Level I | Total | Level III | Level II | Level I | Total | Level III | Level II | Level I | Total | Level III | Level II | Level I | Total | | | | |
| Bansalan | Urban | 7,039 | 6,247 | 4,917 | 16,872 | 6,247 | 1,972 | 1,688 | 3,660 | 7,384 | 7,015 | 768 | 7,015 | 768 | 7,015 | 768 | 7,015 | 768 | 7,015 | 768 | 7,015 | 768 | 7,015 | 768 | | |
| | Rural | 45,110 | 7,513 | 4,917 | 16,872 | 29,322 | 1,972 | 1,688 | 3,660 | 47,317 | 2,513 | 4,917 | 31,555 | 44,005 | 31,555 | 44,005 | 31,555 | 44,005 | 31,555 | 44,005 | 31,555 | 44,005 | 31,555 | 44,005 | | |
| | Total | 52,149 | 13,760 | 9,834 | 33,744 | 35,669 | 3,944 | 3,376 | 7,320 | 54,701 | 14,528 | 9,377 | 31,555 | 51,020 | 31,555 | 51,020 | 31,555 | 51,020 | 31,555 | 51,020 | 31,555 | 51,020 | 31,555 | 51,020 | | |
| Digos (Capital) | Urban | 46,318 | 30,498 | 6,776 | 37,274 | 37,274 | 6,776 | 3,735 | 2,830 | 47,050 | 3,735 | 2,830 | 71,732 | 78,317 | 71,732 | 78,317 | 71,732 | 78,317 | 71,732 | 78,317 | 71,732 | 78,317 | 71,732 | 78,317 | | |
| | Rural | 76,002 | 3,735 | 2,830 | 47,050 | 50,906 | 3,735 | 2,830 | 47,050 | 135,756 | 52,700 | 2,830 | 71,732 | 127,282 | 71,732 | 127,282 | 71,732 | 127,282 | 71,732 | 127,282 | 71,732 | 127,282 | 71,732 | 127,282 | | |
| | Total | 122,320 | 34,233 | 9,606 | 84,324 | 90,906 | 7,511 | 6,565 | 94,100 | 187,756 | 56,436 | 5,565 | 143,482 | 205,604 | 143,482 | 205,604 | 143,482 | 205,604 | 143,482 | 205,604 | 143,482 | 205,604 | 143,482 | 205,604 | | |
| Don Marcelino | Urban | 12,845 | 4,873 | 934 | 4,469 | 10,276 | 4,873 | 1,054 | 11,852 | 12,906 | 4,873 | 1,054 | 11,852 | 12,906 | 4,873 | 1,054 | 11,852 | 12,906 | 4,873 | 1,054 | 11,852 | 12,906 | 4,873 | 1,054 | | |
| | Rural | 23,235 | 1,054 | 1,054 | 17,200 | 25,379 | 1,054 | 1,054 | 17,200 | 41,346 | 13,983 | 1,054 | 17,200 | 38,746 | 13,983 | 1,054 | 17,200 | 38,746 | 13,983 | 1,054 | 17,200 | 38,746 | 13,983 | 1,054 | | |
| | Total | 36,080 | 5,927 | 2,088 | 21,676 | 30,655 | 5,927 | 2,088 | 21,676 | 53,292 | 18,866 | 2,108 | 29,052 | 77,492 | 18,866 | 2,108 | 29,052 | 77,492 | 18,866 | 2,108 | 29,052 | 77,492 | 18,866 | 2,108 | | |
| Hagonoy | Urban | 7,556 | 3,239 | 1,672 | 1,684 | 6,593 | 3,239 | 1,672 | 1,684 | 45,736 | 8,437 | 8,015 | 42,384 | 42,534 | 8,437 | 8,015 | 42,384 | 42,534 | 8,437 | 8,015 | 42,384 | 42,534 | 8,437 | 8,015 | | |
| | Rural | 40,959 | 3,239 | 1,672 | 1,684 | 31,943 | 3,239 | 1,672 | 1,684 | 54,773 | 8,015 | 1,50 | 42,384 | 50,549 | 8,015 | 1,50 | 42,384 | 50,549 | 8,015 | 1,50 | 42,384 | 50,549 | 8,015 | 1,50 | | |
| | Total | 48,515 | 6,478 | 3,344 | 3,368 | 77,679 | 6,478 | 3,344 | 3,368 | 100,509 | 16,452 | 9,532 | 84,768 | 93,083 | 16,452 | 9,532 | 84,768 | 93,083 | 16,452 | 9,532 | 84,768 | 93,083 | 16,452 | 9,532 | | |
| Jose Abad Santos (Trinidad) | Urban | 5,515 | 3,449 | 1,030 | 29,246 | 30,276 | 3,449 | 1,030 | 20,451 | 21,481 | 3,449 | 1,030 | 45,104 | 46,134 | 3,449 | 1,030 | 45,104 | 46,134 | 3,449 | 1,030 | 45,104 | 46,134 | 3,449 | 1,030 | | |
| | Rural | 46,578 | 3,449 | 1,030 | 30,209 | 34,688 | 3,449 | 1,030 | 20,451 | 24,930 | 5,580 | 1,030 | 45,104 | 51,714 | 5,580 | 1,030 | 45,104 | 51,714 | 5,580 | 1,030 | 45,104 | 51,714 | 5,580 | 1,030 | | |
| | Total | 52,093 | 6,898 | 2,060 | 59,485 | 64,964 | 6,898 | 2,060 | 40,902 | 46,411 | 9,110 | 2,060 | 90,208 | 97,848 | 9,110 | 2,060 | 90,208 | 97,848 | 9,110 | 2,060 | 90,208 | 97,848 | 9,110 | 2,060 | | |
| Kiblawan | Urban | 6,712 | 5,080 | 200 | 5,370 | 5,862 | 929 | 7,951 | 7,951 | 42,950 | 967 | 3,376 | 35,601 | 39,944 | 967 | 3,376 | 35,601 | 39,944 | 967 | 3,376 | 35,601 | 39,944 | 967 | 3,376 | | |
| | Rural | 36,282 | 5,080 | 200 | 19,067 | 23,570 | 5,080 | 8,386 | 10,466 | 40,985 | 2,208 | 4,503 | 33,613 | 38,116 | 2,208 | 4,503 | 33,613 | 38,116 | 2,208 | 4,503 | 33,613 | 38,116 | 2,208 | 4,503 | | |
| | Total | 42,994 | 10,160 | 400 | 24,437 | 29,440 | 10,160 | 16,347 | 20,926 | 83,970 | 2,208 | 8,711 | 69,226 | 77,060 | 2,208 | 8,711 | 69,226 | 77,060 | 2,208 | 8,711 | 69,226 | 77,060 | 2,208 | 8,711 | | |
| Magsaysay | Urban | 7,377 | 2,407 | 3,355 | 5,862 | 929 | 7,951 | 7,951 | 42,950 | 967 | 3,376 | 35,601 | 39,944 | 967 | 3,376 | 35,601 | 39,944 | 967 | 3,376 | 35,601 | 39,944 | 967 | 3,376 | | | |
| | Rural | 39,579 | 807 | 2,102 | 25,845 | 29,947 | 807 | 2,102 | 25,845 | 42,950 | 967 | 3,376 | 35,601 | 39,944 | 967 | 3,376 | 35,601 | 39,944 | 967 | 3,376 | 35,601 | 39,944 | 967 | 3,376 | | |
| | Total | 46,956 | 3,214 | 5,457 | 31,707 | 34,894 | 5,759 | 10,053 | 51,790 | 85,900 | 1,934 | 6,733 | 71,545 | 79,888 | 1,934 | 6,733 | 71,545 | 79,888 | 1,934 | 6,733 | 71,545 | 79,888 | 1,934 | 6,733 | | |
| Malabag | Urban | 5,066 | 2,318 | 1,735 | 4,053 | 1,400 | 2,044 | 1,686 | 3,730 | 3,943 | 1,400 | 2,044 | 1,686 | 3,730 | 3,943 | 1,400 | 2,044 | 1,686 | 3,730 | 3,943 | 1,400 | 2,044 | 1,686 | 3,730 | | |
| | Rural | 29,881 | 1,150 | 2,897 | 15,876 | 19,423 | 2,044 | 2,044 | 1,686 | 5,130 | 36,411 | 6,440 | 2,397 | 26,997 | 30,544 | 6,440 | 2,397 | 26,997 | 30,544 | 6,440 | 2,397 | 26,997 | 30,544 | 6,440 | | |
| | Total | 34,947 | 3,468 | 4,632 | 20,929 | 24,846 | 4,088 | 3,730 | 5,416 | 40,351 | 40,351 | 7,880 | 29,327 | 61,088 | 10,384 | 8,837 | 29,327 | 61,088 | 10,384 | 8,837 | 29,327 | 61,088 | 10,384 | 8,837 | | |
| Maliu | Urban | 13,702 | 10,812 | 150 | 10,962 | 5,189 | 23,924 | 23,924 | 29,113 | 95,770 | 16,144 | 3,536 | 69,677 | 75,555 | 16,144 | 3,536 | 69,677 | 75,555 | 16,144 | 3,536 | 69,677 | 75,555 | 16,144 | 3,536 | | |
| | Rural | 76,627 | 2,542 | 3,536 | 43,930 | 49,808 | 43,930 | 49,808 | 51,189 | 95,770 | 16,144 | 3,536 | 69,677 | 75,555 | 16,144 | 3,536 | 69,677 | 75,555 | 16,144 | 3,536 | 69,677 | 75,555 | 16,144 | 3,536 | | |
| | Total | 90,329 | 13,354 | 3,686 | 54,892 | 59,696 | 47,860 | 54,732 | 100,909 | 191,540 | 32,288 | 7,070 | 139,354 | 151,109 | 32,288 | 7,070 | 139,354 | 151,109 | 32,288 | 7,070 | 139,354 | 151,109 | 32,288 | 7,070 | | |
| Mantobo | Urban | 4,356 | 3,034 | 451 | 3,485 | 893 | 3,633 | 3,633 | 47,808 | 4,461 | 6,414 | 37,953 | 44,461 | 4,461 | 6,414 | 37,953 | 44,461 | 4,461 | 6,414 | 37,953 | 44,461 | 4,461 | 6,414 | | | |
| | Rural | 44,113 | 94 | 6,414 | 22,165 | 28,673 | 6,414 | 6,414 | 47,808 | 3,633 | 4,526 | 48,945 | 1,450 | 4,526 | 48,945 | 1,450 | 4,526 | 48,945 | 1,450 | 4,526 | 48,945 | 1,450 | 4,526 | | | |
| | Total | 48,469 | 3,128 | 7,028 | 24,650 | 31,346 | 10,047 | 10,047 | 95,616 | 8,104 | 10,981 | 56,898 | 5,911 | 10,981 | 56,898 | 5,911 | 10,981 | 56,898 | 5,911 | 10,981 | 56,898 | 5,911 | 10,981 | | | |
| Padada | Urban | 10,116 | 6,492 | 1,860 | 8,352 | 2,894 | 2,894 | 2,894 | 2,894 | 16,185 | 1,570 | 10,252 | 15,052 | 1,570 | 10,252 | 15,052 | 1,570 | 10,252 | 15,052 | 1,570 | 10,252 | 15,052 | 1,570 | 10,252 | | |
| | Rural | 14,909 | 1,570 | 1,025 | 7,096 | 9,691 | 2,894 | 2,894 | 2,894 | 27,166 | 12,002 | 10,252 | 15,052 | 1,570 | 10,252 | 15,052 | 1,570 | 10,252 | 15,052 | 1,570 | 10,252 | 15,052 | 1,570 | 10,252 | | |
| | Total | 25,025 | 8,062 | 2,885 | 15,191 | 18,582 | 5,788 | 5,788 | 5,788 | 43,351 | 24,059 | 20,504 | 30,104 | 16,624 | 20,504 | 30,104 | 16,624 | 20,504 | 30,104 | 16,624 | 20,504 | 30,104 | 16,624 | 20,504 | | |
| Santa Cruz | Urban | 13,702 | 10,812 | 150 | 10,962 | 5,189 | 23,924 | 23,924 | 29,113 | 95,770 | 16,144 | 3,536 | 69,677 | 75,555 | 16,144 | 3,536 | 69,677 | 75,555 | 16,144 | 3,536 | 69,677 | 75,555 | 16,144 | 3,536 | | |
| | Rural | 76,627 | 2,542 | 3,536 | 43,930 | 49,808 | 43,930 | 49,808 | 51,189 | 95,770 | 16,144 | 3,536 | 69,677 | 75,555 | 16,144 | 3,536 | 69,677 | 75,555 | 16,144 | 3,536 | 69,677 | 75,555 | 16,144 | 3,536 | | |
| | Total | 90,329 | 13,354 | 3,686 | 54,892 | 59,696 | 47,860 | 54,732 | 100,909 | 191,540 | 32,288 | 7,070 | 139,354 | 151,109 | 32,288 | 7,070 | 139,354 | 151,109 | 32,288 | 7,070 | 139,354 | 151,109 | 32,288 | 7,070 | | |
| Mantobo | Urban | 4,356 | 3,034 | 451 | 3,485 | 893 | 3,633 | 3,633 | 47,808 | 4,461 | 6,414 | 37,953 | 44,461 | 4,461 | 6,414 | 37,953 | 44,461 | 4,461 | 6,414 | 37,953 | 44,461 | 4,461 | 6,414 | | | |
| | Rural | 44,113 | 94 | 6,414 | 22,165 | 28,673 | 6,414 | 6,414 | 47,808 | 3,633 | 4,526 | 48,945 | 1,450 | 4,526 | 48,945 | 1,450 | 4,526 | 48,945 | 1,450 | 4,526 | 48,945 | 1,450 | 4,526 | | | |
| | Total | 48,469 | 3,128 | 7,028 | 24,650 | 31,346 | 10,047 | 10,047 | 95,616 | 8,104 | 10,981 | 56,898 | 5,911 | 10,981 | 56,898 | 5,911 | 10,981 | 56,898 | 5,911 | 10,981 | 56,898 | 5,911 | 10,981 | | | |
| Padada | Urban | 10,116 | 6,492 | 1,860 | 8,352 | 2,894 | 2,894 | 2,894 | 2,894 | 16,185 | 1,570 | 10,252 | 15,052 | 1,570 | 10,252 | 15,052 | 1,570 | 10,252 | 15,052 | 1,570 | 10,252 | 15,052 | 1,570 | 10,252 | | |
| | Rural | 14,909 | 1,570 | 1,025 | 7,096 | 9,691 | 2,894 | 2,894 | 2,894 | 27,166 | 12,002 | 10,252 | 15,052 | 1,570 | 10,252 | 15,052 | 1,570 | 10,252 | 15,052 | 1,570 | 10,252 | 15,052 | 1,570 | 10,252 | | |
| | Total | 25,025 | 8,062 | 2,885 | 15,191 | 18,582 | 5,788 | 5,788 | 5,788 | 43,351 | 24,059 | 20,504 | 30,104 | 16,624 | 20,504 | 30,104 | 16,624 | 20,504 | 30,104 | 16,624 | 20,504 | 30,104 | 16,624 | 20,504 | | |
| Santa Cruz | Urban | 13,702 | 10,812 | 150 | 10,962 | 5,189 | 23,924 | 23,924 | 29,113 | 95,770 | 16,144 | 3,536 | 69,677 | 75,555 | 16,144 | 3,536 | 69,677 | | | | | | | | | |

In the Phase II period, a total of 227,600 persons, of which 73,800 persons or 32% in urban area and 203,800 persons or 68% in rural area, will be further benefited by water supply services. This additional service coverage in urban area includes upgrade of service level for 79,100 persons served by Level I and II facilities in 1997.

8.5.2 Sanitation

(1) Household toilets

The service coverage (number of households to be served) by different types of sanitary facility is estimated by urban and rural area by municipality for the years 2003 and 2010.

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

Additional number of households to be served by different type of facility by urban and rural area by municipality is the shortfall of the number of households to be served in target years comparing with either that in base year or in Phase I (details are referred to Supporting Report). However, when the number of households to be served in target year/s is less than or equal to that in base year, no additional number of households to be served is counted.

In the determination of the number of households to be served by flush type toilet, when number of households to be served in the target year is higher than in base year, the target coverage is applied with conditions. When the target coverage is higher than Level III water supply coverage, the latter coverage is adopted, while in the other case, the target coverage is applied. In cases where the target coverage is less than that in base year, the base year coverage is adopted.

For Phase I, any type of existing sanitary facilities both in urban and rural areas is to be utilized during Phase I period. For Phase II, water-sealed toilet facilities in Phase I both in urban and rural areas are to be utilized.

The projected number of served households at the end of the Phase I period is 132,000. Additional households to be served totaled to 26,000, of which 29% is urban households and 71% is rural households. While at the end of Phase II period, the number of served

households are 196,900 with an additional households to be served at 64,000. Table 8.5.2 provides the number of households to be served by target year for urban and rural areas by municipality.

(2) School toilets

The service coverage or the number of public school students to be served is estimated by municipality for the years 2003 and 2010.

The future service coverage and additional number of students to be served are estimated using the number of students served in the base year, the number of students in target years and the provincial sector targets.

Additional number of students to be served by municipality is the shortfall of the number of students to be served in targets comparing with either that in base year or in Phase I (details are referred to Supporting Report). However, when the number of students to be served in target/s is less than or equal to the base year, no additional number of households to be served is considered.

The existing facilities are to be utilized during Phase I period, while the facilities in Phase I are to be utilized during Phase II period.

The projected number of served students at the end of Phase I period is 104,000. The additional students to be served are 45,000. While at the end of Phase II period, the projected number of served students are 157,000 with an additional students to be served at 52,000. Table 8.5.3 summarizes the number of public school students to be served by target year.

(3) Public toilets

The service coverage of public utilities with sanitary toilet facility by municipality is estimated for the years 2003 and 2010.

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

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

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

| Name of Municipality | Area | Phase I Coverage (2003) | | | | | | | | | | Phase II Coverage (2010) | | | | | | | | | | | | |
|-----------------------------|-------|-------------------------|------------|-------------|--------|---------------------------------------|--------------------------|------------|---------|--------|------------------|--------------------------|------------|-------------|--------|------------------|--------------------------|------------|-------------|--------|---------------------------------------|--------|------------|---------|
| | | Total Households | | | | | No. of Served Households | | | | | Total Households | | | | | No. of Served Households | | | | | | | |
| | | Flush | Poor Flush | VIP Latrine | Total | Add'l. No. of Households to be Served | Flush | Poor Flush | VIP/Dry | Total | Total Households | Flush | Poor Flush | VIP Latrine | Total | Total Households | Flush | Poor Flush | VIP Latrine | Total | Add'l. No. of Households to be Served | Flush | Poor Flush | VIP/Dry |
| Bansalan | Urban | 1,466 | 203 | 763 | 1,172 | 261 | 14 | 275 | 1,446 | 687 | 913 | 117 | 394 | 1,717 | 1,446 | 687 | 913 | 117 | 394 | 1,717 | 261 | 14 | 275 | 544 |
| | Rural | 9,150 | 412 | 6,588 | 8,235 | 370 | 262 | 592 | 11,829 | 1,124 | 8,879 | 1,235 | 712 | 2,291 | 11,829 | 1,124 | 8,879 | 1,235 | 712 | 2,291 | 370 | 262 | 592 | 3,003 |
| | Total | 10,616 | 705 | 7,351 | 9,408 | 591 | 276 | 867 | 13,275 | 1,811 | 9,792 | 1,532 | 1,066 | 2,441 | 13,275 | 1,811 | 9,792 | 1,532 | 1,066 | 2,441 | 712 | 262 | 592 | 3,547 |
| Digos (Capital) | Urban | 9,455 | 1,891 | 4,917 | 7,564 | 104 | 559 | 663 | 12,886 | 4,794 | 6,434 | 756 | 1,984 | 2,903 | 12,886 | 4,794 | 6,434 | 756 | 1,984 | 2,903 | 104 | 559 | 663 | 4,420 |
| | Rural | 15,200 | 684 | 10,944 | 15,682 | 287 | 691 | 978 | 21,053 | 2,000 | 15,948 | 2,032 | 20,000 | 13,116 | 21,053 | 2,000 | 15,948 | 2,032 | 20,000 | 13,116 | 287 | 691 | 978 | 5,004 |
| | Total | 24,655 | 2,575 | 15,861 | 21,244 | 287 | 1,041 | 1,250 | 33,939 | 6,794 | 22,382 | 2,808 | 31,984 | 4,219 | 33,939 | 6,794 | 22,382 | 2,808 | 31,984 | 4,219 | 1,041 | 1,250 | 1,250 | 10,740 |
| Don Marcelino | Urban | 2,475 | 495 | 1,287 | 1,980 | 453 | 530 | 169 | 3,680 | 1,369 | 1,855 | 198 | 874 | 3,422 | 3,680 | 1,369 | 1,855 | 198 | 874 | 3,422 | 453 | 530 | 169 | 1,442 |
| | Rural | 4,409 | 13 | 3,360 | 595 | 3,968 | 1,388 | 1,388 | 6,657 | 13 | 5,716 | 595 | 6,324 | 2,356 | 6,657 | 13 | 5,716 | 595 | 6,324 | 2,356 | 1,388 | 1,388 | 595 | 3,798 |
| | Total | 6,884 | 508 | 4,647 | 793 | 5,948 | 453 | 1,908 | 169 | 10,337 | 1,392 | 7,571 | 793 | 9,746 | 10,337 | 1,392 | 7,571 | 793 | 9,746 | 10,337 | 1,908 | 1,908 | 1,154 | 7,45 |
| Hagonoy | Urban | 1,520 | 304 | 790 | 1,222 | 266 | 188 | 64 | 1,489 | 112 | 1,377 | 104 | 1,481 | 1,489 | 1,489 | 112 | 1,377 | 104 | 1,481 | 1,489 | 266 | 188 | 64 | 504 |
| | Rural | 8,175 | 38 | 6,216 | 7,358 | 266 | 1,125 | 64 | 1,489 | 112 | 1,377 | 104 | 1,481 | 1,489 | 1,489 | 112 | 1,377 | 104 | 1,481 | 1,489 | 266 | 188 | 64 | 4,249 |
| | Total | 9,695 | 342 | 7,006 | 8,642 | 266 | 1,313 | 64 | 1,643 | 1,343 | 1,469 | 263 | 1,724 | 1,643 | 1,643 | 263 | 1,469 | 263 | 1,724 | 1,643 | 532 | 382 | 174 | 519 |
| Jose Abad Santos (Trinidad) | Urban | 1,059 | 212 | 550 | 847 | 184 | 79 | 263 | 1,240 | 184 | 1,056 | 92 | 1,148 | 1,240 | 1,240 | 184 | 1,056 | 92 | 1,148 | 1,240 | 184 | 79 | 263 | 3,642 |
| | Rural | 9,044 | 34 | 6,885 | 1,221 | 8,140 | 2,187 | 1,730 | 2,279 | 12,402 | 34 | 10,527 | 1,221 | 11,782 | 12,402 | 34 | 10,527 | 1,221 | 11,782 | 12,402 | 2,187 | 1,730 | 2,279 | 3,642 |
| | Total | 10,103 | 246 | 7,435 | 1,306 | 8,987 | 184 | 2,266 | 92 | 13,871 | 580 | 11,262 | 1,306 | 13,148 | 13,871 | 580 | 11,262 | 1,306 | 13,148 | 13,871 | 2,187 | 1,730 | 2,279 | 4,161 |
| Kibhawon | Urban | 1,395 | 279 | 725 | 1,122 | 237 | 172 | 409 | 1,897 | 706 | 946 | 112 | 1,058 | 1,897 | 1,897 | 706 | 946 | 112 | 1,058 | 1,897 | 237 | 172 | 409 | 648 |
| | Rural | 6,973 | 33 | 5,302 | 941 | 6,276 | 1,314 | 1,314 | 10,246 | 33 | 8,760 | 941 | 9,734 | 10,246 | 33 | 8,760 | 941 | 9,734 | 10,246 | 33 | 8,760 | 941 | 3,458 | 3,458 |
| | Total | 8,368 | 312 | 6,027 | 1,053 | 7,392 | 237 | 1,486 | 723 | 12,143 | 739 | 9,706 | 1,053 | 11,498 | 12,143 | 739 | 9,706 | 1,053 | 11,498 | 12,143 | 237 | 172 | 409 | 4,106 |
| Magsaysay | Urban | 1,412 | 283 | 734 | 1,130 | 257 | 130 | 401 | 1,493 | 10,738 | 967 | 8,184 | 1,050 | 10,201 | 1,493 | 10,738 | 967 | 8,184 | 1,050 | 10,201 | 257 | 130 | 401 | 3,203 |
| | Rural | 7,776 | 350 | 5,998 | 6,998 | 319 | 1,734 | 1,734 | 8,800 | 12,726 | 1,707 | 9,180 | 1,163 | 12,059 | 8,800 | 12,726 | 1,707 | 9,180 | 1,163 | 12,059 | 319 | 1,734 | 1,734 | 3,922 |
| | Total | 9,188 | 633 | 6,732 | 8,128 | 576 | 1,904 | 2,135 | 10,293 | 13,524 | 2,684 | 9,364 | 2,217 | 12,258 | 13,524 | 2,684 | 9,364 | 2,217 | 12,258 | 13,524 | 576 | 1,904 | 1,904 | 7,125 |
| Malabag | Urban | 1,045 | 209 | 543 | 848 | 179 | 206 | 207 | 1,180 | 439 | 588 | 70 | 1,097 | 1,180 | 439 | 588 | 70 | 1,097 | 1,180 | 439 | 179 | 206 | 207 | 459 |
| | Rural | 5,848 | 263 | 4,211 | 789 | 5,263 | 221 | 8,211 | 780 | 6,231 | 789 | 7,800 | 517 | 2,020 | 7,800 | 6,231 | 789 | 7,800 | 517 | 2,020 | 221 | 206 | 207 | 2,537 |
| | Total | 6,893 | 472 | 4,754 | 6,099 | 400 | 9,663 | 1,598 | 9,663 | 1,598 | 6,924 | 873 | 9,095 | 826 | 9,663 | 1,598 | 6,924 | 873 | 9,095 | 826 | 400 | 206 | 207 | 2,996 |
| Malita | Urban | 2,655 | 531 | 1,381 | 212 | 2,124 | 10 | 431 | 3,632 | 1,351 | 1,815 | 212 | 3,778 | 3,632 | 1,351 | 1,815 | 212 | 3,778 | 3,632 | 1,351 | 531 | 1,381 | 212 | 1,294 |
| | Rural | 15,204 | 684 | 10,944 | 15,682 | 406 | 536 | 528 | 20,311 | 3,930 | 15,312 | 2,093 | 19,293 | 20,311 | 3,930 | 15,312 | 2,093 | 19,293 | 20,311 | 3,930 | 406 | 536 | 528 | 5,611 |
| | Total | 17,859 | 1,215 | 12,325 | 15,808 | 827 | 536 | 538 | 23,943 | 5,281 | 17,127 | 2,263 | 22,673 | 23,943 | 5,281 | 17,127 | 2,263 | 22,673 | 23,943 | 5,281 | 827 | 536 | 528 | 6,865 |
| Matnang | Urban | 873 | 175 | 453 | 70 | 698 | 1 | 206 | 1,180 | 439 | 588 | 70 | 1,097 | 1,180 | 439 | 588 | 70 | 1,097 | 1,180 | 439 | 175 | 453 | 70 | 394 |
| | Rural | 8,500 | 94 | 6,408 | 1,148 | 7,650 | 46 | 1,541 | 1,587 | 11,952 | 94 | 10,112 | 1,148 | 11,354 | 1,587 | 11,952 | 94 | 10,112 | 1,148 | 11,354 | 46 | 1,541 | 1,541 | 3,704 |
| | Total | 9,373 | 269 | 6,861 | 1,218 | 8,348 | 47 | 1,747 | 1,794 | 13,132 | 533 | 10,700 | 1,218 | 12,451 | 13,132 | 533 | 10,700 | 1,218 | 12,451 | 13,132 | 269 | 453 | 207 | 4,103 |
| Padada | Urban | 1,980 | 396 | 1,030 | 158 | 1,584 | 276 | 488 | 4,046 | 6,791 | 1,405 | 4,421 | 571 | 6,397 | 4,046 | 6,791 | 1,405 | 4,421 | 571 | 6,397 | 396 | 1,030 | 158 | 969 |
| | Rural | 5,041 | 534 | 3,234 | 571 | 4,339 | 93 | 323 | 4,16 | 6,331 | 2,355 | 3,173 | 360 | 5,888 | 5,041 | 534 | 3,234 | 571 | 4,339 | 360 | 5,888 | 93 | 323 | 2,058 |
| | Total | 4,304 | 901 | 2,342 | 360 | 3,603 | 681 | 789 | 4 | 1,047 | 12,282 | 1,026 | 9,448 | 1,194 | 11,688 | 626 | 3,083 | 360 | 5,888 | 626 | 3,083 | 360 | 1,117 | 2,285 |
| Santa Cruz | Urban | 8,841 | 398 | 6,265 | 1,194 | 7,957 | 325 | 722 | 18,613 | 3,331 | 12,621 | 1,584 | 17,586 | 18,613 | 3,331 | 12,621 | 1,584 | 17,586 | 18,613 | 3,331 | 398 | 626 | 722 | 3,711 |
| | Rural | 13,345 | 1,299 | 8,707 | 1,554 | 11,560 | 1,006 | 1,511 | 4 | 2,521 | 18,613 | 3,331 | 22,777 | 22,777 | 3,331 | 18,613 | 3,331 | 22,777 | 22,777 | 3,331 | 1,299 | 1,554 | 1,511 | 5,996 |
| | Total | 14,144 | 2,093 | 7,555 | 1,131 | 243 | 2,243 | 2,243 | 2,243 | 2,243 | 2,243 | 2,243 | 2,243 | 2,243 | 2,243 | 2,243 | 2,243 | 2,243 | 2,243 | 2,243 | 2,243 | 2,243 | 2,243 | 2,243 |
| Santa Maria | Urban | 7,538 | 37 | 5,729 | 1,018 | 6,784 | 1,036 | 1,036 | 10,609 | 37 | 9,024 | 1,018 | 10,079 | 10,609 | 37 | 9,024 | 1,018 | 10,079 | 10,609 | 37 | 9,024 | 1,018 | 10,079 | 3,295 |
| | Rural | 8,952 | 320 | 4,464 | 1,131 | 7,915 | 243 | 1,036 | 12,580 | 770 | 10,011 | 1,311 | 11,912 | 12,580 | 770 | 10,011 | 1,311 | 11,912 | 12,580 | 770 | 1,036 | 1,036 | 1,036 | 3,697 |
| | Total | 573 | 115 | 297 | 46 | 458 | 99 | 41 | 1,472 | 4,385 | 12 | 3,753 | 401 | 4,166 | 4,385 | 12 | 3,753 | 401 | 4,166 | 4,385 | 99 | 41 | 41 | 318 |
| Sarangani | Urban | 2,968 | 12 | 2,555 | 447 | 2,671 | 99 | 1,515 | 1,612 | 5,219 | 322 | 4,173 | 447 | 4,942 | 1,612 | 5,219 | 322 | 4,173 | 447 | 4,942 | 12 | 2,555 | 447 | 1,495 |
| | Rural | 3,561 | 127 | 2,555 | 447 | 3,129 | 99 | 1,515 | 1,612 | 5,219 | 322 | 4,173 | 447 | 4,942 | 1,612 | 5,219 | 322 | 4,173 | 447 | 4,942 | 127 | 2,555 | 447 | 1,618 |
| | Total | 1,238 | 248 | 643 | 99 | 940 | 132 | 144 | 1,778 | 5,076 | 539 | 4,263 | 590 | 5,392 | 3,427 | 5,076 | 539 | 4,263 | 590 | 5,392 | 132 | 144 | 144 | 457 |
| Sulop | Urban | 4,370 | 197 | 3,146 | 590 | 3,933 | 1,778 | 5,076 | 539 | 4,263 | 590 | 4,263 | 590 | 5,392 | 3,427 | 5,076 | 539 | 4,263 | 590 | 5,392 | 197 | 3,146 | 590 | 1,459 |
| | Rural | 5,608 | 445 | 3,789 | 689 | 4,923 | 307 | 1,747 | 2,094 | 7,275 | 1,134 | 5,056 | 689 | 6,879 | 4,923 | 307 | 1,747 | 2,094 | 7,275 | 6,879 | 445 | 3,789 | 689 | 1,956 |
| | Total | 33,064 | 6,615 | 17,190 | 2,645 | 26,450 | 3,690 | 8,52 | 45,559 | 16,948 | 8,52 | 45,559 | 16,948 | 8,52 | 45,559 | 16,948 | 8,52 | 45,559 | 16,948 | 8,52 | 6,615 | 17,190 | 689 | 15,920 |
| Provincial Total | Urban | 117,057 | 3,387 | 86,161 | 15,804 | 105,352 | 2,202 | 14,098 | 161,831 | 9,011 | 128,924 | 15,804 | 153,739 | 161,831 | 9,011 | 128,924 | 15,804 | 153,739 | 161,831 | 9,011 | 3,387 | 86,161 | 5,624 | 48,387 |
| | Rural | 150,121 | 10,082 | 103,351 | 18,449 | 133,802 | 5,892 | 16,959 | 2,812 | 23,0 | | | | | | | | | | | | | | |

Table 8.5.3 Additional Number of Public School Students to be Served by Target Year (School Toilets)

| Name of Municipality | Phase I Coverage (2003) | | | Phase II Coverage (2010) | | |
|-----------------------------|-------------------------------------|---|---|-------------------------------------|---|---|
| | Total No. of Public School Students | Std. No. of Public School Students to be Served | Add'l. No. of Public School Students to be Served | Total No. of Public School Students | Std. No. of Public School Students to be Served | Add'l. No. of Public School Students to be Served |
| Bansalan | 11,473 | 6,884 | 3,284 | 12,475 | 9,980 | 3,096 |
| Digos (Capital) | 31,379 | 18,827 | 12,587 | 34,768 | 27,814 | 8,987 |
| Don Marcelino | 6,875 | 4,125 | 1,485 | 8,485 | 6,788 | 2,663 |
| Iligonoy | 10,826 | 6,496 | 3,136 | 12,532 | 10,026 | 3,530 |
| Jose Abad Santos (Trinidad) | 7,550 | 4,530 | 1,650 | 8,740 | 6,992 | 2,462 |
| Kiblawan | 8,196 | 4,918 | 2,518 | 9,976 | 7,981 | 3,063 |
| Magsaysay | 11,207 | 6,724 | 3,364 | 12,877 | 10,302 | 3,578 |
| Malalag | 7,910 | 4,746 | 2,106 | 9,123 | 7,298 | 2,552 |
| Malita | 19,375 | 11,625 | 2,505 | 21,105 | 16,884 | 5,259 |
| Matanao | 11,817 | 7,090 | 2,770 | 13,098 | 10,478 | 3,388 |
| Padada | 4,956 | 2,974 | 1,054 | 5,738 | 4,590 | 1,616 |
| Santa Cruz | 18,024 | 10,814 | 4,574 | 19,871 | 15,897 | 5,083 |
| Santa Maria | 11,274 | 6,764 | 1,484 | 13,053 | 10,442 | 3,678 |
| Sarangani | 7,919 | 4,751 | 1,631 | 8,716 | 6,973 | 2,222 |
| Svlop | 5,247 | 3,148 | 508 | 5,508 | 4,406 | 1,258 |
| PW4SP Study Area | 174,028 | 104,416 | 44,656 | 196,065 | 156,851 | 52,435 |

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

The number of served public utilities at the end of Phase I period is 40. The additional public utilities to be served are 22. While at the end of Phase II period, the number of served public utilities are 48 with an additional public utilities to be served at 8. Table 8.5.4 summarizes the additional number of public utilities to be served by municipality by target year.

8.5.3 Urban Sewerage

The service coverage in 2010 (Phase II) is estimated for the municipalities with population of more than 10,000 in urban area provided by Level III water supply. It is assumed that half of the population in the area/s is to be served by the sewerage systems. Table 8.5.5 shows the population to be served in Phase II.

Table 8.5.5 Population to be Served by Urban Sewerage in Phase II

| Name of Municipality | Urban Population in 2010 | Level III Water Supply Coverage | Population to be Served |
|-------------------------|--------------------------|---------------------------------|-------------------------|
| Digos (Capital) | 51,542 | 48,965 | 25,771 |
| Don Marcelino | 14,719 | 13,983 | 7,360 |
| Malita | 14,528 | 13,802 | 7,264 |
| Padada | 10,981 | 10,432 | 5,491 |
| Santa Cruz | 25,325 | 24,059 | 12,663 |
| PW4SP Study Area | 182,230 | 173,119 | 58,549 |

Table 8.5.4 Additional Number of Public Utilities with Sanitary Toilets by Target Year

| Name of Municipality | Type | Phase I Coverage (2003) | | Phase II Coverage (2010) | |
|-----------------------------|----------------------|--|---|--|---|
| | | Add'l. No. of Public Utility with Sanitary Toilets | No. of Public Utility with Sanitary Toilets | Add'l. No. of Public Utility with Sanitary Toilets | No. of Public Utilities with Sanitary Toilets |
| Bansatan | Public Market | | 1 | 1 | 2 |
| | Bus/Jeepney Terminal | 1 | 1 | | 1 |
| | Parks/Playground | | 1 | | 1 |
| | Total | 1 | 3 | 1 | 4 |
| Digos (Capital) | Public Market | | 2 | 2 | 4 |
| | Bus/Jeepney Terminal | 2 | 2 | | 2 |
| | Parks/Playground | | | | |
| | Total | 2 | 4 | 2 | 6 |
| Don Marcelino | Public Market | | 1 | | 1 |
| | Bus/Jeepney Terminal | 1 | 1 | | 1 |
| | Parks/Playground | | | | |
| | Total | 1 | 2 | | 2 |
| Hagonoy | Public Market | | 1 | 1 | 2 |
| | Bus/Jeepney Terminal | 1 | 1 | | 1 |
| | Parks/Playground | | | | |
| | Total | 1 | 2 | 1 | 3 |
| Jose Abad Santos (Trinidad) | Public Market | | 1 | | 1 |
| | Bus/Jeepney Terminal | | | | |
| | Parks/Playground | | | | |
| | Total | | 1 | | 1 |
| Kiblawan | Public Market | | 1 | | 1 |
| | Bus/Jeepney Terminal | 1 | 1 | | 1 |
| | Parks/Playground | | | | |
| | Total | 1 | 2 | | 2 |
| Magsaysay | Public Market | | 1 | | 1 |
| | Bus/Jeepney Terminal | 1 | 1 | | 1 |
| | Parks/Playground | | | | |
| | Total | 1 | 2 | | 2 |
| Malalag | Public Market | | 1 | | 1 |
| | Bus/Jeepney Terminal | 1 | 1 | | 1 |
| | Parks/Playground | | | | |
| | Total | 1 | 2 | | 2 |
| Malita | Public Market | 2 | 3 | 2 | 5 |
| | Bus/Jeepney Terminal | 1 | 1 | | 1 |
| | Parks/Playground | | | | |
| | Total | 3 | 4 | 2 | 6 |
| Matanao | Public Market | 4 | 5 | | 5 |
| | Bus/Jeepney Terminal | 1 | 1 | | 1 |
| | Parks/Playground | | | | |
| | Total | 5 | 6 | | 6 |
| Padada | Public Market | | 1 | 1 | 2 |
| | Bus/Jeepney Terminal | 1 | 1 | | 1 |
| | Parks/Playground | | | | |
| | Total | 1 | 2 | 1 | 3 |
| Santa Cruz | Public Market | 1 | 2 | | 2 |
| | Bus/Jeepney Terminal | 1 | 1 | | 1 |
| | Parks/Playground | | | | |
| | Total | 2 | 3 | | 3 |
| Santa Maria | Public Market | 1 | 2 | | 2 |
| | Bus/Jeepney Terminal | 1 | 1 | | 1 |
| | Parks/Playground | | | | |
| | Total | 2 | 3 | | 3 |
| Serangani | Public Market | | 1 | 1 | 2 |
| | Bus/Jeepney Terminal | | | | |
| | Parks/Playground | | | | |
| | Total | | 1 | 1 | 2 |
| Sulop | Public Market | | 1 | | 1 |
| | Bus/Jeepney Terminal | 1 | 1 | | 1 |
| | Parks/Playground | | 1 | | 1 |
| | Total | 1 | 3 | | 3 |
| PW4SP Study Area | Public Market | 8 | 24 | 8 | 32 |
| | Bus/Jeepney Terminal | 14 | 14 | | 14 |
| | Parks/Playground | | 2 | | 2 |
| | Total | 22 | 40 | 8 | 48 |

8.5.4 Solid Waste

Future requirements in the sub-sector are studied giving priority to urban area for the Phase I. Staged improvement for the rural area shall be studied in the future.

Service coverage in Phase I was assumed at 50% with reference to the present service coverage of 36% in urban area.. Additional service coverage in Phase I is calculated as a shortfall of target coverage in Phase I comparing with current service coverage. Table 8.5.6 presents additional service coverage for Phase I in the urban area.

Table 8.5.6 Additional Number of Urban Households to be Served by Municipal Solid Waste System in Phase I

| Name of Municipality | No. of Urban Households Served in the Base Year | Phase I Coverage (2003) | | |
|-----------------------------|---|-------------------------|---------------------------|---|
| | | No. of Urban Households | Urban Households Coverage | Add'l. No. of Urban Households to be Served |
| Bansalan | 1,000 | 1,466 | 1,000 | |
| Digos (Capital) | 1,900 | 9,455 | 4,728 | 2,828 |
| Don Marcelino | 150 | 2,475 | 1,238 | 1,088 |
| Hagonoy | 750 | 1,520 | 760 | 10 |
| Jose Abad Santos (Trinidad) | | 1,059 | 530 | 530 |
| Kiblawan | 550 | 1,395 | 698 | 148 |
| Magsaysay | 910 | 1,412 | 910 | |
| Malalag | 800 | 1,045 | 800 | |
| Malita | 1,300 | 2,655 | 1,328 | 28 |
| Matanao | 880 | 873 | 880 | |
| Padada | 850 | 1,980 | 990 | 140 |
| Santa Cruz | 950 | 4,504 | 2,252 | 1,302 |
| Santa Maria | 500 | 1,414 | 707 | 207 |
| Sarangani | | 573 | 287 | 287 |
| Sulop | 430 | 1,238 | 619 | 189 |
| PW4SP Study Area | 10,970 | 33,064 | 17,727 | 6,757 |

8.6 Facilities, Equipment and Rehabilitation to Meet the Target Services

8.6.1 Water Supply

(1) Required facilities

Water supply facilities required by service level were estimated by urban and rural area by municipality based on the additional service coverage by target year and summarized in Table 8.6.1 (details are referred to Supporting Report).

Urban water supply:

Physical requirements of Level III systems are estimated as the number of required house connections. Mode of project indicates whether future urban water supply will be implemented as expansion of existing system or construction of a new system. Number of deep wells was also estimated based on the water source evaluation results in Chapter 7.

Rural water supply:

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

Furthermore, as for Level I facilities, in this PW4SP, 85% of the total required facilities will be implemented by public (LGUs) and 15% of these public Level I facilities will be allocated to spring development.

(2) Rehabilitation

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

(3) Equipment

Logistic support:

For rural water supply development, 1 unit each or set of the following equipment was considered necessary for the provincial government to conduct various activities of PW4SP implementation;

Transportation- service vehicle.

Office equipment- computer with printer, typewriter, mimeo machine, scanning machine and copier.

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

For urban water supply, no hardware was considered.

Table 8.6.1 Water Supply Facilities Required by Target Year

| Name of Municipality | Phase I (2003) Requirements | | | | | | | | | | Phase I (2010) Requirements | | | | | | | | | | |
|-------------------------|--------------------------------|--------------------------|-----------------------|---------------|-------------------------|--------------------|------|------|--------------------|--------------------------|-----------------------------|-----------|----------------------|------|--------------------|--------------------------|-----------------------|---------|-------|-----------|----------------------|
| | Urban Water Supply (Level III) | | | | | Rural Water Supply | | | | | Urban WS (Level III) | | | | | Rural Water Supply | | | | | |
| | Mode of Project | No. of Add'l. Deep Wells | No. of HHS Connection | Level II | | Level I | | | Total No. of Wells | No. of Add'l. Deep Wells | No. of HHS Connection | Level I | | | Total No. of Wells | No. of Add'l. Deep Wells | No. of HHS Connection | Level I | | | |
| | | | | No. of System | No. of Communal Faucets | 30 m | 50 m | 70 m | | | | Sub-total | No. of Shallow Wells | 30 m | | | | 50 m | 70 m | Sub-total | No. of Shallow Wells |
| Bansalan | N/A | | | 4 | 81 | | 12 | 12 | 11 | 23 | 1 | | | | | 192 | | 123 | 123 | 122 | 245 |
| Digos (Capital) | N/A | | | | | | | | | | 3 | | | | | 4,617 | | 124 | 124 | 288 | 412 |
| Don Marcelino | New | 1 | 939 | 2 | 40 | 8 | | 8 | 142 | 150 | 2 | | | | 2,278 | | 9 | 9 | 152 | 161 | |
| Hagonoy | N/A | | | | | | | | | | 1 | | | | 1,194 | | 116 | 116 | 28 | 144 | |
| Jose Abad Santos (Timp) | New | 1 | 662 | 2 | 40 | 14 | | 14 | 251 | 265 | 1 | | | | 533 | | 14 | 14 | 251 | 265 | |
| Kiblawan | Expansion | 1 | 630 | 4 | 81 | 44 | | 44 | 64 | 108 | 1 | | | | 532 | | 98 | 98 | 145 | 243 | |
| Magsaysay | Expansion | 1 | 179 | | | | | | | | 1 | | | | 1,262 | | 188 | 188 | 47 | 235 | |
| Malag | Expansion | 1 | 289 | 4 | 81 | 48 | | 48 | 268 | 316 | 1 | | | | 743 | | 159 | 159 | 27 | 186 | |
| Malita | Expansion | 1 | 1,006 | | | | | | | | 1 | | | | 748 | | 65 | 65 | 365 | 430 | |
| Matanao | Expansion | 1 | 179 | 7 | 141 | | | | | | 1 | | | | 363 | | 159 | 159 | 105 | 264 | |
| Padada | N/A | | | | | | | | | | 1 | | | | 985 | | 81 | 81 | 9 | 90 | |
| Santa Cruz | Expansion | 1 | 850 | 1 | 20 | 18 | | 18 | 71 | 89 | 2 | | | | 2,813 | | 56 | 56 | 223 | 279 | |
| Santa Maria | Expansion | 1 | 465 | 2 | 40 | 103 | | 103 | 18 | 121 | 1 | | | | 802 | | 199 | 199 | 34 | 233 | |
| Sarangani | New | 1 | 212 | 2 | 41 | 19 | | 19 | 44 | 63 | 1 | | | | 511 | | 30 | 30 | 70 | 100 | |
| Sulop | Expansion | 1 | 342 | | | 27 | | 27 | 3 | 30 | 1 | | | | 873 | | 107 | 107 | 11 | 118 | |
| PW4SP Study Area | Exp. - 8 | 11 | 5,753 | 28 | 565 | 8 | 273 | 67 | 348 | 879 | 19 | | | | 18,446 | | 873 | 646 | 1,528 | 1,877 | 3,405 |
| | New - 3 | | | | | | | | | | | | | | | | | | | | |

Well drilling and rehabilitation equipment:

As a reference information, necessary types and number of well drilling and rehabilitation equipment were studied considering the existing equipment of sector agencies in the province.

During the Phase I period, a total of 255 Level I deep wells shall be newly constructed and 10% of these deep wells shall be rehabilitated annually. Although there are huge requirements, only 1 unit of truck-mounted percussion drilling rig is available at DPWH-DEO in the province, while no air compressor for well rehabilitation equipment is available neither at provincial government nor sector agencies.

Therefore, a total of 5 sets of drilling (medium size percussion type) together with 1 set of well rehabilitation equipment, 1 unit of support vehicles for well rehabilitation and 5 units of service trucks for deep well construction shall be mobilized/procured either by private sector or LGUs (details are referred to Supporting Report).

Selection of well drilling machine

An appropriate type of well drilling machine with its specifications shall be selected after comprehensive study on the technical requirements, local capability in O&M of the machine and cost effectiveness.

From the technical viewpoint, geological conditions in the province allow for the use of either rotary or percussion type drilling machine (no rock drilling is expected). While, in view of economical and O&M experience on the machine in the local area, a percussion type is recommendable. Although, the rotary type machine is quite effective to reduce construction period under soft soil condition, but special training on mud-circulation, handling manner, etc. are required together with additional equipment and materials comparing with percussion type. The drilling speed of the percussion type is rather slow, but has advantages in drilling boulder and cobbles formations.

One unit of truck mounted percussion drilling machine was considered to procure in the long-term development period.

(4) Laboratory

Upgrading of Existing Provincial Laboratory in Provision of Instrument/Equipment:

One (1) set of instrument/equipment will be necessary to upgrade the existing provincial laboratory in order for the LGU to undertake regular water quality monitoring and surveillance activities. The following are the requirements:

| <u>Item</u> | <u>Unit</u> | <u>Number</u> |
|------------------------------------|-------------|---------------|
| 1. Instrument/Equipment | | |
| Turbidity meter | set | 1 |
| Color meter | set | 1 |
| pH/Residual chlorine checker | set | 1 |
| Refrigerator | set | 1 |
| Portable water quality testing kit | set | 1 |
| Electric stove | set | 1 |
| Range hood | set | 1 |
| 2. Glassware/Chemical | set | 1 |

8.6.2 Sanitation

This sub-section refers to physical requirements by target year covering household, school and public toilet facilities. Table 8.6.2 presents the required sanitation facilities by target year. Rehabilitation for the sanitation facilities is considered as part of recurrent cost.

(1) Household toilets

Future requirements in the number of household toilets by different type for urban and rural areas were estimated based on the additional households to be served by type of facility both for urban and rural areas by target year (details are referred to Supporting Report).

(2) School toilets

The future requirements in the number of toilet facilities were estimated based on the standard number of students to be served by a 5-unit standard facility and the additional students to be served by target year (details are referred to Supporting Report).

Total required facilities were further broken down into urban and rural areas by applying the percentage share of urban and rural population.

Table 8.6.2 Sanitation Facilities Required by Target Year

| Name of Municipality | Phase I (2003) Requirements | | | | | | | | | | | | Phase II (2010) Requirements | | | | | | | | | | | | | | |
|---------------------------|-----------------------------|------------|----------|----------------------------|-----------------------|---------------|-----------------------|-------------------|--------|------------|----------------------------|-----------------------|------------------------------|---------------|-----------------------|------------------|-------|----------------------------|-----------------------|----------|-------|-------------------|-----------------------|------------------|--------|------------|----------|
| | Urban Sanitation | | | | | | Rural Sanitation | | | | | | Urban Sanitation | | | | | | Rural Sanitation | | | | | | | | |
| | No. of Households | | | No. of Public Sch. Toilets | No. of Public Toilets | | | No. of Households | | | No. of Public Sch. Toilets | No. of Public Toilets | | | No. of Households | | | No. of Public Sch. Toilets | No. of Public Toilets | | | No. of Households | | | | | |
| | Flush | Four Flush | VIP/ Dry | | Total | Public Market | Bus/ Jeepney Terminal | Park/ Playground | Flush | Four Flush | | VIP/ Dry | Total | Public Market | Bus/ Jeepney Terminal | Park/ Playground | Flush | | Four Flush | VIP/ Dry | Total | Public Market | Bus/ Jeepney Terminal | Park/ Playground | Flush | Four Flush | VIP/ Dry |
| Davao | 261 | | 14 | 275 | 5 | 1 | | 330 | | 262 | 392 | 30 | 394 | 150 | 544 | 7 | 1 | | 712 | 2,291 | | | | | | 3,003 | 41 |
| Digos (Capital) | | 104 | 559 | 663 | 36 | 2 | 237 | | 691 | 978 | 58 | 2,903 | 1,517 | 4,420 | 53 | 2 | | 1,316 | 5,004 | | | | | | 6,370 | 86 | |
| Don Marcelino | 453 | 520 | 169 | 1,142 | 7 | 1 | | 1,288 | | 1,288 | 13 | 374 | 568 | 1,442 | 12 | | | | | | | | | | 2,356 | 22 | |
| Magway | 266 | 188 | | 454 | 5 | 1 | | 1,125 | | 64 | 1,189 | 27 | 480 | 265 | 745 | 8 | 1 | | | | | | | | 3,504 | 42 | |
| Jose Abad Santos (Tandag) | 184 | 79 | | 263 | 2 | | | 2,187 | | 92 | 2,279 | 20 | 334 | 185 | 519 | 4 | | | | | | | | | 3,642 | 31 | |
| Kiblawan | 237 | 172 | | 409 | 4 | 1 | | 1,314 | | | 1,314 | 21 | 427 | 221 | 648 | 6 | | | | | | | | | 3,458 | 34 | |
| Massaysay | 257 | 130 | | 387 | 5 | 1 | | 319 | 1,174 | | 1,493 | 28 | 457 | 262 | 719 | 8 | | | 617 | 2,586 | | | | | 3,203 | 43 | |
| Maitag | 179 | | | 179 | 3 | 1 | | 221 | | | 221 | 20 | 309 | 150 | 459 | 5 | | | 517 | 2,020 | | | | | 2,537 | 31 | |
| Maita | 421 | | 10 | 431 | 9 | 2 | | 406 | 536 | 528 | 1,470 | 49 | 820 | 434 | 1,254 | 13 | 2 | | 1,246 | 4,365 | | | | | 5,611 | 72 | |
| Maitao | 1 | 206 | | 207 | 3 | 4 | | 46 | 1,541 | | 1,587 | 32 | 264 | 135 | 399 | 5 | | | | | | | | | 3,704 | 48 | |
| Pudida | 276 | 488 | 74 | 838 | 6 | 1 | | 93 | 323 | 416 | 9 | 625 | 344 | 969 | 9 | 1 | | 246 | 843 | | | | | | 1,089 | 14 | |
| Santa Cruz | 681 | 789 | 4 | 1,474 | 18 | 1 | | 325 | 722 | | 1,047 | 36 | 1,454 | 831 | 2,285 | 27 | | | 628 | 3,083 | | | | | 3,711 | 52 | |
| Santa Maria | 243 | | 22 | 265 | 5 | 1 | | 1,036 | | | 1,036 | 29 | 450 | 252 | 702 | 8 | | | | | | | | | 3,295 | 44 | |
| Surangani | 99 | 41 | | 140 | 4 | | | 1,472 | | | 1,472 | 20 | 195 | 123 | 318 | 6 | 1 | | | | | | | | 1,495 | 26 | |
| Sulop | 132 | 144 | | 276 | 3 | 1 | | 175 | 1,603 | | 1,778 | 12 | 347 | 150 | 497 | 5 | | | 342 | 1,117 | | | | | 1,459 | 17 | |
| PWAGSP Study Area | 3,600 | 2,861 | 852 | 7,403 | 115 | 8 | 14 | 2,202 | 14,298 | 1,940 | 18,260 | 404 | 10,333 | 5,587 | 15,920 | 176 | 8 | | 5,624 | 42,763 | | | | | 48,387 | 608 | |

(3) Public toilets

Future requirements in the number of toilet facilities were estimated based on the additional number of toilets for public markets and bus/jeepney terminals located in urban areas (details are referred to Supporting Report).

8.6.3 Urban Sewerage and Solid Waste

Physical requirements for the sewerage facilities are not discussed in this sub-section. Further study shall be conducted in the future.

As reference information, the number of refuse collection trucks is estimated for the urban area in Phase I. Eleven (11) additional units of truck are required to meet assumed service coverage as reflected in Table 8.6.3.

Table 8.6.3 Number of Refuse Collection Trucks Required in Phase I

| Name of Municipality | Add'l. Urban Households to be Served | Estimated Daily Amount of Refuse to be Generated, (Kg) | Number of Collection Truck Required |
|-----------------------------|--------------------------------------|--|-------------------------------------|
| Bansalan | | | |
| Digos (Capital) | 2,828 | 1,183 | 1 |
| Don Marcelino | 1,088 | 455 | 1 |
| Iligonoy | 10 | 5 | 1 |
| Jose Abad Santos (Trinidad) | 530 | 222 | 1 |
| Kiblawan | 148 | 62 | 1 |
| Magsaysay | | | |
| Malalag | | | |
| Malita | 28 | 12 | 1 |
| Matanao | | | |
| Padada | 140 | 59 | 1 |
| Santa Cruz | 1,302 | 545 | 1 |
| Santa Maria | 207 | 87 | 1 |
| Sarangani | 287 | 120 | 1 |
| Sulop | 189 | 80 | 1 |
| PW4SP Study Area | 6,757 | 2,830 | 11 |

8.7 Identification of Priority Projects for Medium-Term Development Plan

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

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

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

The first level of priority should be given to projects with positive feasibility studies and identified funding. Next level of priority would be given to projects with positive feasibility studies, although no funding source has been identified. The third level should be those for which feasibility study has been conducted. Within each level, if funds were insufficient, a ranking could be carried out in application of some factors such, as willingness to pay, water-related diseases status and per capita cost. Under the above mentioned conditions, a list of projects shall be prepared by the implementors.

Due attention shall be made on the importance of integrated development of relevant sub-sectors to maximize the effects and benefits through simultaneous implementation of water supply and sanitation projects. On a municipal level priority, synthetic evaluation of sector components for concerned municipalities (which is studied in the financial arrangements, Chapter 11) may be used for implementation arrangements.

