

6. PAST FINANCIAL PERFORMANCE IN WATER SUPPLY AND SANITATION

6.2 Past Public Investment

6.2.1 Sources of Local Fund

Table 6.2.1 Income and Expenditure of South Cotabato, 1994-1998

Municipality	1994	1995	1996	1997	1998 1/
1. Banga					
RECEIPTS					
Local Revenues 1/	2,232,468.64	2,195,175.41	2,700,581.81	3,027,665.72	3,774,000.00
IRA	15,765,135.00	17,571,530.00	19,021,937.00	31,949,392.00	34,552,482.00
Other Income (borrowings)					
Total Revenues	17,997,603.64	19,766,705.41	21,722,518.81	34,977,057.72	38,326,482.00
Expenditures					
Current Operating Expenditures:	14,970,627.02	20,003,109.93	21,408,461.50	31,564,770.49	28,705,882.00
Personal Services (P.S.)	9,649,104.62	12,072,482.59	14,087,121.36	22,066,366.00	22,520,822.00
Maint. & Other Oper. Exp. (MOOE)	5,321,522.40	7,930,627.34	7,321,340.14	9,498,404.49	6,185,060.00
NET INCOME	3,026,976.62	(236,404.52)	314,057.31	3,412,287.23	9,620,600.00
Less: Capital Outlays 2/	1,642,225.48	267,629.83	262,384.50	907,453.72	65,000.00
Loan Amortization					
Others					893,630.59
Sub-Total Other Expenditures	1,642,225.48	267,629.83	262,384.50	907,453.72	958,630.59
Net Income	1,384,751.14	(504,034.35)	51,672.81	2,504,833.51	8,661,969.41
2. Koronadal					
RECEIPTS					
Local Revenues 1/	15,138,302.00	18,078,714.02	22,165,608.77	25,918,488.91	33,680,000.00
IRA	26,009,619.00	29,058,601.00	31,489,974.00	40,101,912.00	44,120,000.00
Other Income (Grants & Aids)					
Total Revenues	41,147,921.00	47,137,315.02	53,655,582.77	66,020,400.91	67,800,000.00
Expenditures					
Current Operating Expenditures:	32,124,100.44	41,024,891.96	47,261,687.14	55,518,845.67	53,162,740.00
Personal Services (P.S.)	20,225,587.09	24,148,787.84	23,711,614.72	30,452,335.20	35,518,670.00
Maint. & Other Oper. Exp. (MOOE)	11,898,513.35	16,876,104.12	23,550,072.42	25,066,510.47	17,644,070.00
NET INCOME	9,023,820.56	6,112,423.06	6,393,895.63	10,501,555.24	14,637,260.00
Less: Capital Outlays 2/	7,896,955.62	6,845,468.36	7,205,770.15	8,235,624.98	99,260.00
Other (Non-Office)					14,538,000.00
Sub-Total Other Expenditures	7,896,955.62	6,845,468.36	7,205,770.15	8,235,624.98	14,637,260.00
Net Income	1,126,864.94	(733,045.30)	(811,874.52)	2,265,930.26	
3. Lake Sebu					
RECEIPTS					
Local Revenues 1/	835,128.41	1,057,778.18	1,008,908.20	1,852,321.96	2,508,800.00
IRA	17,436,823.00	19,187,441.00	20,539,704.00	27,447,642.00	27,951,443.00
Other Income (borrowings)					
Total Revenues	18,271,951.41	20,245,219.18	21,548,612.20	29,299,963.96	30,460,243.00
Expenditures					
Current Operating Expenditures:	15,134,598.41	17,787,234.16	18,597,797.18	25,841,246.94	21,933,235.36
Personal Services (P.S.)	7,853,264.51	9,100,782.93	10,940,714.98	14,794,880.12	16,245,079.36
Maint. & Other Oper. Exp. (MOOE)	7,281,333.90	8,686,451.23	7,657,082.20	11,046,366.82	5,688,156.00
NET INCOME	3,137,353.00	2,457,985.02	2,950,815.02	3,458,717.02	8,527,007.64
Less: Capital Outlays 2/	3,587,489.07	2,603,280.28	927,439.16	3,521,504.22	700,000.00
Non Office					7,514,008.77
5% Budgetary					
Sub-Total Other Expenditures	3,587,489.07	2,603,280.28	927,439.16	3,521,504.22	8,214,008.77
Net Income	(450,136.07)	(145,295.26)	2,023,375.86	(62,787.20)	312,998.87
4. Norala					
RECEIPTS					
Local Revenues 1/	2,667,939.74	2,737,456.55	3,746,897.79	3,975,839.01	4,799,000.00
IRA	11,174,197.77	12,419,699.00	13,436,437.00	16,419,122.00	17,985,796.40
Other Income (borrowings)					
Total Revenues	13,842,137.51	15,157,155.55	17,183,334.79	20,394,961.01	22,784,796.40
Expenditures					
Current Operating Expenditures:	12,285,894.83	14,975,910.74	16,432,351.46	20,034,438.52	17,819,573.58
Personal Services (P.S.)	8,685,452.38	10,595,760.67	9,316,700.02	11,409,528.65	13,346,927.94
Maint. & Other Oper. Exp. (MOOE)	3,600,442.45	4,380,150.07	7,115,651.44	8,624,909.87	4,472,645.64
NET INCOME	1,556,242.68	181,244.81	750,983.33	360,522.49	4,965,222.82
Less: Capital Outlays 2/	952,565.66	938,340.23	619,826.46	33,057.00	175,800.00
Non Office					4,789,239.82
5% Budgetary					
Sub-Total Other Expenditures	952,565.66	938,340.23	619,826.46	33,057.00	4,965,039.82
Net Income	603,677.02	(757,095.42)	131,156.87	327,465.49	183.00
5. Sto. Niño					
RECEIPTS					
Local Revenues 1/	1,548,457.93	2,667,645.18	2,928,956.56	3,119,641.38	4,564,782.00

Table 6.2.1 Income and Expenditure of South Cotabato, 1994-1998

Municipality	1994	1995	1996	1997	1998 1/
IRA	8,983,537.00	10,033,725.00	10,887,447.00	13,689,934.00	15,297,120.00
Other Income (borrowings)			850,000.00		
Total Revenues	10,531,994.93	12,701,370.18	14,666,403.56	16,809,575.38	19,861,902.00
Expenditures					
Current Operating Expenditures	8,329,977.76	11,638,992.11	12,533,368.39	16,476,340.39	15,015,208.00
Personal Services (P.S.)	6,254,875.21	8,744,328.42	8,916,753.82	11,723,977.36	13,118,151.00
Maint. & Other Oper. Exp. (MOOE)	2,075,102.55	2,894,663.69	3,616,614.57	4,752,363.03	1,897,057.00
NET INCOME	2,202,017.17	1,062,378.07	2,133,035.17	333,234.99	4,846,694.00
Less: Capital Outlays 2/	970,332.21	960,579.19	1,910,870.13	17,153,386.22	
Non Office					4,846,644.00
Loan Amortization					
Sub-Total Other Expenditures	970,332.21	960,579.19	1,910,870.13	17,153,386.22	4,846,644.00
Net Income	1,231,684.96	101,798.88	222,165.04	(16,820,151.23)	50.00
6. Polomolok					
RECEIPTS					
Local Revenues 1/	9,696,891.94	15,016,312.57	16,870,426.94	22,900,694.44	23,858,044.00
IRA	22,423,123.00	25,087,775.00	27,205,964.00	33,932,347.00	34,141,956.00
Other Income (borrowings /Grant & Aids)	1,675,000.00		28,863,671.93	5,078,328.07	
Total Revenues	33,795,014.94	40,104,087.57	72,940,062.87	61,911,369.51	58,000,000.00
Expenditures					
Current Operating Expenditures	23,209,244.46	28,790,311.04	66,018,978.76	54,811,529.80	39,379,258.00
Personal Services (P.S.)	13,492,783.41	17,906,762.83	20,745,718.63	31,313,808.05	28,731,268.00
Maint. & Other Oper. Exp. (MOOE)	9,716,461.05	10,883,548.21	45,273,260.13	23,497,721.75	10,647,990.00
NET INCOME	10,585,770.48	11,313,776.53	6,921,084.11	7,099,839.71	18,620,742.00
Less: Capital Outlays 2/	8,260,125.54	7,139,550.36	3,705,176.37	4,786,619.38	735,000.00
Non Office					17,885,742.00
5% Budgetary					
Sub-Total Other Expenditures	8,260,125.54	7,139,550.36	3,705,176.37	4,786,619.38	18,620,742.00
Net Income	2,325,644.94	4,174,226.17	3,215,907.74	2,313,220.33	
7. Surallah					
RECEIPTS					
Local Revenues 1/	6,876,751.86	6,876,751.86	8,907,336.52	11,747,330.59	19,007,254.00
IRA	19,118,974.00	21,260,753.00	22,772,135.00	28,982,240.00	31,883,135.00
Other Income (borrowings)			361,809.04		
Total Revenues	25,995,725.86	28,137,504.86	32,041,280.56	40,729,570.59	50,890,389.00
Expenditures					
Current Operating Expenditures	24,567,463.06	24,567,463.06	29,453,726.35	41,736,621.16	31,100,714.00
Personal Services (P.S.)	16,147,440.43	16,147,440.43	16,748,482.00	23,249,624.17	26,643,842.00
Maint. & Other Oper. Exp. (MOOE)	8,420,022.63	8,420,022.63	12,705,244.35	18,486,996.99	4,456,872.00
NET INCOME	1,428,262.80	3,570,041.80	2,587,554.21	(1,007,050.57)	19,789,675.00
Less: Capital Outlays 2/	6,284,146.17	6,284,146.17	1,317,220.38	2,256,756.36	
Non Office					19,789,675.00
5% Budgetary					
Sub-Total Other Expenditures	6,284,146.17	6,284,146.17	1,317,220.38	2,256,756.36	19,789,675.00
Net Income	(4,855,883.37)	(2,714,104.37)	1,270,333.83	(3,263,806.93)	
8. Tampakan					
RECEIPTS					
Local Revenues 1/	1,367,503.11	1,891,270.08	1,912,316.40	2,384,081.53	3,667,850.00
IRA	12,477,212.00	13,726,600.00	14,391,744.00	18,674,131.00	21,000,000.00
Other Income (borrowings)		112,297.00	66,229.05		
Total Revenues	13,844,715.11	15,730,167.08	16,370,289.45	21,058,212.53	24,667,850.00
Expenditures					
Current Operating Expenditures	13,653,198.72	14,953,446.16	16,031,477.35	19,365,199.01	19,286,987.00
Personal Services (P.S.)	7,133,736.92	8,545,369.84	9,716,112.62	13,297,949.96	14,712,359.00
Maint. & Other Oper. Exp. (MOOE)	6,519,461.80	6,408,076.32	6,315,364.73	6,067,249.05	4,574,628.00
NET INCOME	191,516.39	776,720.92	338,812.10	1,693,013.52	5,380,863.00
Less: Capital Outlays 2/	2,666,731.95	807,876.61	958,669.56	2,034,733.43	86,113.00
Non Office					5,249,750.00
Loan Amortization					
Sub-Total Other Expenditures	2,666,731.95	807,876.61	958,669.56	2,034,733.43	5,335,863.00
Net Income	(2,475,215.56)	(31,155.69)	(619,857.46)	(341,719.91)	45,000.00
9. Tantaingan					
RECEIPTS					
Local Revenues 1/	1,177,516.50	1,013,978.34	1,060,167.47	1,516,281.54	2,337,360.00
IRA	9,193,705.00	10,195,987.96	10,907,540.00	14,509,275.00	15,957,373.00
Other Income (Loans/borrowings/Grants & Aids)					

Table 6.2.1 Income and Expenditure of South Cotabato, 1994-1998

Municipality	1994	1995	1996	1997	1998 1/
Total Revenues	10,371,221.50	11,209,966.30	11,967,797.47	16,925,556.54	18,294,733.00
Expenditures					
Current Operating Expenditures:	7,937,277.29	10,917,148.53	11,385,797.89	14,319,066.65	14,179,839.46
Personal Services (P.S.)	6,018,615.24	7,918,734.58	8,801,599.38	11,259,913.22	13,305,981.43
Maint. & Other Oper. Exp. (MOOE)	1,918,662.05	2,998,413.95	2,579,198.51	3,059,153.43	873,058.09
NET INCOME	2,433,944.21	292,817.77	586,999.58	1,706,489.89	4,115,693.60
Less: Capital Outlays 2/	1,660,189.48	360,577.95	989,434.54	1,353,865.94	20,000.00
Others (Non-Office)	-	-	-	-	4,095,693.60
Loan Amortization	-	-	-	-	-
Sub-Total Other Expenditures	1,660,189.48	360,577.95	989,434.54	1,353,865.94	4,115,693.60
Net Income	773,754.73	(67,760.18)	(402,524.96)	352,623.95	-
10. T'boli					
RECEIPTS					
Local Revenues 1/	1,946,613.13	3,383,176.04	3,490,576.96	2,548,839.04	3,341,753.48
IRA	19,463,677.00	21,331,936.00	22,761,660.00	32,134,463.00	35,258,600.00
Other Income (Loans/borrowings)	-	636,788.79	-	-	-
Total Revenues	21,410,290.13	25,351,900.83	26,251,730.96	34,683,302.04	38,600,353.48
Expenditures					
Current Operating Expenditures	20,784,779.17	23,880,541.55	23,885,429.01	31,168,343.54	27,464,991.00
Personal Services (P.S.)	9,143,286.18	12,487,975.78	13,552,445.66	18,031,339.59	20,761,120.00
Maint. & Other Oper. Exp. (MOOE)	11,641,492.99	11,392,565.77	10,332,983.35	13,137,003.95	6,703,871.00
NET INCOME	625,510.96	1,471,359.28	2,366,301.95	3,514,958.50	11,135,362.48
Less: Capital Outlays 2/	986,241.25	1,495,193.07	2,247,880.55	3,406,292.61	469,000.00
Non Office	-	-	-	-	10,666,362.48
5% Budgetary	-	-	-	-	-
Sub-Total Other Expenditures	986,241.25	1,495,193.07	2,247,880.55	3,406,292.61	11,135,362.48
Net Income	(360,730.29)	(23,833.79)	118,421.40	108,665.89	-
11. Tupti					
RECEIPTS					
Local Revenues 1/	3,028,648.96	3,633,619.26	3,296,186.19	4,748,021.17	7,327,199.00
IRA	13,144,522.00	14,783,882.55	15,792,467.00	20,031,575.00	25,000,000.00
Other Income (Grants & Aids)	546,392.50	4,903,439.00	288,516.94	330,948.00	-
Total Revenues	16,719,563.46	23,320,940.81	19,377,170.13	25,110,544.17	32,327,199.00
Expenditures					
Current Operating Expenditures:	14,339,867.60	17,896,187.79	20,459,731.37	22,831,092.02	24,983,295.00
Personal Services (P.S.)	8,492,116.72	10,912,745.27	12,454,515.25	16,083,871.99	19,520,695.00
Maint. & Other Oper. Exp. (MOOE)	5,847,750.88	6,983,442.52	8,005,216.12	6,747,220.03	5,462,600.00
NET INCOME	2,379,695.86	5,424,753.02	(1,082,561.24)	2,279,452.15	7,343,904.00
Less: Capital Outlays 2/	803,721.20	5,507,986.85	891,141.43	1,587,533.66	25,000.00
Non Office	-	-	-	-	7,191,815.00
Others DF	-	-	-	-	-
Sub-Total Other Expenditures	803,721.20	5,507,986.85	891,141.43	1,587,533.66	7,216,815.00
Net Income	1,575,974.66	(83,233.83)	(1,973,702.67)	691,918.49	127,089.00

Table 6.2.2 Past Internal Revenue Allotment for the Province of South Cotabato

Item	1994	1995	1996	1997	1998
1. IRA to All Municipalities (National)	16,325,888,074.00	18,768,925,000.00	19,607,715,553.00	24,849,000,000.00	28,245,815,434.00
2. IRA by Municipality					
Banga	175,190,524.77	194,657,930.51	209,207,009.00	277,872,033.00	303,147,905.40
Koronadal	15,765,135.00	17,571,530.00	19,021,937.00	31,949,392.00	34,552,482.00
Lake Sebu	26,009,619.00	29,058,601.00	31,489,974.00	40,101,912.00	44,120,000.00
Norala	17,436,823.00	19,187,441.00	20,539,704.00	27,447,642.00	27,951,443.00
Polomolok	11,174,197.77	12,419,699.00	13,436,437.00	16,419,122.00	17,985,796.40
Sto. Niño	22,423,123.00	25,087,775.00	27,205,964.00	33,932,347.00	34,141,956.00
Surallah	8,983,537.00	10,033,725.00	10,887,447.00	13,689,934.00	15,297,120.00
T'boli	19,118,974.00	21,260,753.00	22,772,135.00	28,982,240.00	31,883,135.00
Tampakan	19,463,677.00	21,331,936.00	22,761,660.00	32,134,463.00	35,258,600.00
Tantangan	12,477,212.00	13,726,600.00	14,391,744.00	18,674,131.00	21,000,000.00
Tupi	9,193,705.00	10,195,987.96	10,907,540.00	14,509,275.00	15,957,373.00
	13,144,522.00	14,783,882.55	15,792,467.00	20,031,575.00	25,000,000.00
3. % Share by Municipality					
Banga	1.07	1.04	1.07	1.12	1.07
Koronadal	9.00	9.03	9.09	11.50	11.40
Lake Sebu	14.85	14.93	15.05	14.43	14.55
Norala	9.95	9.86	9.82	9.88	9.22
Polomolok	6.38	6.38	6.42	5.91	5.93
Sto. Niño	12.80	12.89	13.00	12.21	11.26
Surallah	5.13	5.15	5.20	4.93	5.05
T'boli	10.91	10.92	10.88	10.43	10.52
Tampakan	11.11	10.96	10.88	11.56	11.63
Tantangan	7.12	7.05	6.88	6.72	6.93
Tupi	5.25	5.24	5.21	5.22	5.26
	7.50	7.59	7.55	7.21	8.25

7. WATER SOURCE DEVELOPMENT

7.3 Groundwater Sources

7.3.2 Groundwater Availability in the Province

(1) Major Information and References

The Groundwater Availability Map was prepared using the following information and reference (detailed list of reference is presented in Table 7.3.1, Data Report):

- Administrative and Topographical Maps of the Province published by NAMRIA with scales of 1:250,000 and 1:50,000, respectively.
- Geological Map of the Philippines published by BMGS with a scale of 1:1,000,000.
- Water Resource Investigation conducted by NWRB, 1986.
- Well Inventory Database prepared by NWRB, LWUA and DPWH.
- Well Inventory Database in the province.
- General information on groundwater condition by DPWH-DEO and PPDO.
- Well Log Data by DPWH-DEO and PEO.
- Water source information by Water Districts.

(2) Approach and Methodology

The procedure in preparing the Groundwater Availability Map is explained below with workflow depicted in Figure 7.3.1.

- 1) Prepare a base map with an approximate scale of 1:600,000 (fit to the A4 map size).
The topographical map of NAMRIA (1:250,000) was used as a reference map. Basic information including rivers and provincial and municipal boundaries are indicated in the prepared base map.
- 2) The groundwater potential areas, based on the geology of the province, are delineated on the base map. The Recent alluvial and/or beach deposits, Pliocene-Quaternary sedimentary formation (clay, silt, sand and gravel) and Pliocene-Quaternary volcanic rock units (pyroclastics, debris flow and tuff) are regarded as possible aquifers considering their high porosity and permeability.

Boundaries between groundwater development potential area and difficult area were defined and delineated as presented in Figure 7.3.1, Main Report.

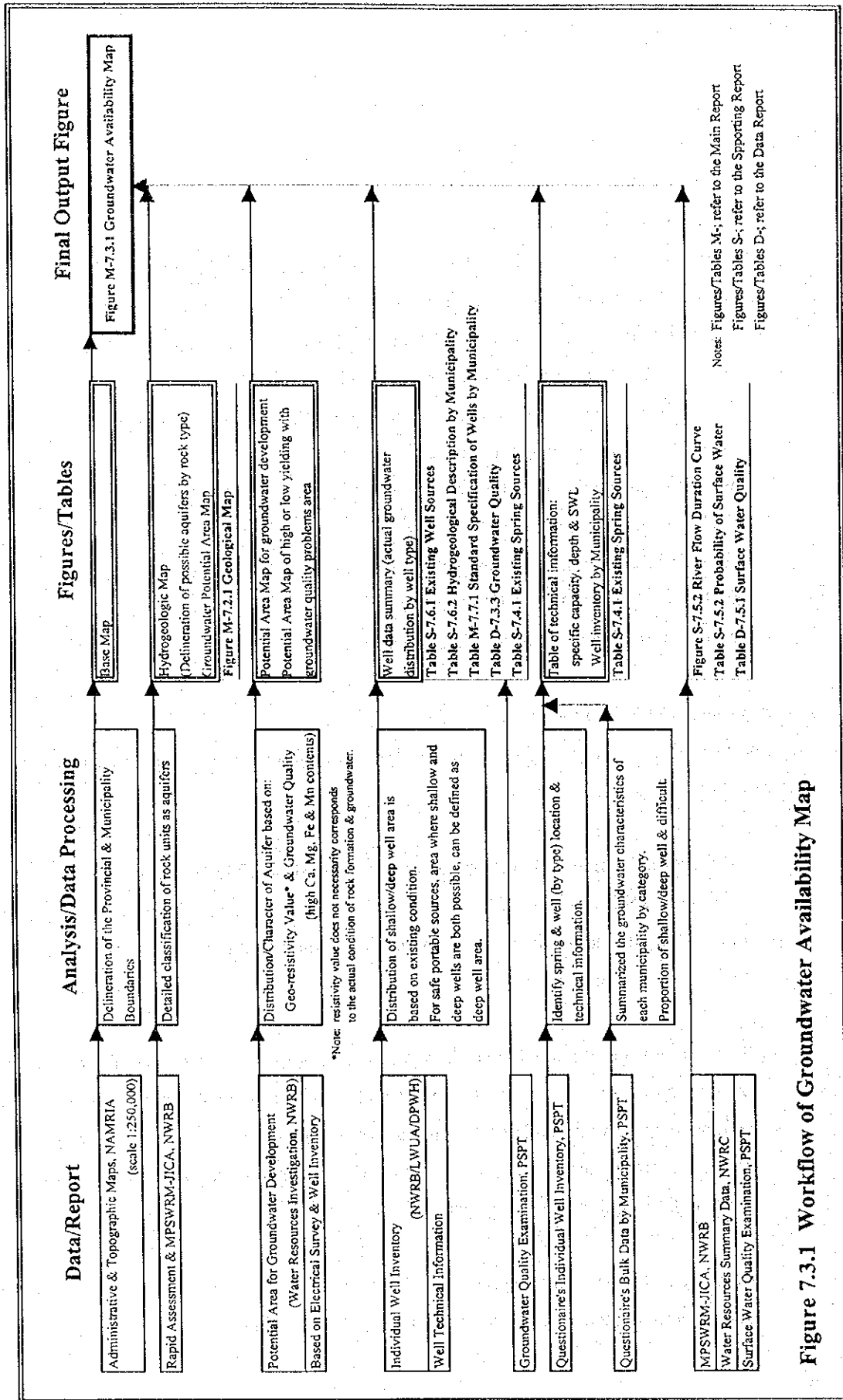


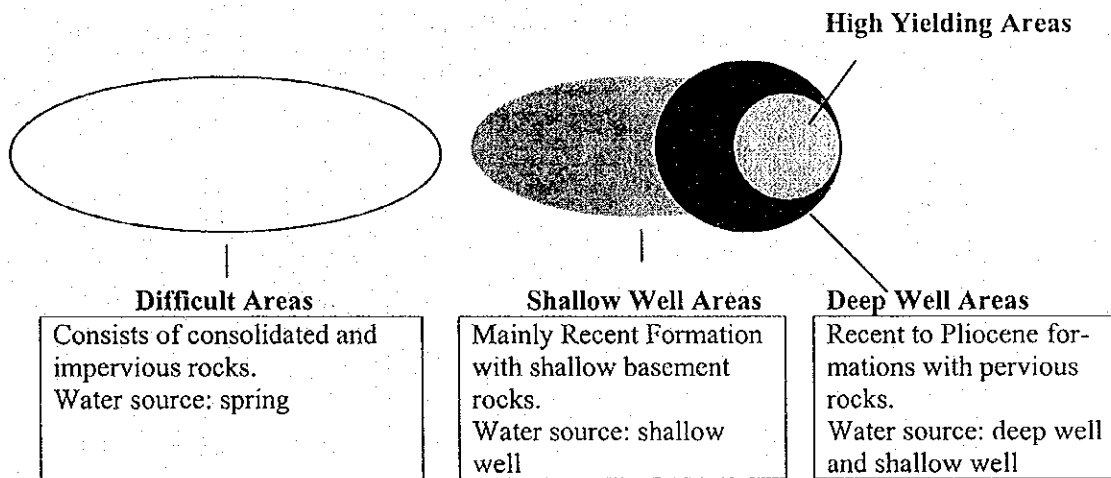
Figure 7.3.1 Workflow of Groundwater Availability Map

- 3) Areas with potential high yielding aquifer in the Water Resources Investigation of NWRB, are reflected in the defined groundwater potential areas.

Based on the results of electric resistivity survey of the above investigation, resistivity values from 20 to 210 ohm-meter indicate a potential high yielding formation. Values less than 10 ohm-meter suggest clayey layer. Figure 7.3.1, Main Report, shows the boundaries of areas with high and low yielding aquifers.

- 4) Delineate shallow and deep well areas based on well database of NWRB and DPWH-central office, well inventory of DPWH-DEO (refer to Table 7.3.1, Data Report) and rock distribution. Figure 7.3.4 presents the categorization in terms of groundwater utilization.

Figure 7.3.2 Area Category by Groundwater Utilization



Shallow well areas are defined on the following basis:

- Predominance of serviceable shallow wells and presence of deep wells with water quality problem and/or low yielding aquifers.
 - Occurrence of impervious rocks beneath the Recent formation at shallow depth.
- 5) Based on the information provided by NWRB's well inventory and the data obtained through the questionnaires, well specification for each municipality is established as shown in the map. These specifications are used as references in evaluating the groundwater availability in each locality. Individual well locations with technical information are presented in Figure 7.6.1, Data Report.

(3) Future Updating and Utilization of the Map

For future updating of the map, the following procedure shall be employed.

- 1) Referring to the results of any supplementary water sources investigation by various agencies, re-define the potential area for groundwater development by applying the aforementioned procedures.
- 2) Update the provincial database using the questionnaire made for the study to make necessary revision of the delineated boundaries of groundwater categories.

7.4 Spring Sources

The numbers and discharge of developed and untapped springs by municipality are shown in Table 7.4.1. The data are derived from and the information obtained through the questionnaires and Table 7.1.1 Water Source Information, Data Report.

Table 7.4.1 Existing Spring Sources

Municipality	No. of Developed Spring		Untapped Spring		
	Q<2.8lps	Q>2.8lps	No.	Ave. lps	Range lps
Banga	1	0	5	0.4	0.1 ~ 0.8
Koronadal	0	0	0	-	- ~ -
Lake Sebu	22	0	19	1.6	0.3 ~ 3.3
Norala	7	0	0	-	- ~ -
Polomolok	5	0	0	-	- ~ -
Santo Nino	0	0	0	-	- ~ -
Surallah	6	0	1	1.5	1.5 ~ 1.5
T'boli	17	0	5	3.7	1.2 ~ 6.0
Tampakan	21	0	4	0.3	0.3 ~ 0.3
Tantangan	6	0	0	-	- ~ -
Tupi	14	1	0	-	- ~ -

Note: Ave.lps & Range lps mean the average discharge and the range of discharges in lps (liter/second), respectively.

7.5 Surface Water Sources

The major rivers in the province were selected to evaluate their potential as water supply sources to meet the future water needs of the province. The following criteria were adopted for the selection:

- rivers currently utilized for domestic water supply
- rivers which have gauging stations, and

- rivers with watershed of 100 km² or more.

Based on the above criteria, the selected major rivers are Silway & Mindanao Rivers. Allah, Banga & Buluan Rivers are tributaries of the Mindanao River as shown in Figure 7.5.1 River Network Map. The boundary of the Water Resources Region divides the provincial area into two parts: WRR-XI and WRR-XII.

The gauging stations in the province are located at the tributaries of the Mindanao River and the Silway River, which are shown in Figure 7.5.1. The runoff records are obtained from the "Philippine Water Resources Summary Data" prepared by the NWRC in 1980. The information on the gauging stations and the present uses (water rights) of the major rivers in the province is summarized in Table 7.5.1.

(1) Surface Water Utilization/Water Rights

As seen in Table 7.5.1, the present water uses in the watershed of tributaries of the Mindanao River and the Silway River total to 74.6 m³/sec. The major diversion points, operated by NIA, are located in General Santos at the Silway River, in Surallah at the Allah River, and in Banga and Norala at the Banga River. Mining sites are located in the mountainous area. Most of them are located in Lake Sebu and Tampakan as shown in the Figure 7.5.1.

(2) River Flow Analysis

The flow duration curves, derived from the available runoff records, are shown in Figure 7.5.2. Also, for the Buayan River duration curve, the specific discharge at the Malingon Gauging Station in the province of Sarangani are added for comparison.

The stream flow, maintenance flow, diversion flow and return flow are usually used to estimate the exploitable surface water potential. In this study, the stream flow was considered as the flow potential for domestic use and the diversion flow value was treated as the equivalent to the discharge of water rights registration in surface water use. No detailed study on the return flow has been performed yet due to the difficulties in investigating the irrigation, evapotranspiration and recharge value to groundwater, etc. within the entire watersheds in the province. Therefore, the return flow was not considered for the estimation of exploitable potential.

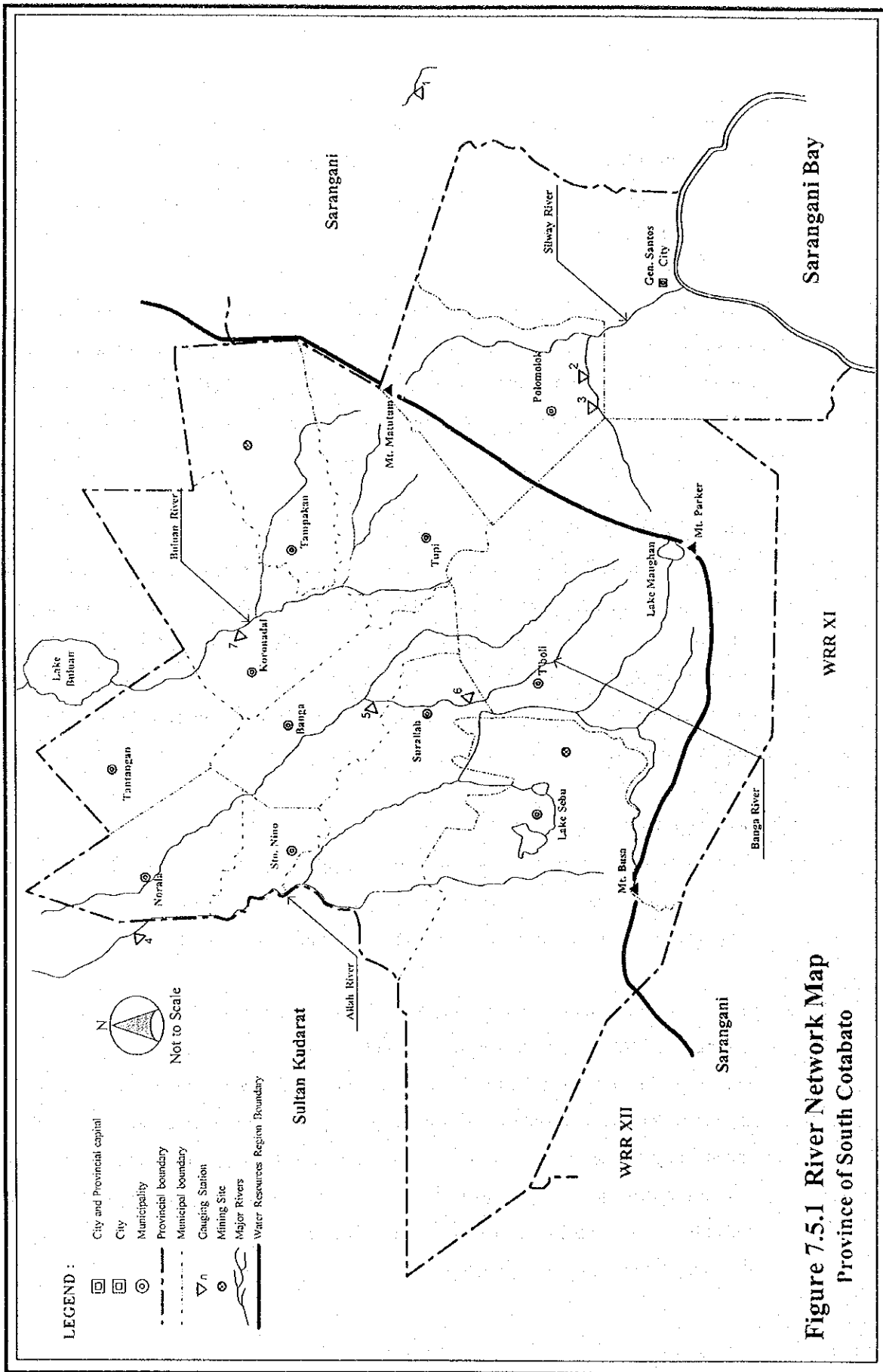


Table 7.5.1 Gauging Station & River Water Use by Major River Basins

Major River	River Basin systems Main	Information from Gauging Station				Surface Water Use (Water Rights) in Watershed						
		Drainage ¹ sq. km	Location No. in Figure 7.5.1	Peak Qp	River Flow Rate (Q: cum/sec) Max. Q _{ax} Mini. Q _{dn} Data Period	Municipality in watershed	Domestic cum/sec	Industrial cum/sec	Irrigation cum/sec	Others ³ cum/sec		
Silway		65.00 (3): upstream 85.00 (2): downstream		83.77 8.69	35.32 5.64	1.96 0.84	1956-70 1950-70	Tboli Polomolok General Santos	NR*4 0.04 0.00	NR*4 0.26 0.00	NR*4 0.72 7.22	NR*4 0.00 0.00
Mindanao	Allah							Tboli Lake Sebu Surallah Santo Nino Norala (Sultan Kudarat)*5	NR*4 NR*4 0.00 NR*4 0.00	NR*4 NR*4 0.00 NR*4 0.00	NR*4 NR*4 8.25 NR*4 12.77	NR*4 NR*4 0.00 NR*4 0.00
	Banaga			159.30	135.29	15.24	1951-70	Tboli Surallah Banga Santo Nino Norala (Sultan Kudarat)*5	NR*4 0.00 0.00 NR*4 0.00	NR*4 0.00 0.00 NR*4 0.00	NR*4 0.39 21.07 NR*4 1.88	NR*4 0.00 0.02 NR*4 0.00
	Palian							Tboli Polomolok Tupi Koronadal	NR*4 NR*4 0.00 0.00	NR*4 NR*4 0.00 0.00	NR*4 NR*4 0.23 10.67	NR*4 NR*4 0.00 0.00
	Buluan			42.39	36.91	2.74	1950-70	Tupi Tampakan Koronadal Tantangan (Sultan Kudarat)*5	NR*4 NR*4 0.00 0.00	NR*4 NR*4 0.00 0.00	NR*4 NR*4 10.67 0.42	NR*4 NR*4 0.00 0.00

Source: Philippine water resources Summary Data, established January 1980 by NWRRC

Notes:

Drainage* : Watershed Area at Gauging Station

NA*2 : Recorded River Gauge Height only

Qp : Peak Discharge of Daily Maximum Discharge

Qdx : Maximum Daily Discharge of Weighted Daily Discharge

Qdn : Minimum Daily Discharge of Weighted Daily Discharge

Others*3 : Including Livestock, Recreation & Fisheries

NR*4 : Surface water utilization was not registered in NWRB Database, as of March 1997.

(Province) : Out of Applicable Area

It is generally accepted that to secure the required volume for water supply, each water use sector adopts the different return periods. Usually, the dependability of domestic water supply is taken to be 90% or higher (10-year or longer return-period) of the whole hydrological period.

In determining the river maintenance flow, such factors as runoff characteristics, navigation, fishing, picturesque scenery, salt water intrusion, clogging of river mouth, riparian structures, groundwater table, flora and fauna, and river water quality shall be considered to maintain the normal function of the river. In the Philippines, 10% of the dependable flow of the river is at least required as minimum maintenance flow. Therefore, the maintenance flow was calculated as the dependable flow for irrigation, which equals to 80% (5-year return-period) of the whole hydrological period.

Finally, the exploitable potential of surface water in the province was studied in the case of inflow to and outflow from the respective municipalities. The results are summarized in Table 7.5.2.

(3) Surface Water Quality

Mining sites exist upstream of the Allah and Buluan streams which are connected to the Mindanao River. The location of the mining sites is shown in Figure 7.5.1.

The results of water quality analysis are summarized in Table 7.5.1, Data Report. The sampling locations were selected upstream of the respective municipalities. In the said table, Class AA and Class A of the DENR "Water Quality Criteria for Fresh Water" are shown as reference for raw water evaluation. The PNSDW-1994 is also used to evaluate water quality with reference to turbidity and trace elements. The water quality of the selected rivers falls within the class "A" standard, although the parameters tested are limited.

Percent of Time (%) (No. in Figure 7.5.1)	Specific Discharge (cum/sec/100sq.km)						
	Buayan 1	Silway-1 2	Silway-2 3	Allah 4	Banga-1 5	Banga-2 6	Buluan 7
10%	1.79	2.76	13.02	7.85	3.91	5.44	3.20
20%	1.42	2.35	10.83	6.63	3.51	5.33	2.48
30%	1.33	2.12	8.26	5.82	3.37	4.81	2.07
40%	1.13	1.83	6.65	5.28	3.04	4.29	1.84
50%	1.02	1.67	4.84	4.68	2.65	3.81	1.62
60%	0.98	1.49	4.17	4.19	2.38	3.39	1.43
70%	0.93	1.38	3.23	3.63	1.94	3.09	1.33
80%	0.86	1.30	2.84	3.07	1.69	2.52	1.24
90%	0.74	1.13	2.50	2.51	1.46	1.52	1.00
100%	0.70	0.71	0.02	0.73	0.97	0.15	0.49
Period of Data Used	1957-'70	1950-'70	1956-'70	1951-'70	1959-'69	1966-'69	1950-'70

Source; Philippine Water Resources Summary Data, as of Jan. 1980 by NWRC
Interim Report, Master Plan Study on Water Resources Management, as of Oct. 1997 by NWRB

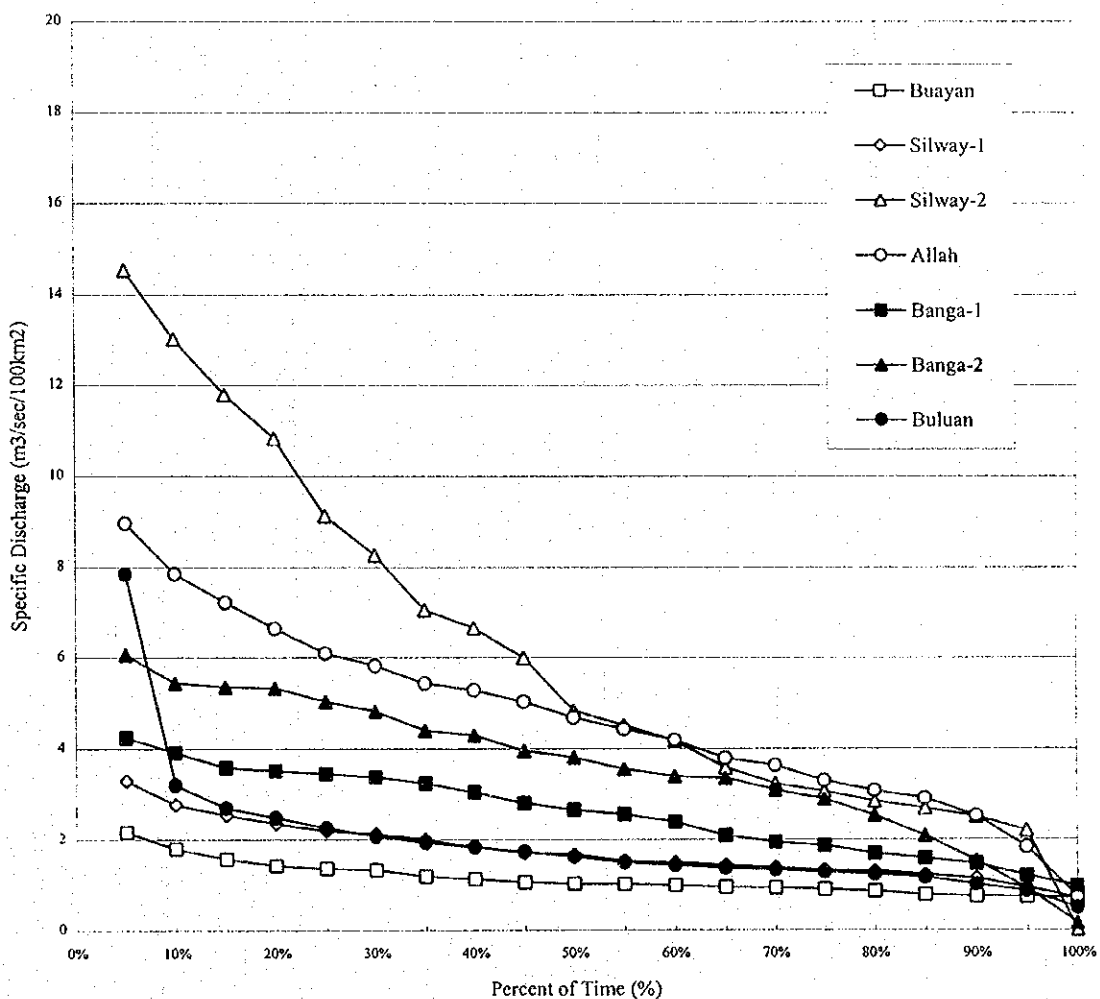


Figure 7.5.2 River Flow Duration Curve

Table 7.5.2 Probability of Surface Water

River Water Major River Water	Systems & Main	Related Data				Probability of Surface Water (10-year return-period)											
		Location Municipality & other Province upstream to down	River Connection	Watershed Area in		Sp.D (return-period)		Inlet Flow to Municipality			Outlet Flow from Municipality			Potential (12)			
				Location (1) sq. km	Upstream (2) sq. km	10-year (3) Q	5-year (4) Q	S/Flow (5) (2.15Y10) cu. m/sec	M/Flow (6) (2.15Y10)100 cu. m/sec	Use (7)	Potential (8) (P1007) cu. m/sec	S/Flow (9) (5.10Y10)100 cu. m/sec	M/Flow (10) (5.10Y10)100 cu. m/sec	Use (11)	Potential (12) (P10011) cu. m/sec		
Silway	T'boli	88.99	0.00	2.50	2.84	0.00	0.00	0.00	0.00	0.00	2.22	0.25	0.00	2.22	0.25	0.00	1.97
	Polomolok	281.18	88.99	2.50	2.84	2.22	0.25	0.00	1.97	9.25	1.05	1.02	9.25	1.05	1.02	7.18	7.18
	General Santos	97.29	370.17	2.50	2.84	9.25	1.05	1.02	7.18	11.69	1.33	8.24	11.69	1.33	8.24	2.12	2.12
	T'boli	248.23	0.00	2.51	3.07	0.00	0.00	0.00	0.00	6.23	0.76	0.00	6.23	0.76	0.00	5.47	5.47
	Lake Sebu	365.47	248.23	2.51	3.07	6.23	0.76	0.00	5.47	15.40	1.88	0.00	15.40	1.88	0.00	13.52	13.52
	Surallah	185.57	613.70	2.51	3.07	15.40	1.88	0.00	13.52	20.06	2.45	8.25	20.06	2.45	8.25	11.06	11.06
	Santo Nino	77.42	799.27	2.51	3.07	20.06	2.45	8.25	9.36	22.00	2.69	8.25	22.00	2.69	8.25	7.53	7.53
	Norala	33.05	876.69	2.51	3.07	22.00	2.69	8.25	11.06	22.83	2.79	12.51	22.83	2.79	12.51	2.19	2.19
	T'boli	172.45	0.00	1.52	2.52	0.00	0.00	0.00	0.00	2.62	0.43	0.00	2.62	0.43	0.00	2.50	2.50
	Surallah	55.43	172.45	1.52	2.52	2.62	0.43	0.00	2.19	3.46	0.57	0.39	3.46	0.57	0.39	0.27	0.27
Palian	Banga	240.35	227.88	1.52	2.52	3.46	0.57	0.39	2.50	7.12	1.18	1.18	7.12	1.18	1.18	0.68	0.68
	Santo Nino	31.62	468.23	1.52	2.52	7.12	1.18	5.66	0.27	7.60	1.26	5.66	7.60	1.26	5.66	0.84	0.84
	Norala	161.35	499.85	1.52	2.52	7.60	1.26	5.66	0.68	10.05	1.67	7.54	10.05	1.67	7.54	0.50	0.50
	T'boli	56.63	0.00	1.00	1.24	0.00	0.00	0.00	0.00	0.57	0.07	0.00	0.57	0.07	0.00	1.00	1.00
	Polomolok	57.79	56.63	1.00	1.24	0.57	0.07	0.00	0.50	1.14	0.14	0.00	1.14	0.14	0.00	0.23	0.23
	Tupi	164.16	114.42	1.00	1.24	1.14	0.14	0.00	1.00	2.79	0.35	0.23	2.79	0.35	0.23	0.25	0.25
	Koronadal	19.90	278.58	1.00	1.24	2.79	0.35	0.23	2.21	2.98	0.37	2.36	2.98	0.37	2.36	0.56	0.56
	Tupi	63.84	0.00	1.00	1.24	0.00	0.00	0.00	0.00	0.64	0.08	0.00	0.64	0.08	0.00	2.49	2.49
	Tampakan	220.68	63.84	1.00	1.24	0.64	0.08	0.00	0.56	2.85	0.35	0.00	2.85	0.35	0.00	0.12	0.12
	Koronadal	173.39	284.52	1.00	1.24	2.85	0.35	2.36	0.13	4.58	0.57	3.89	4.58	0.57	3.89	0.11	0.11
Tantangan	46.62	457.91	1.00	1.24	4.58	0.57	3.89	0.12	5.05	0.63	4.31	5.05	0.63	4.31			

Notes:
 Sp. D (Specific Discharge) was analyzed by monthly mean flow records from gauging station.
 S/Flow (Stream Flow) was estimated specific discharge (10-year return-period) multiplied by upstream area.
 M/Flow (Maintenance Flow) was estimated 10% of river flow in case of 5-year return-period.
 Sp. D (10-year or 5-year return-period) without gauging station was adopted by the other analysis result from near gauging station.
 Inlet & outlet "Use" (Water Rights) are summed up by NWRB Database, as of March 1997.
 Unit Q for Specific Discharge is cu.m/sec/100 sq.km.
 S/Flow, M/Flow & Use in final outlet flow of each stream system was added to respective inlet flows of main system.

7.6 Future Development Potential of Water Sources

(1) Groundwater

A well inventory covering all the municipalities shows that there are 36,013 existing wells in the province, while 208 wells are recorded in the inventory prepared by PSPT (See Table 7.1.1 and 7.3.1, Data Report). Despite the smaller number of wells included in the PSPT data, these were used in the analysis, since these provided technical information. Of the total 208 wells, 203 have complete information: depth, static water level and specific capacity. Data are summarized in Table 7.6.1 Existing Well Sources.

Table 7.6.1 Existing Well Sources

Municipality	Type	No.	Depth (m)		SWL (mbgs)		Sp. Cap. (lpsm)	
			Ave.	Range	Ave.	Range	Ave.	Range
Banga	DW	19	29.8	21.2 - 37.7	4.4	3.0 - 5.0	-	- - -
	SW	19	16.2	12.6 - 19.6	3.0	3.0 - 3.0	-	- - -
Koronadal	DW	25	35.3	22.0 - 78.0	3.9	3.0 - 13.7	-	- - -
	SW	25	15.3	10.3 - 19.8	3.1	3.0 - 5.0	-	- - -
Lake Sebu	DW	1	62.0	62.0 - 62.0	-	- - -	-	- - -
	SW	0	-	- - -	-	- - -	-	- - -
Norala	DW	6	47.9	36.3 - 67.0	7.4	5.0 - 15.0	-	- - -
	SW	14	13.8	12.2 - 18.7	3.0	3.0 - 3.0	-	- - -
Polomolok	DW	12	59.9	45.3 - 150.0	22.3	2.0 - 114.6	-	- - -
	SW	0	-	- - -	-	- - -	-	- - -
Santo Nino	DW	6	54.4	36.6 - 85.0	7.9	2.5 - 15.0	-	- - -
	SW	9	10.3	8.1 - 14.3	3.0	3.0 - 3.0	-	- - -
Surallah	DW	15	47.8	24.4 - 78.4	11.8	4.6 - 57.4	-	- - -
	SW	2	19.1	18.5 - 19.2	-	- - -	-	- - -
T'boli	DW	2	69.8	61.0 - 75.3	20.7	5.0 - 45.6	-	- - -
	SW	0	-	- - -	-	- - -	-	- - -
Tampakan	DW	6	45.6	35.6 - 53.3	17.9	5.0 - 41.5	-	- - -
	SW	4	18.7	17.3 - 19.8	3.0	3.0 - 3.0	-	- - -
Tantangan	DW	11	39.9	26.1 - 62.0	4.8	3.0 - 10.7	-	- - -
	SW	12	16.0	12.2 - 19.7	3.0	3.0 - 3.0	-	- - -
Tupi	DW	10	73.6	56.2 - 91.4	10.3	5.0 - 51.8	-	- - -
	SW	10	18.9	17.5 - 19.9	3.0	3.0 - 3.0	-	- - -

Notes; The values of "Ave. depth, SWL and Sp.Cap." by municipality are estimated using the weighted average based on 1995 census population in respective barangays at well location.

Legend; SWL=static water level, Sp.Cap.=specific capacity, Ave.=average, SW=shallow well and DW=deep well

Considering the well information, the most productive wells are those having depth ranging from 10.3m to 19.8m and from 22.0m to 85.0m. The good yielding wells have static water level varying from about 3.0m to 15.0mbgs and specific capacity of about 1.0 lpsm to 2.5 lpsm.

Based on the hydraulic characteristics and location of wells in South Cotabato, aquifers are widely distributed along both sides of the Allah, Banga and Buluan rivers that originated from two volcanoes and flowing to the province of Sultan Kudarat. Shallow well area is not distributed in the province. The Miocene and older rock units are widely distributed in the northeastern and the southwestern parts of the province that are classified as difficult area for groundwater development.

As indicated in Figure 7.3.1 Main Report, the Cotabato Basin is a high yielding potential area covering the northwestern part of the province. However, more than half of the numbers of shallow and deep wells in the municipalities of Koronadal and Tantangan contain high Cl, as brackish water.

As alternative water sources, the untapped springs can be developed for future use. These are the most reliable sources for water supply in the province because groundwater quality has a serious problem of brackish water. Existing spring sources of 100 are utilized for water supply and they originate from the high mountains in the northeastern and the southwestern parts of the province and the Roxas Range area. The untapped springs of 34 are proposed as future water sources in the areas of Tupi, Polomolok, T'boli, Lake Sebu and Surallah.

The detailed hydrogeological characteristics of each municipality are summarized in Table 7.6.2, while individual well locations with technical information are shown in Figure 7.6.1 individual Well Location and Specification Map, Data Report.

Additional wells shall be designed employing "gravel packed well" with a thickness of about 50mm or more depending on the grain sizes of aquifers and pumping capacity. While, natural gravel packed well may be adopted within the areas where well-sorted natural gravel formation is distributed at the expected aquifer. Such areas are usually the upstream areas of alluvial fans or plains in the province. The application of such method for Level I well is also justifiable, since inflow velocity of groundwater through the screen is very low because of minimal pumping rate by means of hand-pump operation.

Table 7.6.2 Hydrogeological Descriptions by Municipality

Municipality	Ground Information				Well Information				Groundwater Information										
	Topography		Geology		Depth		SWL		Availability		Potential		Quality						
	Area Proportion (%)		Stratigraphy of Geological Age*		m		mbs		Area Proportion (%)		Comparative		Area Feature						
	Plain-Plateau	Hilly-Piedmont	Mountain	Lithofacies (Major Aquifers)	Q	Neo.	Paleo.	C	mini.	max.	mbgs	Sp.Cap. lpsm	L-III well	SW	Diff.	Wells	Springs	Problem	Pollutants
Banga	47%	53%	0%	recent deposit & limestone	X	X		21.2	37.7	3.0	5.0	-	0	0%	100%	0%	good	few	
Gen. Santos	67%	26%	7%	recent deposits	X	X	X	-	-	-	-	-	-	0%	93%	7%	good	poor	
Koronadal	42%	32%	26%	recent deposits	X	X	X	22.0	78.0	3.0	13.7	-	4	0%	74%	26%	good	few	brackish
Lake Sebu	2%	59%	39%	limestone & conglomerate	X	X	X	62.0	62.0	-	-	-	0	0%	61%	39%	fair	rich	mining
Norala	69%	31%	0%	recent deposits	X	X		36.3	67.0	5.0	15.0	-	0	0%	100%	0%	good	poor	
Polomolok	9%	84%	7%	recent deposits & pyroclastics	X	X		45.3	150.0	2.0	114.6	-	6	0%	93%	7%	poor	few	
Santo Nino	99%	1%	0%	recent deposits	X			36.6	85.0	2.5	15.0	-	0	0%	100%	0%	good	poor	
Surallah	55%	27%	18%	recent deposits & limestone	X	X	X	24.4	78.4	4.6	57.4	-	0	0%	82%	18%	good	few	
T'boli	3%	56%	41%	limestone & pyroclastics	X	X	X	61.0	75.3	5.0	45.6	-	1	0%	59%	41%	poor	rich	
Tampakan	23%	18%	59%	recent deposits & limestone	X	X	X	35.6	53.3	5.0	41.5	-	0	0%	41%	59%	good	few	mining
Tantangan	79%	21%	0%	recent deposits	X	X		26.1	62.0	3.0	10.7	-	0	0%	100%	0%	good	poor	brackish
Tupi	9%	85%	6%	recent deposits & limestone	X	X		56.2	91.4	5.0	51.8	-	0	0%	94%	6%	fair	few	

Legend; Geological Age, Q=Quaternary, Neo.=Neogene, Paleo.=Paleogene, C=Cretaceous
 Well Information, SWL=static water level, Sp.Cap.=specific capacity, L-III=wells operated for L-III service
 Groundwater Information, SW=solo shallow well area, DW=deep well area, Diff.=difficult area

Generally, shallower well has higher possibility to be constructed by the natural gravel packed method than the deeper one in areas formed by recent deposits. This is because the layers at different depths of alluvial plain or fan deposits had been formed by different situations of transportation and sedimentation between varied grain sizes. Therefore, the availability of the natural packed well development in the province is experimentally assumed considering the limited information such as topography, geology, static water levels, etc., as shown in Table 7.6.3. However, the different proportions of the 2 kinds of deep well structures (gravel packed and natural gravel packed wells) are not estimated by the accurate results based on the hydrogeological study.

Table 7.6.3 Proportion of Gravel Packed and Natural Gravel Packed Wells

Municipality (only potential area)	Proposed Well Depth	Proportion (%) of Level-I Deep Wells	
		Gravel Packed	Natural Gravel Packed
Banga	40 m	85 %	15 %
Koronadal	40 m	85 %	15 %
Norala	40 m	85 %	15 %
Polomolok	80 m	95 %	5 %
Santo Nino	40 m	85 %	15 %
Surallah	40 m	85 %	15 %
Tampakan	40 m	90 %	10 %
Tantangan	40 m	85 %	15 %
Tupi	40 m	95 %	5 %

Examination on the effective grain sizes and uniformity coefficient by sieve analysis at the influential aquifers (composed of coarse sand and/or fine gravel) should be conducted during the implementation period. Such analysis and actual well construction results are very helpful in considering the natural gravel packed method for future planning.

(2) Spring

Untapped spring source identification data are shown in Table 7.6.3. These data were collected and tabulated using the questionnaire sheet-untapped spring information format, Data Report. Data also include the parameters of barangay name, owner, discharge, transmission line length and elevation difference.

Table 7.6.4 Untapped Spring Source Identification

Location		Identification of Untapped Spring			
Municipality	Barangay	Owner	Discharge (lps)	T.L.L.* (km)	Elevation Difference (m)
Banga	El Nonok	NA	0.2	1.2	18
	El Nonok	NA	0.3	1.2	8
	Lam-Apos	NA	0.8	1.8	30
	Lamba	NA	0.3	1.0	9
	Lampari	NA	0.1	0.3	4
Lake Sebu	Bacdulong	NA	1.3	0.2	-5
	Bacdulong	NA	1.3	0.5	-15
	Bacdulong	NA	3.3	2.0	100
	Hanoon	NA	0.7	1.5	-6
	Hanoon	NA	0.5	0.2	15
	Hanoon	NA	0.3	1.0	15
	Klubi	NA	1.7	0.7	-15
	Klubi	NA	3.3	0.3	20
	Klubi	NA	1.7	0.5	15
	Klubi	NA	1.0	1.2	10
	Klubi	NA	0.7	0.8	NA
	Klubi	NA	3.3	0.3	30
	Lake Lahit	NA	2.7	1.5	15
	Lake Lahit	NA	0.7	0.5	8
Lake Sebu	Lake Lahit	NA	1.3	0.5	50
	Lake Lahit	NA	1.0	0.3	15
	Luhib	NA	1.0	0.1	10
	Maculan (Lower)	NA	1.3	0.8	30
	Maculan (Upper)	NA	2.7	2.0	150
Surallah	Lambontong	NA	1.5	3.0	20
Tampakan	Danlag	NA	0.3	0.8	140
	Lampitak	NA	0.3	2.0	280
	Lampitak	NA	0.3	1.5	100
	Tablu	NA	0.3	4.0	100
T'boli	Afus	NA	6.0	5.6	65
	Laconon	NA	1.2	5.0	50
	Lamsalome	NA	5.6	2.0	130
	Sinolon	NA	1.5	2.0	80
	Taluyo	NA	4.0	3.8	120

Note: T.L.L. - Transmission line length
 NA - Data not available

(3) Surface Water

On 6 September 1995, the outer rim of Lake Maughan collapsed having affected up to a height of 10m at the vicinity of the outlet. The NIA estimated the discharge amount of thirty (30) million m³ that caused considerable damages at irrigated areas downstream and several settlements.

The runoff record available at the Lake Maughan is limited to that collected by the NIA from July to September 1996 (with brief comments on outlet flow). The potential flow rate to be used considering the present ecological conditions of the lake is suggested at 1,690 lps (53.3 million m³/year) based on the above mentioned 3-month data.

The following are the preliminary estimation of the potential water amount to be availed at Lake Maughan.

- Catchment area; 11.9 km² as an area of crater with diameter of 3,900m
- Lake surface area; 3.1 km² as an area of lake with diameter of 2,000m
- Rainfall; 1,677 mm/year (records at Davao City Synoptic Station; 1951 to 1995)
- Evapotranspiration ratio; 65% (assumed as forest area 8.8 km²)
- Evaporation value; 3 mm/day (assumed as lake surface 3.1 km²)
- Probability of 10-year drought; 55% of annual average based on statistical analysis
- Exploitable potential value; 2.3 million m³/year (73 lps) under above conditions
- Water loss ratio; 30% in the delivery of water
- UWC; 100 lpcd (Design criteria for urban water supply)

Assuming that the expected recharge volume of Lake Maughan may be exploitable, the amount of 2.3 million m³/year (73 lps) is estimated. This amount can supply to at least 50,000 people.

There is a large difference between the runoff record (3 months in the year 1996) and the above estimation result. The runoff ratio seems to be affected by the rainfall (which is the main recharge source) for the year. In this connection, the available water volume (suggested based on the three-month measurement records) shall be discounted in consideration of the rainfall pattern for the year. Furthermore, there are some factors that affect the available amount of water: drought year, rainfall pattern, effluent seepage, etc.

Referring to the precipitation records at PAGASA synoptic stations in Mindanao (refer to Table 7.6.5), the period from June to September falls on high-rainfall months. The low rainfall season of southern Mindanao is from February to April. During this period, only about 30% of the rainfall during high-rainwater months are expected.

Table 7.6.5 Average Monthly Rainfall

Station	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Malaybalay City	158	<i>94</i>	<i>110</i>	<i>105</i>	219	304	322	297	320	266	174	125	2,497
Davao City	<i>106</i>	<i>71</i>	<i>92</i>	151	161	192	160	183	171	160	132	97	1,677
Cotabato City	<i>46</i>	<i>62</i>	<i>42</i>	<i>53</i>	71	142	113	84	90	83	69	<i>50</i>	905
Gen. Santos City	<i>64</i>	<i>73</i>	<i>40</i>	<i>51</i>	88	113	104	87	81	94	87	<i>74</i>	955

Note: - Above italic figures indicate dry season and bold figures are rainy season.

In consideration of the above, and the information on the storage capacity of the lake (outlet is the top of the rim) and the inflow of springs to the lake excluded, the available water from the lake for water supply may be calculated as follows:

$$1,690\text{lbs} \times 30\% \text{ (percentage of minimal rainfall month to high-rainfall months)} \times 70\% \text{ (effective percentage of intake water amount)} \times 55\% \text{ (water availability in drought year)} \\ = 195 \text{ lbs}$$

7.7 Water Source Development for Medium-Term Development Plan

7.7.1 Detailed Groundwater Investigation Required

(1) Test Well Investigation on Potable Groundwater Potential in Koronadal

Most of the provincial urban areas, except General Santos City, are concentrated in the northwest alluvial plain along the highway. These urbanized areas may be covered by Level III water supply service. Hence, the existing water supply systems have to be improved, expanded or combined to meet future service level and water demand. The 1995 census indicated a total population of 156,600 these urban barangays. Most of the water source in these areas is deep well. However, problem on brackish water is observed in some areas of Koronadal and Tantangan extending up to Lake Buluan in Sultan Kudarat.

For the future sustainable groundwater development in terms of quantity and quality, therefore, the study on the permissive sustained yield of potable groundwater shall be conducted. The recommended tasks would involve test wells with pumping tests, the water quality analysis, etc. as specified below.

- Study Site; about 25 km along the highway from Koronadal to Tantangan
- Review of Electrical Prospecting Survey; Groundwater Investigation, 1982 by NWRC
- Number of Test Wells; two deep wells in Koronadal
- Tentative Well Design; depth of 100 & 150m, diameter of 250mm and screen length of 25m & 40m
- Pumping Test; Time draw-down with maximum discharge of 2,500m³/day and recovery test
- Water Quality Examination; to include Cl
- Results; Potable Groundwater Potential

(2) Test Well Investigation on Groundwater Potential in Deeper Aquifers (Limestone)

There is a possibility of groundwater imbalance when groundwater extracted from the alluvial plain deposits is the only water source supplying the economic zone along the highway. Nonetheless, there are free flowing deep wells in Banga area. According to the geological background of this area, the aquifer is considered as limestone formation, which are leading to the Cotabato Cordillera and or the fault block Roxas Range. Therefore, the limestone formation can be taken into account as alternative aquifers to provide additional water sources to meet the future demands. The study on permissive sustained yield of the limestone aquifers shall be conducted when the groundwater imbalance of demand and supply is confirmed. Recommended tasks are test wells with pumping tests, water quality analysis, etc. as specified below.

- Test Well Site; limestone plateaus in Maasin
- Test Well; one deep well
- Tentative Well Design; depth of 180m, diameter of 250mm and screen length of 45m
- Pumping Test; Time Draw-down and Recovery Test with maximum discharge of 2,500 m³/day
- Water Quality Examination: to include of Cl
- Results; Groundwater Potential

7.7.2 Spacing Allocation for Level II and III Wells

The pumping rates required for Level I facilities are fairly lower than that for Level II and III systems. The well interference in Level I facilities need not be studied in terms of spacing of wells and production rate, since most formations in shallow and deep well areas generally have enough groundwater development potential. As Level II and III wells are usually ex-

pected to produce larger discharge to meet the water demand, the spacing of wells to avoid well interference has to be considered. Spacing allocation for Level II and III wells was examined considering specific capacity, pumping rate, and assumed drawdown of 1cm at the interference radius for a pumping duration of 16 hours.

(1) Specific Capacity

According to the existing well source information, specific capacity was considered with ranges from 0.5 lpsm to 6.5 lpsm. To simplify the calculation, an average value in each range is adopted in the calculation of interference radius.

(2) Pumping Rate

The pumping rate was estimated by assuming a drawdown of 10m with the average value of specific capacity and pump operation of 16 hours/day. The formula used to determine proper well spacing is the Jacob modified equation. Drawdown at the interference boundary is assumed at 1cm after a pumping duration of 16 hours.

Table 7.7.1 presents the estimated spacing requirements and number of wells to be constructed within a well field of one km². The spacing interval between adjacent wells to avoid well interference is planned to be more than twice the distances of the calculated interference radius.

Table 7.7.1 Spacing Arrangements for Planned Wells

Range of Specific Capacity (lpsm)	Estimated Pumping Rate (m ³ /day)	Estimated Interference Radius (m)	Estimated Number of Wells/km ²
0.5 - 1.5	500	80	45
1.5 - 3.0	1,000	120	20
3.0 - 4.5	2,000	160	11
4.5 - 6.0	2,500	200	7
> 6.0	>2,500	>200	>7

**FUTURE REQUIREMENTS
AND DEVELOPMENT PLAN**

B

8. FUTURE REQUIREMENTS IN WATER SUPPLY AND SANITATION IMPROVEMENT

8.2 Targets of Provincial Sector Plan

Table 8.2.1 Estimation of Base Year Service Coverage of Water Supply

Name of Municipality	Area	Population (1997)	Population Served by 1997 Facilities				Population Served by Planned/On-going Projects				Population Served in the Base Year (1997)				
			Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Percentage Coverage
Banga	Urban	12,926			9,699	9,699							9,699	9,699	75
	Rural	56,274		1,008	28,693	29,701						1,008	28,693	29,701	53
	Total	69,200		1,008	38,392	39,400						1,008	38,392	39,400	57
Koronadal (Capital)	Urban	64,071	2,930		36,016	38,946					2,930		36,016	38,946	61
	Rural	57,643	3,700	500	33,343	37,543					3,700	500	33,343	37,543	65
	Total	121,714	6,630	500	69,359	76,489					6,630	500	69,359	76,489	63
Lake Sebu	Urban	8,362			2,406	2,406							2,406	2,406	29
	Rural	45,654		5,654	19,015	24,669						5,654	19,015	24,669	54
	Total	54,016		5,654	21,421	27,075						5,654	21,421	27,075	50
Nonila	Urban	26,584	11,105		9,351	20,456					11,105		9,351	20,456	77
	Rural	14,695		450	9,946	10,396						450	9,946	10,396	71
	Total	41,279	11,105	450	19,297	30,852					11,105	450	19,297	30,852	75
Polomolok	Urban	51,028	28,993		10,196	39,189					28,993		10,196	39,189	77
	Rural	47,703	13,987	5,184	8,179	27,350					13,987	5,184	8,179	27,350	57
	Total	98,731	42,980	5,184	18,375	66,539					42,980	5,184	18,375	66,539	67
Santo Niño	Urban	14,894			8,292	8,292							8,292	8,292	56
	Rural	17,908		600	10,089	10,689						600	10,089	10,689	60
	Total	32,802		600	18,381	18,981						600	18,381	18,981	58
Surallah	Urban	24,229	2,436		13,023	15,459					2,436		13,023	15,459	64
	Rural	40,209	2,271	5,944	18,183	26,398					2,271	5,944	18,183	26,398	66
	Total	64,438	4,707	5,944	31,206	41,857					4,707	5,944	31,206	41,857	65
Tampakan	Urban	9,972			4,956	4,956							4,956	4,956	50
	Rural	19,322		5,040	8,580	13,620						5,040	8,580	13,620	70
	Total	29,294		5,040	13,536	18,576						5,040	13,536	18,576	63
Tantangan	Urban	9,170			5,013	5,013							5,013	5,013	55
	Rural	22,351		1,740	11,799	13,539						1,740	11,799	13,539	61
	Total	31,521		1,740	16,812	18,552						1,740	16,812	18,552	59
T'boli	Urban	13,894		2,060	2,825	4,885						2,060	2,825	4,885	35
	Rural	52,422	2,165	7,074	5,759	14,998					2,165	7,074	5,759	14,998	29
	Total	66,316	2,165	9,134	8,584	19,883					2,165	9,134	8,584	19,883	30
Tupi	Urban	10,015	1,750		3,778	5,528					1,750		3,778	5,528	55
	Rural	37,867	2,000	10,808	8,537	21,345					2,000	10,808	8,537	21,345	56
	Total	47,882	3,750	10,808	12,315	26,873					3,750	10,808	12,315	26,873	56
Provincial Total	Urban	245,143	47,214	2,060	105,555	154,829					47,214	2,060	105,555	154,829	63
	Rural	412,048	24,123	44,002	162,123	230,248					24,123	44,002	162,123	230,248	56
	Total	657,193	71,337	46,062	267,678	385,077					71,337	46,062	267,678	385,077	59

Table 8.2.2 Population Coverage in Phase I Provided by Served Population in the Base Year (Water Supply)

Name of Municipality	Area	Population Served by 1997 Facilities				1997		2003	
		Level III	Level II	Level I	Total	Total Population	Coverage (%)	Total Population	Coverage (%)
Banga	Urban			9,699	9,699	12,926	75	14,240	68
	Rural		1,008	28,693	29,701	56,274	53	61,992	48
	Total		1,008	38,392	39,400	69,200	57	76,232	52
Koronadal (Capital)	Urban	2,930		36,016	38,946	64,071	61	68,559	57
	Rural	3,700	500	33,343	37,543	57,643	65	61,679	61
	Total	6,630	500	69,359	76,489	121,714	63	130,238	59
Lake Sebu	Urban			2,406	2,406	8,362	29	11,971	20
	Rural		5,654	19,015	24,669	45,654	54	65,360	38
	Total		5,654	21,421	27,075	54,016	50	77,331	35
Norala	Urban	11,105		9,351	20,456	26,584	77	29,336	70
	Rural		450	9,946	10,396	14,695	71	16,217	64
	Total	11,105	450	19,297	30,852	41,279	75	45,553	68
Polomolok	Urban	28,993		10,196	39,189	51,028	77	53,977	73
	Rural	13,987	5,184	8,179	27,350	47,703	57	50,461	54
	Total	42,980	5,184	18,375	66,539	98,731	67	104,438	64
Santo Niño	Urban			8,292	8,292	14,894	56	15,583	53
	Rural		600	10,089	10,689	17,908	60	18,735	57
	Total		600	18,381	18,981	32,802	58	34,318	55
Surallah	Urban	2,436		13,023	15,459	24,229	64	27,322	57
	Rural	2,271	5,944	18,183	26,398	40,209	66	45,342	58
	Total	4,707	5,944	31,206	41,857	64,438	65	72,664	58
Tampakan	Urban			4,956	4,956	9,972	50	10,899	45
	Rural		5,040	8,580	13,620	19,322	70	21,117	64
	Total		5,040	13,536	18,576	29,294	63	32,016	58
Tantangan	Urban			5,013	5,013	9,170	55	10,386	48
	Rural		1,740	11,799	13,539	22,351	61	25,315	53
	Total		1,740	16,812	18,552	31,521	59	35,701	52
T'Boli	Urban		2,060	2,825	4,885	13,894	35	24,952	20
	Rural	2,165	7,074	5,759	14,998	52,422	29	94,141	16
	Total	2,165	9,134	8,584	19,883	66,316	30	119,093	17
Tupi	Urban	1,750		3,778	5,528	10,015	55	10,618	52
	Rural	2,000	10,808	8,537	21,345	37,867	56	40,143	53
	Total	3,750	10,808	12,315	26,873	47,882	56	50,761	53
Provincial Total	Urban	47,214	2,060	105,555	154,829	245,145	63	277,843	56
	Rural	24,123	44,002	162,123	230,248	412,048	56	500,502	46
	Total	71,337	46,062	267,678	385,077	657,193	59	778,345	49

Table 8.2.3 Number of Households Served by Sanitary Toilets in the Base Year (1997)

Name of Municipality	Area	Population (1997)	Number of Households (1997)	Households Using Sanitary Toilets in 1997				Recipient HHs of Planned/On-going Projects				Households Using Sanitary Toilets in the Base Year (1997)								
				Flush Toilets	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Coverage (%)				
																Pour Flush	VIP/Dry	Total	Flush	VIP/Dry
Banga	Urban	12,926	2,596	33	2,265	178	2,476						33	2,265	178	2,476	1	87	7	95
	Rural	56,274	10,927	15	5,523	3,024	8,562						15	5,523	3,024	8,562		51	28	78
	Total	69,200	13,523	48	7,788	3,202	11,038						48	7,788	3,202	11,038		58	24	82
Koronadai (Capital)	Urban	64,071	13,432	247	8,486	576	9,309						247	8,486	576	9,309	2	63	4	69
	Rural	57,643	11,325	12	6,050	1,883	7,943						12	6,050	1,883	7,943		53	17	70
	Total	121,714	24,757	259	14,536	2,459	17,254						259	14,536	2,459	17,254	1	59	10	70
Lak Sebu	Urban	8,362	1,679	2	601	468	1,071						2	601	468	1,071		36	28	64
	Rural	45,654	9,186		1,017	1,970	2,987							1,017	1,970	2,987		11	21	33
	Total	54,016	10,865	2	1,618	2,438	4,058						2	1,618	2,438	4,058		15	22	37
Norala	Urban	26,584	5,142	20	2,898	1,072	3,990						20	2,898	1,072	3,990		56	21	78
	Rural	14,695	2,706	11	1,687	421	2,119						11	1,687	421	2,119		62	16	78
	Total	41,279	7,848	31	4,585	1,493	6,109						31	4,585	1,493	6,109		58	19	78
Polonekok	Urban	51,028	10,288	72	7,273	1,286	8,631						72	7,273	1,286	8,631	1	71	13	84
	Rural	47,703	9,263	42	4,768	1,540	6,350						42	4,768	1,540	6,350		51	17	69
	Total	98,731	19,551	114	12,041	2,826	14,981						114	12,041	2,826	14,981	1	62	14	77
Santo Niho	Urban	14,894	2,826	13	1,550	609	2,172						13	1,550	609	2,172		55	22	77
	Rural	17,908	3,392	6	2,085	451	2,542						6	2,085	451	2,542		61	13	75
	Total	32,802	6,218	19	3,635	1,060	4,714						19	3,635	1,060	4,714		58	17	76
Surallah	Urban	24,229	4,760	30	2,901	842	3,773						30	2,901	842	3,773	1	61	18	79
	Rural	40,209	8,010	12	4,480	1,464	5,956						12	4,480	1,464	5,956		56	18	74
	Total	64,438	12,770	42	7,381	2,306	9,729						42	7,381	2,306	9,729		58	18	76
Tampakan	Urban	9,972	1,833	3	1,037	287	1,327						3	1,037	287	1,327		57	16	72
	Rural	19,322	3,781	15	1,438	965	2,418						15	1,438	965	2,418		38	26	64
	Total	29,294	5,614	18	2,475	1,252	3,745						18	2,475	1,252	3,745		44	22	67
Tantangau	Urban	9,170	1,757	12	1,034	140	1,186						12	1,034	140	1,186		59	8	68
	Rural	22,351	4,109	7	1,754	984	2,745						7	1,754	984	2,745		43	24	67
	Total	31,521	5,866	19	2,788	1,124	3,931						19	2,788	1,124	3,931		48	19	67
T'Bohi	Urban	13,894	2,757	3	484	771	1,258						3	484	771	1,258		18	28	46
	Rural	52,422	10,381	9	1,485	2,444	3,938						9	1,485	2,444	3,938		14	24	38
	Total	66,316	13,138	12	1,969	3,215	5,196						12	1,969	3,215	5,196		15	24	40
Tupi	Urban	10,015	2,007	64	1,053	269	1,386						64	1,053	269	1,386	3	52	13	69
	Rural	37,867	7,254	28	3,066	2,019	5,113						28	3,066	2,019	5,113		42	28	70
	Total	47,882	9,261	92	4,119	2,288	6,499						92	4,119	2,288	6,499	1	44	23	70
Provincial Total	Urban	245,145	49,077	499	29,582	6,498	36,579						499	29,582	6,498	36,579	1	60	13	75
	Rural	412,048	80,334	157	33,353	17,165	50,675						157	33,353	17,165	50,675		42	21	63
	Total	657,193	129,411	656	62,935	23,663	87,254						656	62,935	23,663	87,254	1	49	18	67

Table 8.2.4 Number of Public School Student Served by School Toilets in Base Year (1997)

Name of Municipality	1997 Total Number of Public School Student	Standard No. of Student that can be Served by 1997	No. of Student to be Served by Planned /On-going Projects	Standard No. of Students that can be Served by Toilets in Base Year (1997)	Coverage (%)
Banga	13,129	11,560		11,560	88
Koronadal (Capital)	28,941	21,160		21,160	73
Lake Sebu	7,169	400		400	6
Norala	10,171	6,200		6,200	61
Polomolok	20,148	15,080		15,080	75
Santo Niño	9,364	8,640		8,640	92
Surallah	16,445	8,480		8,480	52
Tampakan	7,737	4,520		4,520	58
Tantangan	6,487	5,360		5,360	83
T'Boli	10,063	4,000		4,000	40
Tupi	13,037	6,480		6,480	50
Provincial Total	142,691	91,880		91,880	64

Table 8.2.5 Number of Public Utilities with Sanitary Toilets in the Base Year (1997)

Name of Municipality	Type	No. of PU with Toilets in 1997	No. of PU with Sanitary Toilets in 1997	No. of PU with Toilets in Planned/ On-going Project	No. of PU with Sanitary Toilets in Planned/ On-going Projects	No. of PU with Toilets in Base Year 1997	No. of PU with Sanitary Toilets in Base year 1997	Coverage (%)
Banga	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal	1	1			1	1	100
	Parks/Playground	2	2			2	2	100
	Total	4	4			4	4	100
Koronadal (Capital)	Public Market	4	4			4	4	100
	Bus/Jeepney Terminal	2	2			2	2	100
	Parks/Playground	4	4			4	4	100
	Total	10	10			10	10	100
Lake Sebu	Public Market							
	Bus/Jeepney Terminal							
	Parks/Playground							
	Total							
Norala	Public Market	1				1		
	Bus/Jeepney Terminal	1	1			1	1	100
	Parks/Playground							
	Total	2	1			2	1	50
Polomolok	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal	1	1			1	1	100
	Parks/Playground	4	4			4	4	100
	Total	6	6			6	6	100
Santo Niño	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal	1	1			1	1	100
	Parks/Playground	1	1			1	1	100
	Total	3	3			3	3	100
Surallah	Public Market	2	2			2	2	100
	Bus/Jeepney Terminal	1	1			1	1	100
	Parks/Playground	2	2			2	2	100
	Total	5	5			5	5	100
Tampakan	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal							
	Parks/Playground	1	1			1	1	100
	Total	2	2			2	2	100
Tantangan	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal							
	Parks/Playground							
	Total	1	1			1	1	100
T'Bohi	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal							
	Parks/Playground							
	Total	1	1			1	1	100
Jupi	Public Market	2	2			2	2	100
	Bus/Jeepney Terminal							
	Parks/Playground	2	2			2	2	100
	Total	4	4			4	4	100
Provincial Total	Public Market	15	14			15	14	93
	Bus/Jeepney Terminal	7	7			7	7	100
	Parks/Playground	16	16			16	16	100
	Total	38	37			38	37	97

Table 8.2.6 Households Coverage in Phase I Provided by Existing Facilities in the Base Year (Household Toilets)

Name of Municipality	Area	No. of Household Served by Existing Facilities						Coverage in 1997												Coverage in 2003					
		Flush		VIP/Dry		Total		No. of HHs	Percentage of Served Households			Served Population			No. of HHs	Percentage of Served Households			Served Population						
		Flush	VIP/Dry	Total	Flush	VIP/Dry	Total		Flush	VIP/Dry	Total	Number	%	Flush		VIP/Dry	Total	Number	%						
Banga	Urban	33	2,265	178	2,476	2,596	1	87	7	95	12,280	95	2,859	1	79	6	87	13,893	87						
	Rural	15	5,523	3,024	8,562	10,927	1	51	28	78	10,082	78	12,037	1	46	23	71	49,360	71						
	Total	48	7,788	3,202	11,038	13,523	2	58	24	82	22,362	82	14,896	2	52	21	74	63,253	74						
Koronadal (Capital)	Urban	247	8,486	576	9,309	13,432	2	63	4	60	44,209	69	14,373	2	59	4	65	51,919	65						
	Rural	12	6,050	1,883	7,945	11,325	1	53	17	70	44,850	70	12,118	1	50	16	66	47,428	66						
	Total	259	14,536	2,459	17,254	24,757	3	59	10	70	89,059	70	26,491	3	55	9	65	99,347	65						
Lake Sebu	Urban	2	601	468	1,071	1,679	36	28	64	64	5,352	64	2,404	1	25	19	45	6,462	45						
	Rural	1	1,017	1,970	2,987	9,186	11	11	21	33	2,759	33	13,151	1	8	15	23	18,032	23						
	Total	2	1,618	2,438	4,058	10,865	15	22	37	78	8,111	37	15,555	2	10	16	26	24,494	26						
Noroala	Urban	20	2,898	1,072	3,990	5,142	56	21	78	78	20,736	78	5,674	51	19	70	70	22,422	70						
	Rural	11	1,687	421	2,119	2,706	62	16	78	78	2,987	78	2,987	56	14	71	71	34,994	71						
	Total	31	4,585	1,493	6,109	7,848	58	19	78	78	41,472	78	8,661	53	17	71	71	52,232	71						
Polomeleok	Urban	72	7,273	1,286	8,631	10,288	1	71	13	84	42,864	84	10,882	1	67	12	79	52,232	79						
	Rural	42	4,768	1,540	6,350	9,263	51	17	69	69	35,209	69	9,798	48	16	65	40,176	65							
	Total	114	12,041	2,826	14,981	19,551	62	62	14	77	78,073	77	20,680	1	58	14	72	92,408	72						
Santo Niño	Urban	13	1,550	609	2,172	2,826	55	22	77	77	11,468	77	2,957	52	21	73	73	13,701	73						
	Rural	6	2,085	451	2,542	3,392	61	13	75	75	11,171	75	3,548	59	13	72	16,247	72							
	Total	19	3,635	1,060	4,714	6,218	58	17	76	76	22,639	76	6,505	56	16	72	29,948	72							
Surallah	Urban	30	2,911	842	3,773	4,760	1	61	18	79	19,141	79	5,368	1	54	16	70	21,610	70						
	Rural	12	4,480	1,464	5,956	8,010	56	18	74	74	17,929	74	9,032	50	16	66	33,812	66							
	Total	42	7,381	2,306	9,729	12,770	58	18	76	76	37,070	76	14,400	51	16	68	55,422	68							
Tampakan	Urban	3	1,037	287	1,327	1,833	57	16	72	72	7,180	72	2,003	52	14	66	8,570	66							
	Rural	15	1,438	965	2,418	3,781	38	26	64	64	6,382	64	4,132	35	23	59	14,844	59							
	Total	18	2,475	1,252	3,745	5,614	44	22	67	67	13,562	67	6,135	40	20	61	23,414	61							
Tantangan	Urban	12	1,034	140	1,186	1,757	1	59	8	68	6,236	68	1,990	1	52	7	60	6,743	60						
	Rural	7	1,754	984	2,745	4,109	43	24	67	67	6,144	67	4,653	38	21	59	16,164	59							
	Total	19	2,788	1,124	3,931	5,866	48	19	67	67	12,380	67	6,643	42	17	59	22,907	59							
T'Boli	Urban	3	484	771	1,258	2,757	18	28	46	46	6,391	46	4,951	10	16	25	7,000	25							
	Rural	9	1,485	2,444	3,938	10,381	14	24	38	38	5,280	38	18,642	8	13	21	22,186	21							
	Total	12	1,969	3,215	5,196	13,138	15	24	40	40	11,671	40	23,593	8	14	22	29,186	22							
Tupi	Urban	64	1,053	269	1,386	2,007	3	52	13	69	6,910	69	2,128	3	49	13	65	8,095	65						
	Rural	28	3,066	2,019	5,113	7,254	42	28	70	70	7,011	70	7,690	40	26	66	31,078	66							
	Total	92	4,119	2,288	6,499	9,261	44	44	23	70	13,921	70	9,818	42	23	66	39,173	66							
Provincial Total	Urban	499	29,582	6,498	36,579	49,077	1	60	13	75	182,767	75	55,589	1	53	12	66	212,647	66						
	Rural	157	33,353	17,165	50,675	80,334	42	42	21	63	167,553	63	97,788	34	18	52	301,899	52							
	Total	656	62,935	23,663	87,254	129,411	49	49	18	67	350,320	67	153,377	41	15	57	514,546	57							

Table 8.2.7 Public School Students and Public Utilities Coverage in Phase I by Existing Facilities in the Base Year

Name of Municipalities	Public School Toilets				Public Toilets				
	Std. No. of Student that can be Served by Base Year	Coverage in 1997		Coverage in 2003		Coverage in 1997		Coverage in 2003	
		Total No. of Public School Students	%	Total No. of Public School Student	%	No. of PU with Toilets in Base Year	%	No. of PU with Sanitary Toilets in Base Year	%
Banga	11,560	13,129	88	16,142	72	4	100	4	100
Koronadal (Capital)	21,160	28,941	73	28,337	75	10	100	10	100
Lake Sebu	400	7,169	6	15,511	3			2	
Norala	6,200	10,171	61	11,411	54	2	50	3	33
Polomolok	15,080	20,148	75	25,210	60	6	100	8	75
Santo Niño	8,640	9,364	92	9,189	94	3	100	3	100
Surallah	8,480	16,445	52	18,805	45	5	100	5	100
Tampakan	4,520	7,737	58	8,857	51	2	100	3	67
Tantangan	5,360	6,487	83	7,679	70	1	100	2	50
T'Boh	4,000	10,063	40	23,605	17	1	100	2	50
Tupi	6,480	13,037	50	13,384	48	4	100	5	80
Provincial Total	91,880	142,691	64	178,130	52	38	97	47	79

8.3 Projection of Frame Values

8.3.1 Review of Past Population Development and Population Projection

Since NSO has not yet prepared/issued future population of the provinces, the provincial population for the years 1997 (planning base year), 2003 (medium-term target year) and 2010 (long-term target year) were projected for this study. Available information for this study at present is as follows:

- NSO population census results in 1980, 1990 and 1995
- 1995 Census-based National and Regional Population Projection prepared by the NSO
- Provincial Physical Framework Plan/Comprehensive Provincial Land Use Plan (1993-2002)

(1) 1995 Census-Based National and Regional Population Projections: NSO

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

In the regional population projection, Regions X and XI, the subject regions for the 2nd batch areas of this study, are classified as medium-sized regions (at least 5 million but less than 10 million by year 2000). The following are the result of projection for the two regions in 2000, 2005 and 2010.

Table 8.3.1 Regional Population Projection

Year		1980	1990	1995	2000	2005	2010
Region X	Population	2,758,985	3,509,753	3,938,252	4,441,739	4,955,545	5,465,272
	Growth rate	-	2.44 %	2.33 %	2.44 %	2.21 %	1.98 %
Region XI	Population	3,346,803	4,458,829	5,052,730	5,749,821	6,456,464	7,146,889
	Growth rate	-	2.91 %	2.53 %	2.62 %	2.35 %	2.05 %

(2) Provincial Physical Framework Plan/Comprehensive Provincial Land Use Plan: South Cotabato: Planning period 1993-2002

The provincial population for the year 2002 was projected with 1990 as the base year. The provincial growth rate of 2.99 % experienced between 1980 and 1990 was basically adopted for the projection. Meanwhile, the recorded/projected growth rates of Region XI are 2.91 % between 1980 and 1990 and 2.58 % between 1990 and 2000.

The population projection on the provincial total and the component municipalities was prepared with 1990 as the base year. The population for the year 2002 was projected using a uniform growth rate between 1990 and 2002 referring to the experience from 1980 to 1990 (census years). Minor arrangements on the municipal growth rates were made to meet the provincial average growth rate of about 2.99%.

Table 8.3.2 shows the past population development in census years (1980-1995) and projections for the years 1995 and 2002 with 1990 as base year using the assumed growth rates for the period 1990 to 2002 as established in the Comprehensive Provincial Land Use Plan (hereafter referred to as "Land Use Plan").

Comparing the census and the projected population in 1995, the provincial population based on census results is about 7% lower than the projected. Regarding the municipal census population in 1995, about half (6 municipalities) of the 11 municipalities is lower comparing with the projected figures (maximum of 10 %). While, the remaining municipalities are higher with a range of 0-50 %. Since the growth rates of Lake Sebu and T'boli from 1990 to 1995 are considerably different from the projected, future projection shall be made using the 1995 census results as base year.

Table 8.3.2 Census Population and Projected Population

Municipality	Census Population /Growth Rate (%)			Projected Population/Adopted Growth Rate (%) : Base Year 1990 in Land Use Plan	
	1980	1990	1995	1995	2002
Banga	47,544	59,743	66,571	67,495	80,066
		2.31	2.19	2.47	2.47
Koronadal	80,566	108,708	118,231	126,206	155,534
		3.04	1.69	3.03	3.03
Lake Sebu	23,924	34,350	47,617	40,718	51,665
		3.68	6.75	3.46	3.46
Norala	29,557	35,566	39,688	39,422	45,533
		1.87	2.22	2.08	2.08
Polomolok	59,312	89,372	96,274	107,538	139,336
		4.19	1.50	3.77	3.77
Sto. Niño	20,756	30,076	32,103	35,755	45,552
		3.78	1.31	3.52	3.52
Surallah	42,467	54,136	61,509	61,489	73,492
		2.46	2.59	2.58	2.58
Tampakan	18,057	25,526	28,256	30,112	37,950
		3.52	2.05	3.36	3.36
Tantangan	22,207	26,346	30,044	29,017	33,217
		1.72	2.66	1.95	1.95
T'boli	25,724	32,373	54,206	36,591	43,436
		2.33	10.86	2.48	2.48
Tupi	31,591	43,232	46,656	50,435	62,579
		3.19	1.54	3.13	3.13
Province	401,705	539,428	621,155	624,779	768,360
		2.99	2.86	2.98	2.99

(3) Population Projection of the Province

The following conditions are considered/assumed in the population projection.

Provincial Population

- 1) The growth rates experienced by province/municipalities from 1990 to 1995 were basically adopted for the projection of medium-term target years (1997-2003). However, the provincial population was first determined by applying the growth rate from 1990 to 1995 (2.86%) before finalization of the municipal population and their corresponding growth rates. The base year for the projection was 1995 using census results.
- 2) For the long-term projection from 2004 to 2010, the population ratios of the province to the regional total population were assumed considering past experience.

The range of population ratios of the provincial population to the regional total population (from 1980 to 1995 and projected year 2002 in the Land Use Plan) considered the correlation with other component provinces in the region and projected regional population. The following are the population ratios of the province to the region, both in the past and the projected.

Year	1980	1990	1995	2002	2003	2010
Province	401,705	539,428	621,155	768,360	778,345	901,057
Region	3,346,803	4,458,829	5,052,730	6,032,322	6,173,575	7,146,889
P/R (%)	12.00	12.10	12.29	12.74	12.61	12.61

The population ratios of the province from 1980 to 1990 were about 12%, while the 1995 census results showed a higher figure of 12.29 %. The ratio for the year 2002, as projected in the Land Use Plan (12.74 %), is slightly higher than the past experience (1980-1990). Furthermore, the projected population for the year 2003 as mentioned above, is 12.61% of the regional population. The population ratio of the province, between 12-13% may be taken into account throughout the future. The provincial ratio of 12.61% is adopted for the year 2010 to determine the 2010 provincial population (estimated growth rate is 2.11%, while the regional rate from 2000-2005 is assumed at 2.05%). The projected population for the years 1997, 2003 and 2010 are as follows:

Year	Population	Growth Rate
1995	621,155	Census result
1997	657,193	2.86 % (growth rate from 1990 to 1995)
1998	778,345	2.86 % (growth rate from 1990 to 1995)
1999	901,057	2.11 % (estimated from projected population)

Municipal population

- 1) The total population of the province by target year is fixed.
- 2) The growth rates of respective municipalities for the years 1997 and 2003 are determined referring to the development experienced between 1990 and 1995. The municipal population for the respective target years was finally adjusted according to the initially calculated population size to meet the fixed provincial population. Accordingly, the growth rates of municipalities were modified. Table 8.3.3 presents the calculation results under the above conditions/assumptions.

Table 8.3.3 Municipal Population Projection

Municipality	Annual Growth Rate (%)			Population (person)				
	'80-'90	Land Use Plan	'90-'95	1995	1997	Estimated G.R	2003	Estimated G.R
Banga	2.31	2.47	2.19	66,571	69,200	1.96	76,232	1.71
Koronadal	3.04	3.03	1.69	118,231	121,714	1.46	130,238	1.22
Lake Sebu	3.68	3.46	6.75	47,617	54,016	6.51	77,331	6.25
Norala	1.87	2.08	2.22	39,688	41,279	1.98	45,553	1.74
Polomolok	4.19	3.77	1.50	96,274	98,731	1.27	104,438	1.02
Sto. Nino	3.78	3.52	1.31	32,103	32,802	1.08	34,318	0.84
Surallah	2.46	2.58	2.59	61,509	64,438	2.35	72,664	2.11
Tampakan	3.52	3.36	2.05	28,256	29,294	1.82	32,016	1.57
Tantangan	1.72	1.95	2.66	30,044	31,521	2.43	35,701	2.18
T'boli	2.33	2.48	10.86	54,206	66,316	10.61	119,093	10.34
Tupi	3.19	3.13	1.54	46,656	47,882	1.31	50,761	1.06
Province	2.99	2.99	2.86	621,155	657,193	2.86	778,345	2.86

Note: 1995 population is census results.

Regarding the municipal population for the year 2010 in the long-term, it is assumed that the tendency of population growth of respective municipalities between 1990 and 2002, which is considered in the Land Use Plan, will be realized in line with the land use plan of the province. Thus, the projected growth rates for the year 2002 by municipality in the Land Use Plan are first applied to project the 2010 population from the year 2003. Then, the municipal population initially estimated is adjusted in proportion to the population size of each municipality to the total provincial population to meet the above mentioned provincial population fixed for the year 2010 (901,057 persons). Table 8.3.4 shows the

study process results and the projected population by municipality for the year 2010 and the adjusted growth rates.

Table 8.3.4 Municipal Population for the year 2010 and Growth Rates

Municipality	Pop. Projection using G.R in Land Use Plan				2010 Pop. Projection	
	2003 Pop.	Growth Rate(%)	2010 Pop.	Percent	Population	Growth Rate(%)
Banga	76,232	2.47	90,431	9.5	85,490	1.65
Koronadal	130,238	3.03	160,504	16.8	151,735	2.21
Lake Sebu	77,331	3.46	98,121	10.3	92,760	2.63
Norala	45,553	2.08	52,614	5.5	49,739	1.26
Polomolok	104,438	3.77	135,319	14.2	127,926	2.94
Sto. Nino	34,318	3.52	43,721	4.6	41,333	2.69
Surallah	72,664	2.58	86,848	9.1	82,103	1.76
Tampakan	32,016	3.36	40,350	4.2	38,145	2.53
Tantangan	35,701	1.95	40,869	4.3	38,636	1.14
T'boli	119,093	2.48	141,371	14.8	133,648	1.66
Tupi	50,761	3.13	62,983	6.6	59,542	2.31
Province	778,345	2.99	953,129	100.0	901,057	2.11

Notes: 2010 population by municipality is calculated proportionally distributing 901,057 persons to 11 municipalities.

N.A: Not Applicable

Growth rate: 2003-2010

Population by urban and rural area

In the Land Use Plan, the urban/rural population by municipality for the year 2002 was projected with 1990 as the base year. The annual growth rate of the urban population for the year 2002 by municipality was estimated by PPDO referring to the experience from 1980 to 1990 and the future land use plan. The provincial average growth rate was modified at 4.25% from 4.95% (growth rate of 1980-1990). The rural population by municipality was estimated as the balance between the total population and the urban population. The average growth rate of the province was estimated at about half of the urban area (2.24%).

Urban and rural population by municipality was studied considering the 1995 census results and the figures estimated in the Land Use Plan.

1) Past population development

Table 8.3.5 shows the urban and rural population with growth rates in census years (1980-1995) by municipality. With regards to the ratio of the urban population of the province to the total population, the provincial averages in 1980 and 1990 were 28.9% and 34.9%, while it increased to 37.8% in 1995. The provincial average growth rate of 4.95% between 1980 and 1990 was slightly reduced to 4.51% in 1995.

Rural population by municipality has been slightly reduced with a provincial average growth rate of 1.93% from 1990 to 1995.

Table 8.3.5 Past Population Development by Urban and Rural Area

Municipality	1980			1990				1995				
	Total	Urban/ Rural	Share (%)	Total	Urban/ Rural	G.R. (%)	Share (%)	Total	Urban/ Rural	G.R. (%)	Share (%)	
Urban Area	Banga	47,544	9,987	21.0	59,743	12,436	2.22	20.8	66,571	12,435	0.00	18.7
	Koronadal	80,566	33,526	41.6	108,708	51,815	4.45	47.7	118,231	62,238	3.73	52.6
	Lake Sebu	23,924		0.0	34,350	4,268	N.A.	12.4	47,617	7,371	11.55	15.5
	Norala	29,557	9,634	32.6	35,566	10,917	1.26	30.7	39,688	25,559	18.55	64.4
	Polomolok	59,312	28,921	48.8	89,372	48,697	5.35	54.5	96,274	49,758	0.43	51.7
	Sto. Nino	20,756		0.0	30,076	7,840	N.A.	26.1	32,103	14,577	13.21	45.4
	Surallah	42,467	9,666	22.8	54,136	17,740	6.26	32.8	61,509	23,128	5.45	37.6
	Tampakan	18,057	6,052	33.5	25,526	7,611	2.32	29.8	28,256	9,619	4.79	34.0
	Tantangan	22,207	4,966	22.4	26,346	8,039	4.93	30.5	30,044	8,740	1.69	29.1
	T'boli	25,724	6,423	25.0	32,373	9,985	4.51	30.8	54,206	11,357	2.61	21.0
	Tupi	31,591	6,919	21.9	43,232	8,770	2.40	20.3	46,656	9,759	2.16	20.9
	Province	401,705	116,094	28.9	539,428	188,118	4.95	34.9	621,155	234,541	4.51	37.8
	Rural Area	Banga	47,544	37,557	79.0	59,743	47,307	2.33	79.2	66,571	54,136	2.73
Koronadal		80,566	47,040	58.4	108,708	56,893	1.92	52.3	118,231	55,993	-0.32	47.4
Lake Sebu		23,924	23,924	100.0	34,350	30,082	2.32	87.6	47,617	40,246	5.99	84.5
Norala		29,557	19,923	67.4	35,566	24,649	2.15	69.3	39,688	14,129	-10.53	35.6
Polomolok		59,312	30,391	51.2	89,372	40,675	2.96	45.5	96,274	46,516	2.72	48.3
Sto. Nino		20,756	20,756	100.0	30,076	22,236	0.69	73.9	32,103	17,526	-4.65	54.6
Surallah		42,467	32,801	77.2	54,136	36,396	1.05	67.2	61,509	38,381	1.07	62.4
Tampakan		18,057	12,005	66.5	25,526	17,915	4.08	70.2	28,256	18,637	0.79	66.0
Tantangan		22,207	17,241	77.6	26,346	18,307	0.60	69.5	30,044	21,304	3.08	70.9
T'boli		25,724	19,301	75.0	32,373	22,388	1.49	69.2	54,206	42,849	13.86	79.0
Tupi		31,591	24,672	78.1	43,232	34,462	3.40	79.7	46,656	36,897	1.37	79.1
Province		401,705	285,611	71.1	539,428	351,310	2.09	65.1	621,155	386,614	1.93	62.2

1) Projection of urban and rural population for the years 1997, 2003 and 2010

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

In the projection of the municipal urban population for the short/medium-term and long-term purpose, the following are assumed:

- Short/Medium-term target: 1997 and 2003

Updated census results in 1995 are applied in terms of the share of urban population to total population by municipality.

- Long-term target: 2010

The growth rate of the urban population by municipality, which is used for the projection in the year 2002 in the Land Use Plan, is employed with 2003 as the base year. It is anticipated that the share between the urban and the rural population will be regulated to meet the land use plan in the long-term period.

Under the above assumptions, the provincial average share of urban population for the year 2010 was arrived at 40.9%, higher than the figures in 1995 (37.8%) and in 1990 (34.9%). Table 8.3.6 presents projected urban and rural population. The growth rates and shares on rural population are calculated using estimated rural population.

Table 8.3.6 Population Projection by Urban and Rural Area: 1997, 2003 and 2010

Municipality	1997			2003			2010				
	Total	Urban/ Rural	Share (%)	Total	Urban/ Rural	Share (%)	Total	Urban/ Rural	G.R. (%)	Share (%)	
Urban Area	Banga	69,200	12,926	18.7	76,232	14,240	18.7	85,490	17,147	2.69	20.1
	Koronadal	121,714	64,072	52.6	130,238	68,559	52.6	151,735	92,490	4.37	61.0
	Lake Sebu	54,016	8,361	15.5	77,331	11,971	15.5	92,760	16,020	4.25	17.3
	Norala	41,279	26,584	64.4	45,553	29,336	64.4	49,739	33,010	1.70	66.4
	Polomolok	98,731	51,028	51.7	104,438	53,977	51.7	127,926	75,396	4.89	58.9
	Sto. Nino	32,802	14,894	45.4	34,318	15,583	45.4	41,333	20,853	4.25	50.5
	Surallah	64,438	24,229	37.6	72,664	27,322	37.6	82,103	39,325	5.34	47.9
	Tampakan	29,294	9,972	34.0	32,016	10,899	34.0	38,145	13,205	2.78	34.6
	Tantangan	31,521	9,170	29.1	35,701	10,386	29.1	38,636	14,286	4.66	37.0
	T'boli	66,316	13,894	21.0	119,093	24,952	21.0	133,648	33,752	4.41	25.3
	Tupi	47,882	10,015	20.9	50,761	10,618	20.9	59,542	12,926	2.85	21.7
	Province	657,193	245,146	37.3	778,345	277,842	35.7	901,057	368,410	4.11	40.9
	Rural Area	Banga	69,200	56,274	81.3	76,232	61,992	81.3	85,490	68,343	1.40
Koronadal		121,714	57,643	47.4	130,238	61,680	47.4	151,735	59,245	-0.57	39.0
Lake Sebu		54,016	45,654	84.5	77,331	65,360	84.5	92,760	76,741	2.32	82.7
Norala		41,279	14,695	35.6	45,553	16,217	35.6	49,739	16,729	0.45	33.6
Polomolok		98,731	47,703	48.3	104,438	50,460	48.3	127,926	52,530	0.58	41.1
Sto. Nino		32,802	17,908	54.6	34,318	18,735	54.6	41,333	20,479	1.28	49.5
Surallah		64,438	40,209	62.4	72,664	45,342	62.4	82,103	42,778	-0.83	52.1
Tampakan		29,294	19,322	66.0	32,016	21,117	66.0	38,145	24,940	2.41	65.4
Tantangan		31,521	22,351	70.9	35,701	25,315	70.9	38,636	24,350	-0.55	63.0
T'boli		66,316	52,421	79.0	119,093	94,141	79.0	133,648	99,896	0.85	74.7
Tupi		47,882	37,866	79.1	50,761	40,143	79.1	59,542	46,616	2.16	78.3
Province		657,193	412,047	62.7	778,345	500,503	64.3	901,057	532,647	0.89	59.1

Note: High population growth and higher share of rural area in the municipalities of Lake Sebu and T'boli from 1995 to 2003 decrease provincial urban share from 37.8 % (1995) to 35.7 % (2003).

Table 8.3.7 Projected Number of Households by Urban and Rural Area by Municipality by Target Year

Name of Municipality	Number of Households														
	Household Size			1995			1997			2003			2010		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Banga	4.98	5.15	5.12	2,498	10,510	13,008	2,596	10,927	13,523	2,859	12,037	14,896	3,992	17,380	21,372
Koronadal (Capital)	4.77	5.09	4.91	13,050	11,006	24,056	13,432	11,325	24,757	14,373	12,118	26,491	19,969	17,965	37,934
Lake Sebu	4.98	4.97	4.97	1,479	8,104	9,583	1,679	9,186	10,865	2,404	13,151	15,555	3,590	19,600	23,190
Norala	5.17	5.43	5.26	4,948	2,600	7,548	5,142	2,706	7,848	5,674	2,987	8,661	8,008	4,427	12,435
Polomolok	4.96	5.15	5.05	10,039	9,024	19,063	10,288	9,263	19,551	10,882	9,798	20,680	16,529	15,452	31,981
Santo Niño	5.27	5.28	5.27	2,768	3,320	6,088	2,826	3,392	6,218	2,957	3,548	6,505	4,692	5,641	10,333
Surallah	5.09	5.02	5.05	4,543	7,645	12,188	4,760	8,010	12,770	5,368	9,032	14,400	7,718	12,808	20,526
Tampakan	5.44	5.11	5.22	1,768	3,646	5,414	1,833	3,781	5,614	2,003	4,132	6,135	3,246	6,290	9,536
Tantangan	5.22	5.44	5.37	1,673	3,917	5,590	1,757	4,109	5,866	1,990	4,653	6,643	2,810	6,849	9,659
T'Boli	5.04	5.05	5.05	2,254	8,483	10,737	2,757	10,381	13,138	4,951	18,642	23,593	7,000	26,412	33,412
Tupi	4.99	5.22	5.17	1,954	7,069	9,023	2,007	7,254	9,261	2,128	7,690	9,818	3,114	11,772	14,886
Provincial Total	4.99	5.13	5.08	46,974	75,324	122,298	49,077	80,334	129,411	55,589	97,788	153,377	80,668	144,596	225,264

8.3.2 School Enrollment Projection

Table 8.3.8 Projected School Enrollment by Municipality by Target Year

Name of Municipality	1997				2003				2010					
	School Age Population		Total Enrollment		School Age Population		Total Enrollment		School Age Population		Total Enrollment			
	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate		
Banga	19,538	79	13,129	67	21,523	18,295	85	16,142	75	24,137	21,723	90	19,310	80
Koronadal (Capital)	33,103	100	28,941	87	35,421	33,650	95	28,337	80	41,268	39,205	95	33,014	80
Lake Sebu	15,478	67	7,169	46	22,159	17,727	80	15,511	70	26,580	22,593	85	19,935	75
Norala	11,489	96	10,171	89	12,679	12,045	95	11,411	90	13,844	13,152	95	12,460	90
Polomolok	28,038	88	20,148	72	29,659	28,176	95	25,210	85	36,329	34,513	95	30,880	85
Santo Niño	9,246	110	9,364	101	9,673	9,673	100	9,189	95	11,650	11,068	95	10,485	90
Surallah	18,529	100	16,445	89	20,894	19,849	95	18,805	90	23,608	22,428	95	21,247	90
Tampakan	8,530	91	7,737	91	9,323	8,857	95	8,857	95	11,108	10,553	95	10,553	95
Tantangan	9,039	77	6,487	72	10,238	8,702	85	7,679	75	11,080	9,972	90	8,864	80
T'Boli	18,778	54	10,063	54	33,722	23,605	70	23,605	70	37,843	28,382	75	28,382	75
Tupi	14,028	102	13,037	93	14,871	14,127	95	13,384	90	17,443	16,571	95	15,699	90
Provincial Total	185,796	87	142,691	77	220,162	194,706	88	178,130	81	254,890	230,160	90	210,829	83

8.3.3 Projection of the Number of Public Utilities

Table 8.3.9 Projected Number of Public Utilities by Municipality by Target Year

Name of Municipality	Type	1997	2003		2010	
		No. of Public Utilities	Proposed Construction	Total	Proposed Construction	Total
Banga	Public Market	1		1		1
	Bus/Jeepney Terminal	1		1		1
	Parks/Playground	2		2		2
	Total	4		4		4
Koronadal (Capital)	Public Market	4		4	1	5
	Bus/Jeepney Terminal	2		2	1	3
	Parks/Playground	4		4	1	5
	Total	10		10	3	13
Lake Sebu	Public Market		1	1	1	2
	Bus/Jeepney Terminal		1	1	1	2
	Parks/Playground				1	1
	Total		2	2	3	5
Norala	Public Market	1		1		1
	Bus/Jeepney Terminal	1		1		1
	Parks/Playground		1	1		1
	Total	2	1	3		3
Polomolok	Public Market	1	1	2	1	3
	Bus/Jeepney Terminal	1	1	2	1	3
	Parks/Playground	4		4	1	5
	Total	6	2	8	3	11
Santo Niño	Public Market	1		1		1
	Bus/Jeepney Terminal	1		1		1
	Parks/Playground	1		1		1
	Total	3		3		3
Surallah	Public Market	2		2		2
	Bus/Jeepney Terminal	1		1	1	2
	Parks/Playground	2		2		2
	Total	5		5	1	6
Tampakan	Public Market	1		1		1
	Bus/Jeepney Terminal		1	1		1
	Parks/Playground	1		1		1
	Total	2	1	3		3
Tantangan	Public Market	1		1		1
	Bus/Jeepney Terminal		1	1		1
	Parks/Playground				1	1
	Total	1	1	2	1	3
T'Boli	Public Market	1		1	1	2
	Bus/Jeepney Terminal		1	1		1
	Parks/Playground				1	1
	Total	1	1	2	2	4
Tupi	Public Market	2		2		2
	Bus/Jeepney Terminal		1	1	1	2
	Parks/Playground	2		2		2
	Total	4	1	5	1	6
Provincial Total	Public Market	15	2	17	4	21
	Bus/Jeepney Terminal	7	6	13	5	18
	Parks/Playground	16	1	17	5	22
	Total	38	9	47	14	61

8.4 Types of Facilities and Implementation Criteria

8.4.1 Water Supply

(1) Urban water supply

Table 8.4.1 shows the existing condition and future requirements of urban water supply in the respective municipalities of the province.

Banga

Groundwater level is quite low in the area and shallow wells are mostly in use with huge number of unsanitary wells. Together with other municipalities, requests on the establishment of WDs were made to LWUA, but until now, it has not been realized. No plan exists on the system development. A LWUA assisted feasibility study that considers staged expansion shall be conducted by the LGU. An individual system with deep well sources may be developed.

Koronadal

There is an existing WD and is presently applying for a loan to LWUA for system expansion. Water sources are deep wells that have to be increased. One of the current water supply problems (service coverage at present is very low) is the delay of expansion. There is a need to augment its water source (currently LWUA is assisting the construction of the reservoir) and to increase service coverage in order to ensure sound financial management. Subdivisions (numbering more than 10) located higher than the existing reservoirs are provided with individual systems. Topography in other areas is favorable to ensure gravity flow. Some associations are operating small systems, however assistance from the WD to these systems is not extended at present.

Lake Sebu

Currently there are no Level III systems. Water source can be shallow wells. Thus, demand for Level III is low at present. LGU will start the work for indigenous people. There are a number of springs (many untapped springs are identified, but remote and discharge rate is small for Level III), but wells are to be used. An individual system shall be constructed. There are three lakes, but with water quality problems. The province is considering tapping the "Urban Water Supply Project of DILG".

Norala

There is a WD but need to expand the system with augmentation of wells. Gravity flow can be ensured because of its topography. High collection charge is also ensured.

Table 8.4.1 Existing Condition and Future Requirements of Urban Water Supply by Municipality

Name of Municipality	Existing Condition (1997)										Phase I (2003)					Phase II (2010)							
	Urban Population (1997)			Existing Level III System and Others			Level III Water Source		Urban Population (2003)		Population Served by Level III and Others			Newly Developed/ Additional Water Source (m ³ /d)		Urban Population (2010)		Population Served by Level-III		Newly developed/ Additional Water Source (m ³ /d)		Total Water Required (m ³ /d)	
	No. of Level-III and Operating Body	Pop. Served by Level-III	% Served	Total Pop. Served	Total Pop. Served (%)	Type	Production (m ³ /d)	Additional Pop. Served by L-III	Level-III Total	%	Served Pop. Total	%	Additional Water Source (m ³ /d)	Total Water Source Required (m ³ /d)	Urban Population (2010)	Additional Pop. Served	Total	%	Additional Water Source (m ³ /d)	Total Water Required (m ³ /d)			
Banga	12,926	None	9,699	9,699	75%			14,240	980	7%	10,680	75%	300	200	17,147	15,309	16,290	95%	2,000	2,200			
Koronadal (Capital)	64,071	1(WD)	2,930	36,016	38,946	61%	DW	68,559	8,139	11,069	16%	47,085	69%	1,100	1,500	92,450	76,796	87,865	95%	10,000	11,500		
Lake Sebu	8,362	None	2,406	2,406	29%			11,971	1,421	1,421	12%	3,827	32%	300	200	16,020	13,798	15,219	95%	1,800	2,000		
Norala	26,584	1(WD)	11,105	9,351	20,456	77%	DW	29,336	2,132	13,237	45%	22,589	77%	300	1,800	33,010	18,122	31,359	95%	2,400	4,100		
Palomolok	51,028	1(WD)	38,993	9,142	38,135	75%	DW	53,977	2,248	31,341	58%	40,483	75%	400	4,100	75,396	40,285	71,626	95%	5,300	9,400		
Santo Niño	14,894	None	8,292	8,292	56%			15,583	1,850	1,850	12%	10,142	65%	300	300	20,853	17,961	19,811	95%	2,400	2,600		
Sarallah	24,229	1(WD)	2,436	13,848	16,284	67%	DW	27,322	2,022	4,458	16%	18,306	67%	300	600	39,325	32,901	37,359	95%	4,200	4,900		
Tampakan	9,972	None	5,310	5,310	53%			10,899	1,294	1,294	12%	6,604	61%	200	200	13,205	11,251	12,545	95%	1,500	1,700		
Tantangan	9,170	None	5,013	5,013	55%			10,346	1,233	1,233	12%	6,246	60%	200	200	14,286	12,338	13,571	95%	1,700	1,800		
T'boli	13,894	None	4,885	4,885	35%			24,952	2,952	2,962	12%	7,847	31%	400	400	33,752	29,102	32,064	95%	3,700	4,300		
Tupi	10,015	1(WD)	1,750	3,778	5,528	55%		10,618	1,260	3,010	28%	6,788	64%	200	400	12,926	9,269	12,279	95%	1,300	1,600		
Provincial Total	245,145		47,214	107,742	154,956	63%		277,842	25,642	72,856	26%	180,597	65%	3,800	9,900	368,410	277,134	349,989	95%	36,300	46,000		

(Note) WD: Water District, Prov: Province, Mun: Municipality, Asc: Association
 Unit consumption: 100 lpcd
 Additional population served in 2010 includes the served population that will be absorbed by Level III system.

Polomolok

The existing WD covers about 50% of the population. Expansion of the system is planned using deepwell. Utilization of Lake Maughan is under study

Sto.Nino

There are WDs, but Level III systems exist. No spring source exists thus, deep wells shall be used. The Poblacion residents are requesting for a Level III system.

Surallah

There are numerous Level II systems (deep wells). There is a WD but expansion is needed. New urban development (agri-industry) has been proceeded and there is an urgent need for water supply augmentation.

Tampakan

No WD/Level III exists at present, however there are many Level II systems.

Tantangan

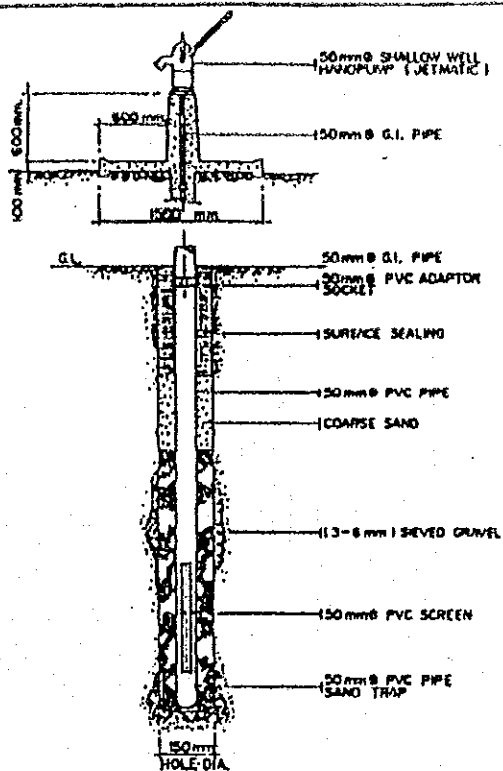
No WD/Level III exists at present. Brackish water is common for those who are using groundwater. Many Level II systems are using spring source, and sometimes also public deep wells.

T'boli

The municipality is located on a hilly area with water supply. No water district exists. It is difficult to develop deep wells. Transmission line is very long from spring sources (15 km) to service area. Spring sources at Barangay Kemate may be studied as a water source.

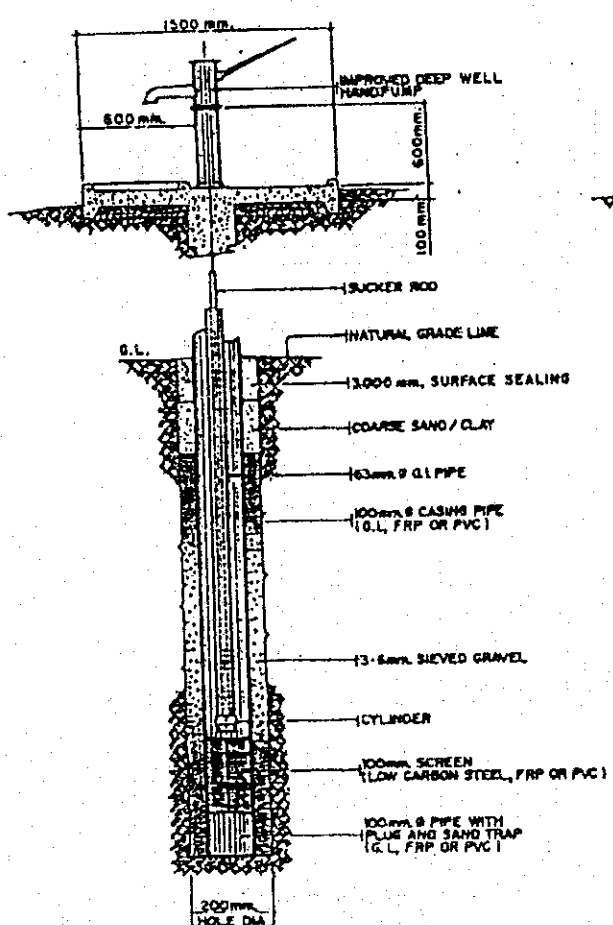
Tupi

There is a WD to serve the urban area at present.

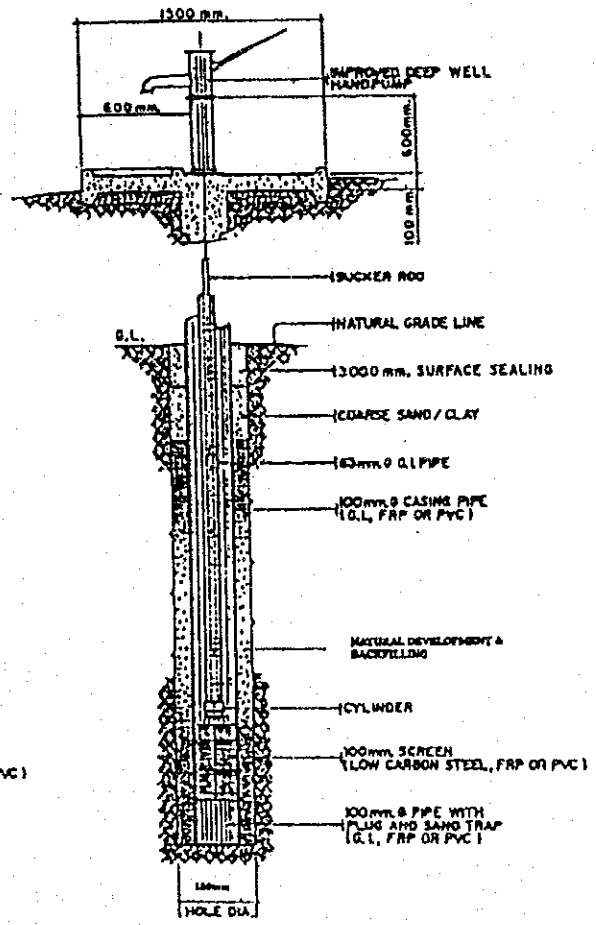


OPEN HOLE DRILLING & GRAVEL PACK METHOD

SHALLOW WELLS



OPEN HOLE DRILLING & GRAVEL PACK METHOD



OPEN HOLE DRILLING & NATURAL GRAVEL PACK METHOD

DEEP WELLS

FIGURE 8.4.1

TYPICAL STRUCTURE OF LEVEL I WELL FACILITY

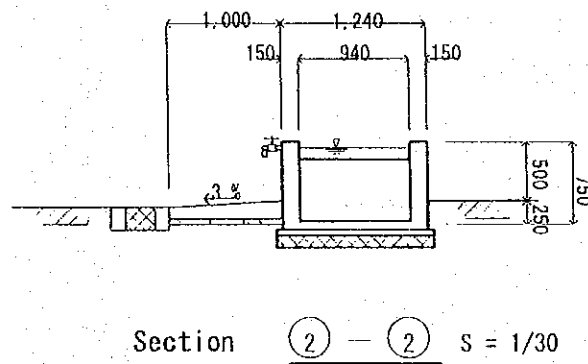
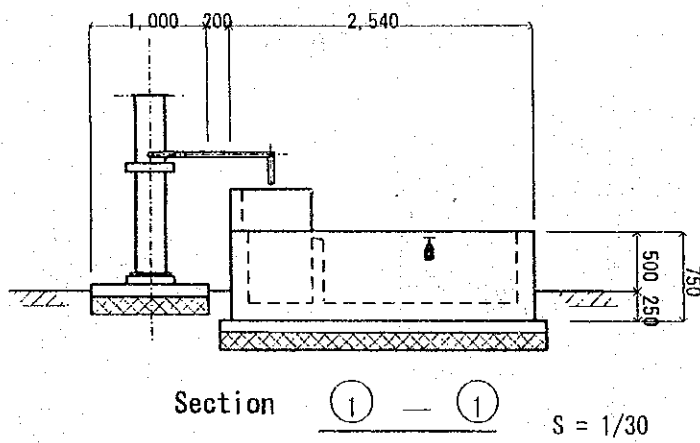
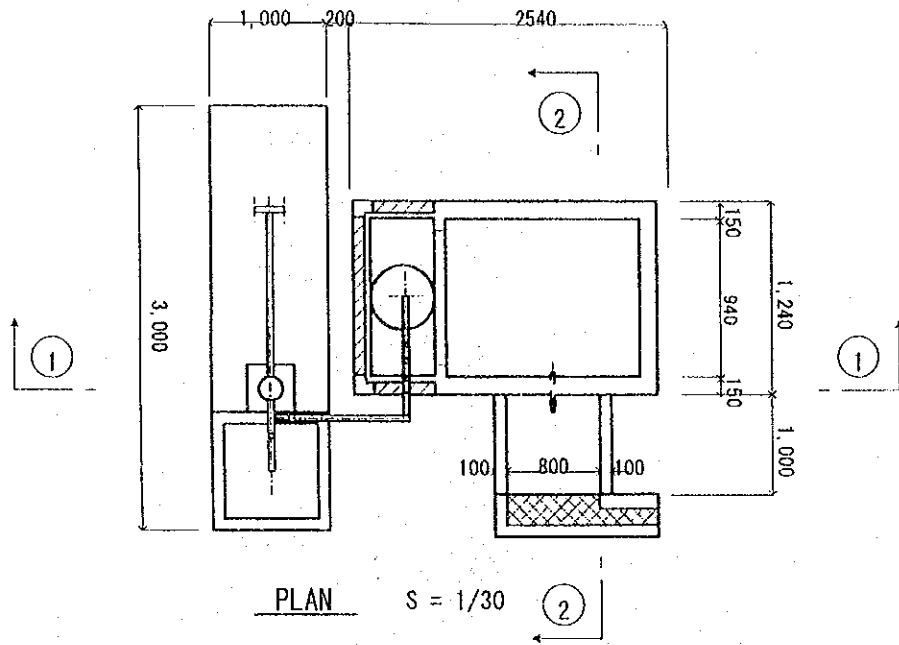


Figure 8.4.2(a) Iron Removal Facility

STAGED IMPROVEMENT IN SEWAGE COLLECTION METHOD

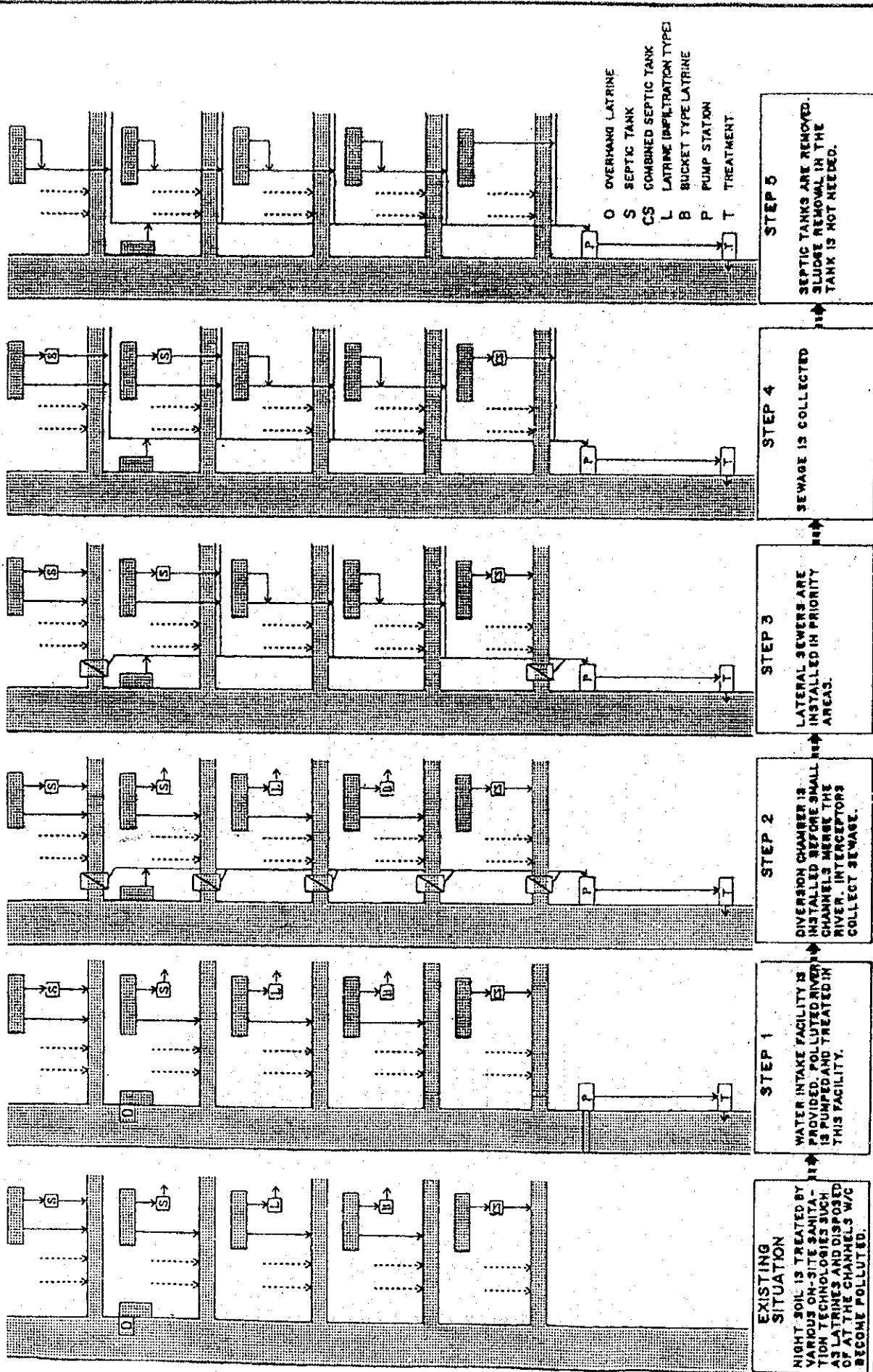


Figure 8.4.3

8.5 Service Coverage by Target Year

8.5.1 Water Supply

(1) Population to be served by Level II system in Phase I

Thirty three (33) untapped spring sources were confirmed to be suitable for Level II systems in rural water supply during PW4SP preparation as shown in Table 8.5.1. The conditions and assumptions applied for this estimate are as follows:

Source capacity:

The average source capacity of untapped spring was assumed to meet the needs of 100 households based on the review of existing Level II systems with spring sources.

Number of system:

Twenty seven (27), out of 33 untapped springs, were considered to serve 27 Level II systems in 27 rural barangays of 3 municipalities in the medium-term.

Table 8.5.1 Population to be Served by Level II System in Phase I

Name of Municipality	Number of Untapped Spring	Number of Barangay to be Served	Number of Households to be Served	Population to be Served
Banga	5	5	500	2,575
Koronadal (Capital)				
Lake Sebu	19	17	1,700	8,449
Norala				
Polomolok				
Santo Niño				
Surallah				
Tampakan	4			
Tantangan				
T'Boli	5	5	500	2,525
Tupi				
Provincial Total	33	27	2,700	13,549

(2) Population to be served by target year

Phase I

For urban area, the additional service coverage was estimated to be served by Level III service. For rural area, the population to be served by Level II systems with untapped springs was first calculated and the rest of the additional service coverage was estimated to be served by Level I facilities.

Phase II

For urban area, the population served by Level I and II facilities in the base year was considered to be absorbed by Level III service aside from the additional service coverage to be estimated by the sector target. For rural area, all existing facilities in Phase I was assumed to be utilized throughout the future.

The population to be served by target year is exhibited in Table 8.5.2 and Table 8.5.3.

Table 8.5.2 Population to be Served in Phase I (Water Supply)

Name of Municipality	Area	Population Served in the Base Year				Phase I Coverage (2003)													
		Level III	Level II	Level I	Total	Service Coverage			Additional Population to be Served										
						Level III	Level II	Level I	Total	Level III	Level II	Level I	Total						
Banga	Urban			9,699	9,699	14,240			9,699										
	Rural	1,008		29,701	30,709	61,992		3,583	32,372					2,575	3,679				6,254
	Total	1,008		39,400	40,408	76,232		3,583	42,071					2,575	3,679				6,254
Koronadal (Capital)	Urban	2,930		36,016	38,946	68,559	8,547		36,016					5,617					5,617
	Rural	3,700	500	33,343	37,543	61,679	3,700	500	33,343										5,617
	Total	6,630	500	69,359	76,489	130,238	12,247	500	69,359					5,617					5,617
Lake Sebu	Urban			2,406	2,406	11,971	5,375		2,406					5,375					5,375
	Rural		5,654	19,015	24,669	65,360		14,103	23,806					8,449	4,791				13,240
	Total		5,654	21,421	27,075	77,331	5,375	14,103	26,212					5,375	8,449	4,791			18,615
Norala	Urban	11,105		9,351	20,456	29,336	11,105		9,351										
	Rural		450	9,946	10,396	16,217		450	9,946										
	Total	11,105	450	19,297	30,852	45,553	11,105	450	19,297										
Polomolok	Urban	28,993		10,196	39,189	53,977	28,993		10,196										
	Rural	13,987	5,184	8,179	27,350	50,461	13,987	5,184	10,096						1,917	1,917			1,917
	Total	42,980	5,184	18,375	66,539	104,438	42,980	5,184	20,292						1,917	1,917			1,917
Santo Niño	Urban			8,292	8,292	15,583	1,837		8,292					1,837					1,837
	Rural		600	10,089	10,689	18,735		600	10,266					10,866					177
	Total		600	18,381	18,981	34,318	1,837	600	18,558					1,837					177
Surallah	Urban	2,436		13,023	15,459	27,322	4,736		13,023					2,300					2,300
	Rural	2,271	5,944	18,183	26,398	45,342	2,271	5,944	18,183					2,300					2,300
	Total	4,707	5,944	31,206	41,857	72,664	7,007	5,944	31,206					2,300					2,300
Tampakan	Urban			4,956	4,956	10,899	2,128		4,956					2,128					2,128
	Rural		5,040	8,580	13,620	21,117		5,040	8,580					13,620					2,128
	Total		5,040	13,536	18,576	32,016	2,128	5,040	13,536					2,128					2,128
Tantangan	Urban		1,740	11,799	13,539	25,315		1,740	12,943					1,738					1,738
	Rural		1,740	16,812	18,552	35,701		1,740	17,956					1,738					1,738
	Total		3,480	28,611	32,091	61,016		3,480	30,904					3,476					3,476
Tiboli	Urban		2,060	2,825	4,885	24,952	11,334		2,825					11,334					11,334
	Rural	2,165	7,074	5,759	14,998	94,141	2,165	9,599	42,838					54,602					54,602
	Total	2,165	9,134	8,584	19,883	119,093	13,499	11,659	45,663					54,602					54,602
Tupi	Urban	1,750		3,778	5,528	10,618	3,124		3,778					6,902					6,902
	Rural	2,000	10,808	8,537	21,345	40,143	2,000	10,808	10,475					23,283					23,283
	Total	3,750	10,808	12,315	26,873	50,761	5,124	10,808	14,253					23,283					23,283
Provincial Total	Urban	47,214	2,060	105,555	154,829	277,843	78,917	2,060	105,555					186,532					186,532
	Rural	24,123	44,002	162,123	230,248	500,502	24,123	57,551	212,848					294,522					294,522
	Total	71,337	46,062	267,678	385,077	778,345	103,040	59,611	318,403					481,054					481,054

Table 8.5.3 Population to be Served in Phase II (Water Supply)

Name of Municipality	Area	Population Served in 2003				Phase II Coverage (2010)									
		Population Served in 2003			Total Population	Service Coverage			Additional Population to be Served						
		Level III	Level II	Level I		Total	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	
Banga	Urban			9,699	15,969	15,171				15,171					15,171
	Rural		3,583	32,372	35,955		3,583	61,072	64,655				28,700		28,700
	Total		3,583	42,071	45,654	85,490	15,171	3,583	61,072	79,826	15,171		28,700		43,871
Koronadal (Capital)	Urban	8,547		36,016	44,563	79,875	75,881								67,334
	Rural	3,700	500	33,343	37,543	71,860	3,700	500	62,630	66,830					29,287
	Total	12,247	500	69,359	82,106	151,735	79,581	500	62,630	142,711	67,334				96,621
Lake Sebu	Urban	5,375		2,406	7,781	14,359	13,641								8,266
	Rural		14,103	23,806	37,909	78,401		14,103	58,810	72,913					35,004
	Total	5,375	14,103	26,212	45,690	92,760	13,641	14,103	58,810	86,554	8,266				35,004
Norala	Urban	11,105		9,351	20,456	32,032	30,430								19,325
	Rural		450	9,946	10,396	17,707		450	16,018	16,468					6,072
	Total	11,105	450	19,297	30,852	49,739	30,430	450	16,018	46,898	19,325				25,397
Polomolok	Urban	28,993		10,196	39,189	66,117	62,811								33,818
	Rural	13,987	5,184	10,096	29,267	61,809	13,987	5,184	38,311	57,482					28,215
	Total	42,980	5,184	20,292	68,456	127,926	76,798	5,184	38,311	120,293	33,818				62,033
Santo Niño	Urban	1,837		8,292	10,129	18,768	17,850								15,993
	Rural		600	10,266	10,866	22,565		600	20,385	20,985					10,119
	Total	1,837	600	18,558	20,995	41,333	17,850	600	20,385	38,815	15,993				26,112
Surallah	Urban	4,736		13,023	17,759	30,872	29,328								24,592
	Rural	2,271	5,944	18,183	26,398	51,231	2,271	5,944	39,430	47,645					21,247
	Total	7,007	5,944	31,206	44,157	82,103	31,599	5,944	39,430	76,973	24,592				45,839
Tampakan	Urban	2,128		4,956	7,084	12,985	12,336								10,208
	Rural		5,040	8,580	13,620	25,160		5,040	18,359	23,399					9,779
	Total	2,128	5,040	13,536	20,704	38,145	12,336	5,040	18,359	35,735	10,208				19,987
Tantangan	Urban	1,738		5,013	6,751	11,239	10,677								8,939
	Rural		1,740	12,943	14,683	27,397		1,740	23,739	25,479					10,796
	Total	1,738	1,740	17,956	21,434	38,636	10,677	1,740	23,739	36,156	8,939				19,735
T'boli	Urban	11,334	2,060	2,825	16,219	28,001	26,601								15,267
	Rural	2,165	9,599	42,838	54,602	105,647	2,165	9,599	86,488	98,252					43,650
	Total	13,499	11,659	45,663	70,821	133,648	28,766	9,599	86,488	124,853	15,267				58,917
Tupi	Urban	3,124		3,778	6,902	12,454	11,831								8,707
	Rural	2,000	10,808	10,475	23,283	47,088	2,000	10,808	30,984	43,792					20,509
	Total	5,124	10,808	14,253	30,185	59,542	13,831	10,808	30,984	55,623	8,707				29,216
Provincial Total	Urban	78,917	2,060	105,555	186,532	322,671	306,537								227,620
	Rural	24,123	57,551	212,848	294,522	578,386	24,123	57,551	456,226	537,900					243,378
	Total	103,040	59,611	318,403	481,054	901,057	330,660	57,551	456,226	844,437	227,620				470,998

8.5.2 Sanitation

Table 8.5.4 Additional Number of Households to be Served in Phase I (Household Toilets)

Name of Municipality	Area	No. of Household Served in the Based Year				Phase I Coverage (2003)									
		Flush	Pour Flush	VIP/Dry	Total	Total No. of HHs	Household Coverage			Additional No. of HHs to be Served					
							Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	
Bunga	Urban	33	2,265	178	2,476	2,859	33	2,072	371	2,476				193	
	Rural	15	5,523	3,024	8,562	12,037	15	7,659	1,354	9,028			2,136	2,136	
	Total	48	7,788	3,202	8,562	14,896	48	9,731	1,725	11,504			2,136	193	2,329
Koronadal (Capital)	Urban	247	8,486	576	9,309	14,373	2,443	7,941	1,833	12,217	2,196			1,257	3,453
	Rural	12	6,050	1,883	7,945	12,118	909	6,817	1,363	9,089	897		767		1,664
	Total	259	14,536	2,459	7,945	26,491	3,352	14,758	3,196	21,306	3,093		767	1,257	5,117
Lake Sebu	Urban	2	601	468	1,071	2,404	409	1,328	306	2,043	407		727		1,134
	Rural		1,017	1,970	2,987	13,151		8,384	1,479	9,863			7,367		7,367
	Total	2	1,618	2,438	2,987	15,555	409	9,712	1,785	11,906	407		8,094		8,501
Norala	Urban	20	2,898	1,072	3,990	5,674	965	3,135	723	4,823	945		206		206
	Rural	11	1,687	421	2,119	2,987	11	1,893	336	2,240			206		206
	Total	31	4,585	1,493	2,119	8,661	976	5,028	1,059	7,063	945		443		1,388
Polomolok	Urban	72	7,273	1,286	8,631	10,882	1,850	6,012	1,388	9,250	1,778		102		1,880
	Rural	42	4,768	1,540	6,350	9,798	735	5,512	1,102	7,349	693		744		1,437
	Total	114	12,041	2,826	6,350	20,680	2,585	11,524	2,490	16,599	2,471		744	102	3,317
Santo Niño	Urban	13	1,550	609	2,172	2,957	503	1,633	377	2,513	490		83		573
	Rural	6	2,085	451	2,542	3,548	6	2,256	399	2,661			171		171
	Total	19	3,635	1,060	2,542	6,505	509	3,889	776	5,174	490		254		744
Surallah	Urban	30	2,901	842	3,773	5,368	913	2,966	684	4,563	883		65		948
	Rural	12	4,480	1,464	5,956	9,032	677	5,081	1,016	6,774	665		601		1,266
	Total	42	7,381	2,306	5,956	14,400	1,590	8,047	1,700	11,337	1,548		666		2,214
Tampakan	Urban	3	1,037	287	1,327	2,003	341	1,107	255	1,703	338		70		408
	Rural	15	1,438	965	2,418	4,132	15	2,619	465	3,099			1,181		1,181
	Total	18	2,475	1,252	2,418	6,135	356	3,726	720	4,802	338		1,251		1,589
Tantangan	Urban	12	1,034	140	1,186	1,990	338	1,100	254	1,692	326		66		506
	Rural	7	1,754	984	2,745	4,653	7	2,959	524	3,490			1,205		1,205
	Total	19	2,788	1,124	2,745	6,643	345	4,059	778	5,182	326		1,271	114	1,711
T'boli	Urban	3	484	771	1,258	4,951	842	2,735	631	4,208	839		2,251		3,090
	Rural	9	1,485	2,444	3,938	18,642	1,398	10,487	2,097	13,982	1,389		9,002		10,391
	Total	12	1,969	3,215	3,938	23,593	2,240	13,222	2,728	18,190	2,228		11,253		13,481
Tupi	Urban	64	1,053	269	1,386	2,128	362	1,176	271	1,809	298		123		423
	Rural	28	3,066	2,019	5,113	7,690	577	4,326	865	5,768	549		1,260		1,809
	Total	92	4,119	2,288	5,113	9,818	939	5,502	1,136	7,577	847		1,383	2	2,232
Provincial Total	Urban	499	29,582	6,498	36,579	55,589	8,999	31,205	7,093	47,297	8,500		3,622		13,790
	Rural	157	33,353	17,165	50,675	97,788	4,350	57,993	11,000	73,343	4,193		24,640		28,833
	Total	656	62,935	23,663	87,254	153,377	13,349	89,198	18,093	120,640	12,693		28,262		42,623

Table 8.5.5 Additional Number of Households to be Served in Phase II (Household Toilets)

Name of Municipality	Area	No. households Served in 2003						Phase II Coverage (2010)					
		Total			Additional No. of HHs to be Served								
		Flush	Pour Flush	VIP/Dry	Flush	Pour Flush	VIP/Dry	Flush	Pour Flush	VIP/Dry	Total		
Banga	Urban	33	2,072	371	2,476	3,992	1,857	1,485	371	3,713	1,824		1,824
	Rural	15	7,659	1,354	9,028	17,380	15	14,794	1,354	16,163		7,135	7,135
	Total	48	9,731	1,725	11,504	21,372	1,872	16,279	1,725	19,876	1,824	7,135	8,959
Koronadal (Capital)	Urban	2,443	7,941	1,833	12,217	19,959	9,286	7,452	1,833	18,571	6,843		6,843
	Rural	909	6,817	1,363	9,089	17,965	2,506	12,838	1,363	16,707	1,597	6,021	7,618
	Total	3,352	14,758	3,196	21,306	37,924	11,792	20,290	3,196	35,278	8,440	6,021	14,461
Lake Sebu	Urban	409	1,328	306	2,043	3,590	1,670	1,363	306	3,339	1,261	35	1,296
	Rural		8,384	1,479	9,863	19,600	16,749	1,479	18,228		8,365	8,365	8,365
	Total	409	9,712	1,785	11,906	23,190	1,670	18,112	1,785	21,567	1,261	8,400	9,661
Norala	Urban	965	3,135	723	4,823	8,008	3,724	3,000	723	7,447	2,759		2,759
	Rural	11	1,893	336	2,240	4,427	11	3,770	336	4,117		1,877	1,877
	Total	976	5,028	1,059	7,063	12,435	3,735	6,770	1,059	11,564	2,759	1,877	4,636
Polomolok	Urban	1,850	6,012	1,388	9,250	16,529	7,686	6,298	1,388	15,372	5,836	286	6,122
	Rural	735	5,512	1,102	7,349	15,452	2,156	11,112	1,102	14,370	1,421	5,600	7,021
	Total	2,585	11,524	2,490	16,599	31,981	9,842	17,410	2,490	29,742	7,257	5,886	13,143
Santo Niño	Urban	503	1,633	377	2,513	4,692	2,182	1,805	377	4,364	1,679	172	1,851
	Rural	6	2,256	399	2,661	5,641	6	4,841	399	5,246		2,585	2,585
	Total	509	3,889	776	5,174	10,333	2,188	6,646	776	9,610	1,679	2,757	4,436
Sumalih	Urban	913	2,966	684	4,563	7,718	3,589	2,905	684	7,178	2,676		2,676
	Rural	677	5,081	1,016	6,774	12,808	1,787	9,108	1,016	11,911	1,110	4,027	5,137
	Total	1,590	8,047	1,700	11,337	20,526	5,376	12,013	1,700	19,089	3,786	4,027	7,813
Tampakan	Urban	341	1,107	255	1,703	3,246	1,510	1,254	255	3,019	1,169	147	1,316
	Rural	15	2,619	465	3,099	6,290	15	5,370	465	5,850		2,751	2,751
	Total	356	3,726	720	4,802	9,536	1,525	6,624	720	8,869	1,169	2,898	4,067
Tantangan	Urban	338	1,100	254	1,692	2,810	1,307	1,052	254	2,613	969		969
	Rural	7	2,959	524	3,490	6,849	7	5,839	524	6,370		2,880	2,880
	Total	345	4,059	778	5,182	9,659	1,314	6,891	778	8,983	969	2,880	3,849
T'boli	Urban	842	2,735	631	4,208	7,000	3,255	2,624	631	6,510	2,413		2,413
	Rural	1,398	10,487	2,097	13,982	26,412	2,165	20,301	2,097	24,563	767	9,814	10,581
	Total	2,240	13,222	2,728	18,190	33,412	5,420	22,925	2,728	31,073	3,180	9,814	12,994
Tupi	Urban	362	1,176	271	1,809	3,114	1,448	1,177	271	2,896	1,086	1	1,087
	Rural	577	4,326	865	5,768	11,772	1,642	8,441	865	10,948	1,065	4,115	5,180
	Total	939	5,502	1,136	7,577	14,886	3,090	9,618	1,136	13,844	2,151	4,116	6,267
Provincial Total	Urban	8,999	31,205	7,093	47,297	80,668	37,514	30,415	7,093	75,022	28,515	641	29,156
	Rural	4,350	57,993	11,000	73,343	144,596	10,310	113,163	11,000	134,473	5,960	55,170	61,130
	Total	13,349	89,198	18,093	120,640	225,264	47,824	143,578	18,093	209,495	34,475	55,811	90,286

Table 8.5.6 Additional Number of Public School Students to be Served in Phases I and II (School Toilets)

Name of Municipality	Std. No. of Public School Student that can be Served in the Base Year (1997)	Projected No. of Public School Student in 2003	Phase I Coverage (2003)		Projected Number of Public School Students in 2010	Phase II Coverage (2010)	
			Public School Students Coverage	Additional No. of Public School Student to be Served		Public School Students Coverage	Additional No. of Public School Students to be Served
Banga	11,560	16,142	12,914	1,354	19,310	17,379	4,465
Koronadal (Capital)	21,160	28,337	22,670	1,510	33,014	29,713	7,043
Lake Sebu	400	15,511	12,409	12,009	19,935	17,942	5,533
Norala	6,200	11,411	9,129	2,929	12,460	11,214	2,085
Potomolok	15,080	25,210	20,168	5,088	30,880	27,792	7,624
Santo Niño	8,640	9,189	7,351		10,485	9,437	2,086
Surallah	8,480	18,805	15,044	6,564	21,247	19,122	4,078
Tampakan	4,520	8,857	7,086	2,566	10,553	9,498	2,412
Tantangan	5,360	7,679	6,143	783	8,864	7,978	1,835
T'Boli	4,000	23,605	18,884	14,884	28,382	25,544	6,660
Tupi	6,480	13,384	10,707	4,227	15,699	14,129	3,422
Provincial Total	91,880	178,130	142,505	51,914	210,829	189,748	47,243

Table 8.5.7 Additional Number of Public Utilities with Sanitary Toilets in Phase I and II

Name of Municipality	Type	Coverage in Base Year (1997)		Phase I Coverage (2003)			Phase I Coverage (2010)		
		No. of PU with Toilet Facilities	No. of PU with Sanitary Toilets	No. of PU with Toilet Facilities	Add'l. No. of Public Utilities With Sanitary Toilets	No. of PU with Sanitary Toilets	No. of PU with Toilet Facilities	Add'l. No. of Public Utilities with Sanitary Toilets	No. of PU with Sanitary Toilets
Banga	Public Market	1	1	1		1	1		1
	Bus/Jeepney Terminal	1	1	1		1	1		1
	Parks/Playground	2	2	2		2	2		2
	Total	4	4	4		4	4		4
Koronadal (Capital)	Public Market	4	4	4		4	5	1	5
	Bus/Jeepney Terminal	2	2	2		2	3	1	3
	Parks/Playground	4	4	4		4	5	1	5
	Total	10	10	10		10	13	3	13
Lake Sebu	Public Market			1	1	1	2	1	2
	Bus/Jeepney Terminal			1	1	1	2	1	2
	Parks/Playground						1	1	1
	Total			2	2	2	5	3	5
Norala	Public Market	1		1		1	1		1
	Bus/Jeepney Terminal	1	1	1		1	1		1
	Parks/Playground			1	1	1	1		1
	Total	2	1	3	1	3	3		3
Polemolok	Public Market	1	1	2	1	2	3	1	3
	Bus/Jeepney Terminal	1	1	2	1	2	3	1	3
	Parks/Playground	4	4	4		4	5	1	5
	Total	6	6	8	2	8	11	3	11
Santo Niño	Public Market	1	1	1		1	1		1
	Bus/Jeepney Terminal	1	1	1		1	1		1
	Parks/Playground	1	1	1		1	1		1
	Total	3	3	3		3	3		3
Surallah	Public Market	2	2	2		2	2		2
	Bus/Jeepney Terminal	1	1	1		1	2	1	2
	Parks/Playground	2	2	2		2	2		2
	Total	5	5	5		5	6	1	6
Tampakan	Public Market	1	1	1		1	1		1
	Bus/Jeepney Terminal			1	1	1	1		1
	Parks/Playground	1	1	1		1	1		1
	Total	2	2	3	1	3	3		3
Tantangan	Public Market	1	1	1		1	1		1
	Bus/Jeepney Terminal			1	1	1	1		1
	Parks/Playground						1	1	1
	Total	1	1	2	1	2	3	1	3
T'boli	Public Market	1	1	1		1	2	1	2
	Bus/Jeepney Terminal			1	1	1	1		1
	Parks/Playground						1	1	1
	Total	1	1	2	1	2	4	2	4
Tupi	Public Market	2	2	2		2	2		2
	Bus/Jeepney Terminal			1	1	1	2	1	2
	Parks/Playground	2	2	2		2	2		2
	Total	4	4	5	1	5	6	1	6
Provincial Total	Public Market	15	14	17	2	17	21	4	21
	Bus/Jeepney Terminal	7	7	13	6	13	18	5	18
	Parks/Playground	16	16	17	1	17	22	5	22
	Total	38	37	47	9	47	61	14	61