

Chapter

8

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



8. FUTURE REQUIREMENTS IN WATER SUPPLY AND SANITATION IMPROVEMENT

8.1 General

Phased investments for provincial sector development are planned in almost the same manner as adopted in the 1998 Philippine National Development Plan (PNDP) and the National Sector Master Plan (NSMP), Medium-Term Investment covering the years 2000 to 2004 and Long-Term Development covering the period 2005 to 2010.

Targets of provincial service coverage for the two phases are established as percentages of beneficiaries or utilities to be served by sub-sector. Service coverage in the base year (1998) and national sector targets indicated in the National Sector Master Plan (NSMP) and the updated Medium-Term Philippine Development Plan, 1996 - 1998 (MTPDP) are the bases of the study. Sector targets which are not prescribed in the national plan; school and public toilets as well as sewerage are assumed based on the current conditions. In addition, preliminary discussions on solid waste management are included as a vital component of sanitation sector.

Projection of frame values by municipality is undertaken for respective sub-sectors; future population by urban and rural area, the number of student enrollment to public schools and the number of public utilities. Reference base figures for the study of framework are the 1995 Census of Population and Housing, the statistical data of the province and the information from relevant agencies. Provincial population by target year and the base year (1998) is estimated referring to the NSO population census results (past 10 census periods: 1903 - 1995), the 1995 Census-based National and Regional Population projection prepared by NSO, the 1995 Census-based Regional and Provincial Population projection prepared by the NEDA Regional Office VIII and the Provincial Physical Framework Plan/Comprehensive Provincial Land Use Plan. While, the population distribution to urban and rural areas prepared by NSO in 1995 is modified to meet actual conditions in the classification of the areas.

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

In estimating future requirements by municipality, additional population (or number of students/public utilities) to be served by sub-sector is first calculated as a shortfall at target years in comparison between each target and its base year service coverage. In this regard, planned/on-going projects to be completed by respective base years are considered as part of existing services for each target year. Required number of facilities by sector component is then estimated corresponding to the said additional population (or number of students/public utilities) to be served. Rehabilitation work for Level I facilities limited to new deep wells to be constructed under PW4SP is taken into account. Generally, rehabilitation of deep wells and shallow wells constructed by means of conventional method is difficult.

Logistic support is considered as a minimum requirement of LGUs for community development and training, and other relevant activities along with the implementation of PW4SP. The types and number of well drilling/rehabilitation equipment and supporting vehicle for Level I facilities are also suggested as reference information. Also, minimum requirements for setting up a provincial laboratory to support drinking water quality surveillance and monitoring are described. This will include building, instrument/equipment and reagent/chemical requirements. The 1993 Philippine National Standards for Drinking Water (PNSDW) requires that initial examinations of water from newly constructed sources should first be undertaken before operation for public use and henceforth periodic examinations of these water supply sources/facilities.

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

8.2 Targets of Provincial Sector Plan

Provincial sector targets for the years 2004 and 2010 are determined as the provincial average of the desirable minimum level for each sub-sector. Table 8.2.1 summarizes the target percentages to be served by sub-sector. Details by sub-sector are discussed in this sub-section.

(1) Water supply

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

Table 8.2.1 Provincial Sector Targets

Sub-sector	Base Year Service Coverage	Phase I (2000-2004)		Phase II (2005-2011)	
		Population Coverage (%)	Additional Population to be Served	Population Coverage (%)	Additional Population to be Served
Water Supply					
<i>Urban Water Supply</i>	77	77	15,331	95	48,453
<i>Rural Water Supply</i>	71	83	24,300	93	25,753
Sanitation					
<i>Household Toilet</i>					
<i>Urban Area</i>	77	90	6,128	95	10,503
Flush	4	10	1,297	50	10,503
Pour Flush	96	90	4,831	50	0
VIP/Dry	0	0	0	0	0
<i>Rural Area</i>	83	88	1,968	93	8,754
Flush	1	1	39	20	5,892
Pour Flush	99	99	1,929	80	2,862
VIP/Dry	0	0	0	0	0
<i>School Toilet</i>					
Public School Student Coverage (%)		Public School Student Coverage (%)	Additional Public School Students to be Served	Public School Student Coverage (%)	Additional Public School Students to be Served
	84	90	6,131	95	5,224
<i>Public Toilet</i>					
Public Utilities Coverage (%)		Public Utilities Coverage (%)	Additional Public Utilities with Sanitary Toilets	Public Utilities Coverage (%)	Additional Public Utilities with Sanitary Toilets
	100	100	7	100	2
<i>Sewerage</i>		Not Applicable			
Urban Population Coverage (%)				Urban Population Coverage (%)	Urban Population to be Served
	0			50	26,847
<i>Solid Waste</i>				Not Applicable	
Urban Household Coverage (%)		Urban Household Coverage (%)	Additional Urban House- holds to be Served		
	56	60	3,529		

Table 8.2.2 Estimation of Base Year Service Coverage of Water Supply

Name of Municipality	Area	Population (1998)	Population Served by 1998 Facilities				% Coverage
			Level III	Level II	Level I	Total	
Anahawan	Urban	2,805	1,483	186		1,669	60
	Rural	3,473	955	1,016	1,306	3,277	94
	Total	6,278	2,438	1,202	1,306	4,946	79
Bontoc	Urban	3,780	1,068	1,012	458	2,538	67
	Rural	20,015	1,160	5,486	5,590	12,236	61
	Total	23,795	2,228	6,498	6,048	14,774	62
Hinunangan	Urban	1,575	1,226		201	1,427	91
	Rural	20,502	6,097	5,463	5,556	17,116	83
	Total	22,077	7,323	5,463	5,757	18,543	84
Hinundayan	Urban	4,307	1,270	1,782	615	3,667	85
	Rural	6,523	2,328	3,990		6,318	97
	Total	10,830	3,598	5,772	615	9,985	92
Libagon	Urban	1,450	409	300	478	1,187	82
	Rural	9,146	859	5,532	1,247	7,638	84
	Total	10,596	1,268	5,832	1,725	8,825	83
Liloan	Urban	4,557	1,075	40	2,844	3,959	87
	Rural	12,204	349	3,692	6,916	10,957	90
	Total	16,761	1,424	3,732	9,760	14,916	89
Limasawa	Urban	1,229			360	360	29
	Rural	3,831		721	538	1,259	33
	Total	5,060		721	898	1,619	32
Maasin (Capital)	Urban	30,316	10,815	4,948	8,488	24,251	80
	Rural	33,120	5,210	12,763	2,223	20,196	61
	Total	63,436	16,025	17,711	10,711	44,447	70
Macrohon	Urban	6,698	2,115		3,369	5,484	82
	Rural	13,290	797	7,101	2,568	10,466	79
	Total	19,988	2,912	7,101	5,937	15,950	80
Malitbog	Urban	2,882	1,240		889	2,129	74
	Rural	15,757		3,352	5,139	8,491	54
	Total	18,639	1,240	3,352	6,028	10,620	57
Padre Burgos	Urban	2,543	2,065		302	2,367	93
	Rural	5,121	1,123	1,226	1,880	4,229	83
	Total	7,664	3,188	1,226	2,182	6,596	86
Pintuyan	Urban	1,048	283			283	27
	Rural	7,409	889	2,127		3,016	41
	Total	8,457	1,172	2,127		3,299	39
Saint Bernard	Urban	3,475	3,400			3,400	98
	Rural	18,085	4,976	2,350	7,181	14,507	80
	Total	21,560	8,376	2,350	7,181	17,907	83
San Francisco	Urban	2,222	1,844		112	1,956	88
	Rural	7,029		3,049	567	3,616	51
	Total	9,251	1,844	3,049	679	5,572	60
San Juan (Cabalian)	Urban	3,800			1,716	1,716	45
	Rural	7,490		4,399	885	5,284	71
	Total	11,290		4,399	2,601	7,000	62
San Ricardo	Urban	695	487			487	70
	Rural	6,569	1,120	3,991	109	5,220	79
	Total	7,264	1,607	3,991	109	5,707	79
Silago	Urban	2,168	824	384	833	2,041	94
	Rural	7,634	3,390	2,841	845	7,076	93
	Total	9,802	4,214	3,225	1,678	9,117	93
Sogod	Urban	8,841	5,583	123		5,706	65
	Rural	22,129	9,584	3,792	879	14,255	64
	Total	30,970	15,167	3,915	879	19,961	64
Tomas Oppus	Urban	1,932	771	342	389	1,502	78
	Rural	10,487		8,168		8,168	78
	Total	12,419	771	8,510	389	9,670	78
Provincial Total	Urban	86,323	35,958	9,117	21,054	66,129	77
	Rural	229,814	38,837	81,059	43,429	163,325	71
	Total	316,137	74,795	90,176	64,483	229,454	73

The base year service coverage in urban area (77%) is higher than the updated MTPDP sector target (69%) for the year 1998, while rural area (71%) is behind the sector target of 79%. As identified in Chapter 4, lower service coverage in rural area is considered to arise because of the existence of high percentage of underserved population.

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

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

Thus, the service coverage of 77% for urban and 83% for rural area shall be set up in the medium-term period, respectively.

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

(2) Sanitation

1) Household toilets

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

Table 8.2.3 Base Year Service Coverage of Household Toilets

Name of Municipality	Area	1998		Households and Population Using Sanitary Toilets								
		Popula- tion	HHs	Number of Households				Popula- tion	Service Coverage (%)			
				Flush	Pour Flush	VIP/Dry	Total		Flush	Pour Flush	VIP/Dry	Total
Anahawan	Urban	2,805	598	10	567		577	2,693	2	95		96
	Rural	3,473	762	5	650		655	2,987	1	85		86
	Total	6,278	1,360	15	1,217		1,232	5,680	1	89		91
Bontoc	Urban	3,780	758	100	585		685	3,402	13	77		90
	Rural	20,015	3,932	50	2,906		2,956	15,012	1	74		75
	Total	23,795	4,690	150	3,491		3,641	18,414	3	74		78
Hinunangan	Urban	1,575	339	30	259		289	1,339	9	76		85
	Rural	20,502	4,496	20	4,156		4,176	19,067		92		93
	Total	22,077	4,835	50	4,415		4,465	20,406	1	91		92
Hinundayan	Urban	4,307	911	45	755		800	3,791	5	83		88
	Rural	6,523	1,365	17	1,303		1,320	6,328	1	95		97
	Total	10,830	2,276	62	2,058		2,120	10,119	3	90		93
Libagon	Urban	1,450	290	4	273		277	1,392	1	94		96
	Rural	9,146	1,890	2	1,695		1,697	8,232		90		90
	Total	10,596	2,180	6	1,968		1,974	9,624		90		91

Table 8.2.3 Base Year Service Coverage of Household Toilets

(cont'd)

(cont'd)

Name of Municipality	Area	1998		Households and Population Using Sanitary Toilets								
		Popula- tion	HHS	Number of Households				Popula- tion	Service Coverage (%)			
				Flush	Pour Flush	VIP/Dry	Total		Flush	Pour Flush	VIP/Dry	Total
Liloan	Urban	4,557	934	23	790		813	3,965	2	85		87
	Rural	12,204	2,575	8	2,344		2,352	11,106		91		91
	Total	16,761	3,509	31	3,134		3,165	15,071	1	89		90
Limasawa	Urban	1,229	253		234		234	1,131		92		92
	Rural	3,831	769		706		706	3,525		92		92
	Total	5,060	1,022		940		940	4,656		92		92
Maasin (Capital)	Urban	30,316	6,264	140	4,047		4,187	20,312	2	65		67
	Rural	33,120	7,017	45	5,361		5,406	25,503	1	76		77
	Total	63,436	13,281	185	9,408		9,593	45,815	1	71		72
Macrohon	Urban	6,698	1,410		1,130		1,130	5,359		80		80
	Rural	13,290	2,752		2,317		2,317	11,164		84		84
	Total	19,988	4,162		3,447		3,447	16,523		83		83
Malitbog	Urban	2,882	561	40	476		516	2,652	7	85		92
	Rural	15,757	2,967		2,489		2,489	13,236		84		84
	Total	18,639	3,528	40	2,965		3,005	15,888	1	84		85
Padre Burgos	Urban	2,543	486	18	166		184	967	4	34		38
	Rural	5,121	1,002	4	982		986	5,019		98		98
	Total	7,664	1,488	22	1,148		1,170	5,986	1	77		79
Pintuyan	Urban	1,048	206		142		142	724		69		69
	Rural	7,409	1,411		1,347		1,347	7,039		95		95
	Total	8,457	1,617		1,489		1,489	7,763		92		92
Saint Bernard	Urban	3,475	721	69	545		614	2,954	10	76		85
	Rural	18,085	3,654	298	2,794		3,092	15,373	8	76		85
	Total	21,560	4,375	367	3,339		3,706	18,327	8	76		85
San Francisco	Urban	2,222	488	26	360		386	1,756	5	74		79
	Rural	7,029	1,545	9	1,349		1,358	6,186	1	87		88
	Total	9,251	2,033	35	1,709		1,744	7,942	2	84		86
San Juan (Cabalian)	Urban	3,800	835	50	450		500	2,280	6	54		60
	Rural	7,490	1,635		1,026		1,026	4,719		63		63
	Total	11,290	2,470	50	1,476		1,526	6,999	2	60		62
San Ricardo	Urban	695	153		118		118	536		77		77
	Rural	6,569	1,309		1,286		1,286	6,438		98		98
	Total	7,264	1,462		1,404		1,404	6,974		96		96
Silago	Urban	2,168	461		430		430	2,017		93		93
	Rural	7,634	1,652		1,595		1,595	7,405		97		97
	Total	9,802	2,113		2,025		2,025	9,422		96		96
Sogod	Urban	8,841	1,801	45	1,361		1,406	6,896	2	76		78
	Rural	22,129	4,489	19	2,748		2,767	13,720		61		62
	Total	30,970	6,290	64	4,109		4,173	20,616	1	65		66
Tomas Oppus	Urban	1,932	388	11	368		379	1,894	3	95		98
	Rural	10,487	2,162	36	1,996		2,032	9,858	2	92		94
	Total	12,419	2,550	47	2,364		2,411	11,752	2	93		95
Provincial Total	Urban	86,323	17,857	611	13,056		13,667	66,060	3	73		77
	Rural	229,814	47,384	513	39,050		39,563	191,917	1	82		83
	Total	316,137	65,241	1,124	52,106		53,230	257,977	2	80		82

The province has base year service coverage of 82%, which is well above the current national average coverage of 60%. Urban area registers a level of 77%, while rural area has 83%, both above the national average coverage. By type of sanitary toilet facility, the existing percentage composition to total households is as follows:

Type	Urban (%)	Rural (%)
Flush	4	1
Pour-flush	96	99
VIP latrine	0	0

To pursue sufficiency and equitable access to basic services, provincial target of Phase I for urban household toilets is planned at 90%, while, for rural household toilets, 88% is projected. A higher increase in the urban service coverage is aimed for to lessen the gap of the coverage between the urban and rural areas and to achieve a balanced distribution of this basic facility as embodied in the PNDP. For Phase II, 95%, which is 2% higher than the set coverage by the NSMP is adopted for urban household toilets, while, 93% is arranged for rural household toilets.

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

2) School toilets

The base year service coverage of public school students is shown in Table 8.2.4 counting expected coverage of any planned or on-going projects scheduled to be completed by 1999 (details are referred to Supporting Report).

Base year service coverage is 84% applying the standard number of public school students to be served by one (1) unit of toilet facility. A relatively high level of coverage is observed in the province.

In the absence of national targets for school toilets, the existing level of service coverage is the base in setting up the targets. It is expected that all new construction of school-buildings will entail sanitary toilets enabling the coverage to increase on a high level. For Phase I and II, 90% and 95% are set, respectively.

3) Public toilets

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

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

Name of Municipality	Public School Toilets			Public Toilets		
	Total Number of Public School Students (1998)	Std. No. of Public School Student that can be Served by Base Year (1998) Sanitary Toilets	Service Coverage (%)	Number of Public Utilities with Toilets in 1998	Number of Public Utility with Sanitary Toilets in Base Year (1998)	Service Coverage (%)
Anahawan	1,189	1,189	100	1	1	100
Bontoc	6,403	3,600	56	1	1	100
Binunangan	4,720	4,600	97	2	2	100
Binundayan	2,310	1,800	78	2	2	100
Libagon	2,625	2,320	88	2	2	100
Liloan	4,333	4,333	100	3	3	100
Limasawa	1,271	1,200	94	2	2	100
Maasin (Capital)	13,071	9,360	72	5	5	100
Macrohon	5,166	4,000	77	1	1	100
Malitbog	3,389	3,280	97	2	2	100
Padre Burgos	1,407	1,120	80	3	3	100
Pintuyan	1,668	1,668	100			
Saint Bernard	4,641	4,641	100	3	3	100
San Francisco	2,393	2,160	90	3	3	100
San Juan (Cabalian)	2,611	1,920	74	3	3	100
San Ricardo	2,260	2,260	100			
Silago	2,102	2,102	100	2	2	100
Sogod	7,447	5,760	77	3	3	100
Tomas Oppus	3,056	3,056	100	1	1	100
Provincial Total	72,062	60,369	84	39	39	100

All existing public utilities are served with at least one sanitary toilet giving 100% coverage. This can be attributed by the fact that almost all public utilities (mostly public markets) are provided with sanitary toilet facilities.

Without national targets as of now, the indicator in setting up provincial targets would be the existing level of coverage. Accordingly, 100% coverage for both Phase I and Phase II are assumed.

(3) Sewerage

Given the non-existence of sewerage systems in any municipality at the present time, this plan does not consider the service during Phase I. For Phase II, a target of 50% coverage was applied to urban population of municipalities with more than 10,000 urban population provided by Level III water supply systems.

(4) Solid waste

The municipal level data in 1998 on the number of households served by the municipal refuse collection revealed that the current practice is concentrated to urban areas. The base year service coverage for urban area by municipality is reflected in Table 8.2.5.

About 15% of the total households in the province relied on municipal refuse collection using trucks or 56% urban household coverage. These municipalities have a total of 13 units of collection truck.

No national targets have yet been set. However, considering the present level of coverage, 60% urban household coverage is applied for the medium-term period (2000-2004).

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

Name of Municipality	Total No. of Households	No. of Urban Households	No. of Households Served	Coverage of Households (%)	Coverage of Urban Households (%)
Anahawan	1,360	598			
Bontoc	4,690	758	440	9	58
Hinunangan	4,835	339			
Hinundayan	2,276	911	726	32	80
Libagon	2,180	290			
Liloan	3,509	934	598	17	64
Limasawa	1,022	253			
Maasin (Capital)	13,281	6,264	5,298	40	85
Macrohon	4,162	1,410			
Malitbog	3,528	561	639	18	100
Padre Burgos	1,488	486			
Pintuyan	1,617	206			
Saint Bernard	4,375	721	337	8	47
San Francisco	2,033	488	210	10	43
San Juan (Cabalian)	2,470	835	639	26	77
San Ricardo	1,462	153			
Sitago	2,113	461			
Sogod	6,290	1,801	1,166	19	65
Tomas Oppus	2,550	388			
Provincial Total	65,241	17,857	10,053	15	56

8.3 Projection of Frame Values

8.3.1 Population Projection

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

Future regional population is published by the NSO, while projections at the provincial and the municipal levels were not available during the study. On the other hand, the NEDA Re-

gional Office VIII projected the regional and provincial population for year 2006. The future population of LGUs was therefore projected (details are included in the Supporting Report). Available information for the study at present is as follows:

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

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

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

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

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

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

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

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

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

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

The provincial and municipal population for the year 2002 was projected with 1990 as base year. The population growth rates by municipality experienced between 1980 and

1990 were basically adopted for the projection. The provincial growth rate was 0.83% between 1980 and 1990. While the experienced and projected growth rates of Region VIII are 0.88 % between 1980 and 1990 and 0.95 % between 1990 and 2002.

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

Comparing the census and the projected population in 1995, the provincial population based on the census is about 6% lower than the projected. Regarding the municipal census population in 1995, fourteen (14) out of 19 municipalities were lower with a range of -1% to -23% comparing with the projected figures, while the remaining five (5) municipalities were higher with a range of 1% to 23%.

In addition to this, the province is presently updating its Land Use Plan using the NEDA projection based on the 1995 census population. Thus, the future projection shall be made using the 1995 census results as the base year.

(3) Population Projection of the Province

The following conditions are considered in the population projection.

Regional Population

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

- 1) The regional population projected by the NEDA for the year 2006 is referred to for the short and medium-term period. The annual growth rate of 1.00% between 1995 and 2006 will be adopted for the projection in 1998 and 2004 using the compounded formula with 1995 as the base year.
- 2) For the long-term projection, it is assumed that the annual growth rates will decrease gradually as adopted in the NSO projection. The annual growth rates adopted in the NSO projection decline from 2.00% (2000 - 2005) to 1.82% (2005 - 2010), which indicate that the relative reduction rate is 0.09%. In this study, the same reduction rate may be used to the NEDA projected growth rate of 1.00% (2000 - 2005). Thus, the

population in year 2010 is estimated at 3,891,501 applying the growth rate of 0.91% from year 2005. The growth rates adopted in the study correspond to half the figures employed by NSO.

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

Provincial Population

In the NEDA projection, the regional population to be increased from 1995 to 2006 was distributed to each province in proportion to the share of the provincial population increase to the regional population experienced between 1990 and 1995. In this study, it is assumed that the tendency of the population growth by province will not drastically change. Thus, the same manner as adopted by the NEDA projection was employed both for the short/medium-term and long-term period in the population distribution from the regional population to those for concerned provinces. The distribution of the regional population to be increased to the provincial population was made between the respective base/target years. Table 8.3.2 shows the projected population in year 1998, 2004 and 2010 together with the NEDA projection.

Table 8.3.2 Projected Population of the Provinces

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

Municipal Population

- 1) The total population of the province in 1998, 2004 and 2010 was fixed.
- 2) For the population projection by municipality, the same method employed in NEDA projection for the distribution of regional population to provincial population was applied. The provincial population to be increased in respective planning years was distributed to each municipality in proportion to the share of the population increase

of each municipality to the provincial total experienced between 1990 and 1995. Table 8.3.3 presents the census results (1990 and 1995) and the projected population of the municipalities.

Table 8.3.3 Census Results and Projected Population of Municipalities

Municipality	Census Result				Projected Population					
	1990	1995	Pop. Growth	Share to Provincial Pop Growth	1998		2004		2010	
					Population	Growth Rate	Population	Growth Rate	Population	Growth Rate
Anahawan	7,063	6,471	-592	13.5%	6,278	-1.00%	5,874	-1.10%	5,478	-1.16%
Bontoc	24,818	24,047	-771	17.6%	23,795	-0.35%	23,268	-0.37%	22,752	-0.37%
Hinunangan	22,454	22,170	-284	6.5%	22,077	-0.14%	21,883	-0.15%	21,693	-0.15%
Hinundayan	9,965	10,617	652	-14.9%	10,830	0.66%	11,275	0.67%	11,711	0.63%
Libagon	11,239	10,754	-485	11.1%	10,596	-0.49%	10,265	-0.53%	9,940	-0.53%
Liloan	18,383	17,160	-1,223	28.0%	16,761	-0.78%	15,926	-0.85%	15,107	-0.88%
Limasawa	4,519	4,927	408	-9.3%	5,060	0.89%	5,339	0.90%	5,612	0.83%
Maasin	64,694	63,746	-948	21.7%	63,436	-0.16%	62,788	-0.17%	62,153	-0.17%
Macrohon	20,416	20,093	-323	7.4%	19,988	-0.17%	19,767	-0.19%	19,551	-0.18%
Malitbog	15,946	17,976	2,030	-46.4%	18,639	1.21%	20,025	1.20%	21,384	1.10%
Padre Burgos	7,375	7,593	218	-5.0%	7,664	0.31%	7,813	0.32%	7,959	0.31%
Pintuyan	8,177	8,388	211	-4.8%	8,457	0.27%	8,601	0.28%	8,742	0.27%
Saint Bernard	20,760	21,363	603	-13.8%	21,560	0.31%	21,972	0.32%	22,376	0.30%
San Francisco	10,438	9,543	-895	20.5%	9,251	-1.03%	8,640	-1.13%	8,041	-1.19%
San Juan	11,703	11,392	-311	7.1%	11,290	-0.30%	11,078	-0.32%	10,870	-0.32%
San Ricardo	9,723	7,869	-1,854	42.4%	7,264	-2.63%	5,998	-3.14%	4,757	-3.79%
Silago	9,733	9,785	52	-1.2%	9,802	0.06%	9,838	0.06%	9,873	0.06%
Sogod	31,342	31,062	-280	6.4%	30,970	-0.10%	30,778	-0.10%	30,591	-0.10%
Tomas Oppus	13,192	12,609	-583	13.3%	12,419	-0.50%	12,021	-0.54%	11,631	-0.55%
Province	321,940	317,565	-4,375	100.0%	316,137	-0.15%	313,149	-0.16%	310,221	-0.16%

Note: Growth rates in 1998, 2004 and 2010 were calculated using compounded formula.

Population by Urban and Rural Area

1) Past population development

With regard to the ratio of the urban population of the province to the total population, the provincial averages in 1980 and 1990 were 15.1% and 20.5%. Likewise, it increased to 24.7% in 1995. The provincial growth rate of 3.94% between 1980 and 1990 slightly decreased to 3.58% in 1995. While, the provincial average growth rates of rural population were 0.18% (1980 - 1990) and -0.65%(1990 - 1995).

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

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

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

- Short/Medium-term target: 1998 and 2004

Growth rates between 1990 and 1995 in terms of the profile of urban population to total population by municipality were basically adopted. However, for the municipalities having drastic change of growth rates between the two census periods (1990 - 1995 and 1980 - 1990), i.e., negative to positive/positive to negative, the average growth rates between 1980 and 1995 were employed in order to avoid a negative growth. These municipalities are Pintuyan and Saint Bernard.

In addition, some modifications were made as follows:

- Municipalities of Hinunangan, Hinundayan and Maasin; The respective average growth rates from 1980 to 1995 were employed considering that the growth rates between 1990 and 1995 indicated a very high increase (about 10% or more).
- Municipalities of Bontoc, Libagon, San Francisco, San Juan, San Ricardo and Tomas Oppus; Population in 1995 was fixed for the short/medium-term to avoid a negative growth rate.
- Municipality of Macrohon; Population in 1995 was fixed for the short/medium-term considering a higher growth rate between 1980 and 1995, although a negative growth rate was recorded between 1990 and 1995.
- Long-term target: 2010

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

Under the above assumptions, the provincial average share of the urban population for the year 2010 was arrived at 33.9%, higher than the figures in 1995 (24.7%) and in 1990 (20.5%). Table 8.3.4 presents the projected urban and rural population. The growth rates and shares on rural population were calculated using the estimated rural population.

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

Municipality		1998				2004				2010			
		Total	Urban/ Rural	G.R. (%)	Share (%)	Total	Urban/ Rural	G.R. (%)	Share (%)	Total	Urban/ Rural	G.R. (%)	Share (%)
Urban Area	Anahawan	6,278	2,805	0.76%	44.7%	5,874	2,936	0.76%	50.0%	5,478	2,738	-1.16%	50.0%
	Bontoc	23,795	3,780	0.00%	15.9%	23,268	3,780	0.00%	16.2%	22,752	3,696	-0.37%	16.2%
	Hinunangan	22,077	1,575	3.88%	7.1%	21,883	1,980	3.88%	9.0%	21,693	1,963	-0.14%	9.0%
	Hinundayan	10,830	4,307	3.84%	42.7%	11,275	5,399	3.81%	52.2%	11,711	5,608	0.64%	52.2%
	Libagon	10,596	1,450	0.00%	13.7%	10,265	1,450	0.00%	14.1%	9,940	1,404	-0.54%	14.1%
	Liloan	16,761	4,557	0.61%	27.2%	15,926	4,726	0.61%	29.7%	15,107	4,483	-0.88%	29.7%
	Limasawa	5,060	1,229	1.28%	24.3%	5,339	1,327	1.29%	24.9%	5,612	1,395	0.84%	24.9%
	Maasin	63,436	30,316	5.71%	47.8%	62,788	42,311	5.71%	67.4%	62,153	41,883	-0.17%	67.4%
	Macrohon	19,988	6,698	0.00%	33.5%	19,767	6,698	0.00%	33.9%	19,551	6,625	-0.18%	33.9%
	Malitbog	18,639	2,832	4.08%	15.5%	20,025	3,665	4.09%	18.3%	21,384	3,914	1.10%	18.3%
	Padre Bur-	7,664	2,543	2.91%	33.2%	7,813	3,021	2.91%	38.7%	7,959	3,077	0.31%	38.7%
	Pintuyan	8,457	1,048	1.24%	12.4%	8,601	1,129	1.25%	13.1%	8,742	1,148	0.28%	13.1%
	Saint Bernard	21,560	3,475	4.63%	16.1%	21,972	4,559	4.63%	20.7%	22,376	4,613	0.30%	20.7%
	San Francisco	9,251	2,222	0.00%	24.0%	8,640	2,222	0.00%	25.7%	8,041	2,068	-1.19%	25.7%
	San Juan	11,290	3,800	0.00%	33.7%	11,078	3,800	0.00%	34.3%	10,870	3,729	-0.31%	34.3%
	San Ricardo	7,264	695	0.00%	9.6%	5,998	695	0.00%	11.6%	4,757	551	-3.80%	11.6%
	Silago	9,802	2,168	0.84%	22.1%	9,838	2,280	0.84%	23.2%	9,873	2,288	0.06%	23.2%
Sogod	30,970	8,841	5.05%	28.5%	30,778	11,882	5.05%	38.6%	30,591	11,810	-0.10%	38.6%	
Tomas Oppus	12,419	1,932	0.00%	15.6%	12,021	1,932	0.00%	16.1%	11,631	1,869	-0.55%	16.1%	
Province	316,137	86,323	3.19%	27.4%	313,149	105,792	3.45%	33.9%	310,221	104,892	-0.14%	33.9%	
Rural Area	Anahawan	6,278	3,473	-2.34%	55.3%	5,874	2,938	-2.75%	50.0%	5,478	2,740	-1.16%	50.0%
	Bontoc	23,795	20,015	-0.42%	84.1%	23,268	19,488	-0.44%	83.8%	22,752	19,056	-0.37%	83.8%
	Hinunangan	22,077	20,502	-0.42%	92.9%	21,883	19,903	-0.49%	91.0%	21,693	19,730	-0.15%	91.0%
	Hinundayan	10,830	6,523	-1.23%	60.2%	11,275	5,876	-1.73%	52.1%	11,711	6,103	0.63%	52.1%
	Libagon	10,596	9,146	-0.57%	86.3%	10,265	8,815	-0.61%	85.9%	9,940	8,536	-0.53%	85.9%
	Liloan	16,761	12,204	-1.28%	72.8%	15,926	11,200	-1.42%	70.3%	15,107	10,624	-0.88%	70.3%
	Limasawa	5,060	3,831	0.77%	75.7%	5,339	4,012	0.77%	75.1%	5,612	4,217	0.83%	75.1%
	Maasin	63,436	33,120	-4.55%	52.2%	62,788	20,477	-7.70%	32.6%	62,153	20,270	-0.17%	32.6%
	Macrohon	19,988	13,290	-0.26%	66.5%	19,767	13,069	-0.28%	66.1%	19,551	12,926	-0.18%	66.1%
	Malitbog	18,639	15,757	0.72%	84.5%	20,025	16,360	0.63%	81.7%	21,384	17,470	1.10%	81.7%
	Padre Bur-	7,664	5,121	-0.89%	66.8%	7,813	4,792	-1.10%	61.3%	7,959	4,882	0.31%	61.3%
	Pintuyan	8,457	7,409	0.14%	87.6%	8,601	7,472	0.14%	86.9%	8,742	7,594	0.27%	86.9%
	Saint Bernard	21,560	18,085	-0.45%	83.9%	21,972	17,413	-0.63%	79.3%	22,376	17,733	0.30%	79.3%
	San Francisco	9,251	7,029	-1.35%	76.0%	8,640	6,418	-1.50%	74.3%	8,041	5,973	-1.19%	74.3%
	San Juan	11,290	7,490	-0.45%	66.3%	11,078	7,278	-0.48%	65.7%	10,870	7,141	-0.32%	65.7%
	San Ricardo	7,264	6,569	-2.89%	90.4%	5,998	5,303	-3.51%	88.4%	4,757	4,206	-3.79%	88.4%
	Silago	9,802	7,634	-0.16%	77.9%	9,838	7,558	-0.17%	76.8%	9,873	7,585	0.06%	76.8%
Sogod	30,970	22,129	-1.89%	71.5%	30,778	18,896	-2.60%	61.4%	30,591	18,781	-0.10%	61.4%	
Tomas Oppus	12,419	10,487	-0.60%	84.4%	12,021	10,089	-0.64%	83.9%	11,631	9,762	-0.55%	83.9%	
Province	316,137	229,814	-1.30%	72.6%	313,149	207,357	-1.70%	66.1%	310,221	205,329	-0.16%	66.1%	

Note: G.R. - Growth Rate

8.3.2 School Enrollment Projection

From the 1995 total population of the province, the number of children who would be enrolling in elementary and high school levels for all municipalities is derived.

School age population is extrapolated from the NSO age group classification of 5-9, 10-14 and 15-19 years old bracket by municipality. The age group for the elementary level is from 6 to 13 years, while that for the high school level is from 14 to 17 years. The percentages of

school age population for the target years are based on the existing composition or structure of the 1995 population.

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

The number of public school students by target year is then derived from the projected number of children who will attend school. A participation rate for public school enrollment is established based on the existing participation rate of public school students to the total school age population. Based on the projection, an increase of 3% from the 1998 rate is foreseen in 2004 and the same level of the 2004 rate in 2010 (details are referred to Table 8.3.6, Supporting Report). It should be noted that some municipalities had participation rate in 1998 of over 100%, an indication that a number of school enrollees are over-aged.

Table 8.3.5 shows the projected number of public school students by municipality, by target year. About 73,888 and 72,994 public school students are estimated to enroll for years 2004 and 2010, respectively. The decrease in enrolment in year 2010 is due to the decline of over-aged students.

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

Name of Municipality	Number of Public School Student			Number of Public Utilities		
	1998	2004	2010	1998	2004	2010
Anahawan	1,189	1,114	1,040	1	1	1
Bontoc	6,403	6,603	6,457	1	2	2
Hinunangan	4,720	5,098	5,054	2	3	3
Hinundayan	2,310	2,495	2,591	2	2	2
Libagon	2,625	2,464	2,386	2	2	2
Liloan	4,333	3,728	3,536	3	4	4
Limasawa	1,271	1,375	1,445	2	2	2
Maasin (Capital)	13,071	14,130	13,988	5	6	6
Macrohon	5,166	4,678	4,627	1	1	1
Malitbog	3,389	4,038	4,582	2	3	3
Padre Burgos	1,407	1,879	1,914	3	3	3
Pintuyan	1,668	1,834	1,981			1
Saint Bernard	4,641	4,886	4,976	3	4	4
San Francisco	2,393	2,130	1,762	3	3	3
San Juan (Cabalian)	2,611	2,709	2,805	3	3	3
San Ricardo	2,260	1,694	1,277			1
Silago	2,102	2,273	2,407	2	2	2
Sogod	7,447	7,642	7,149	3	4	4
Tomas Oppus	3,056	3,118	3,017	1	1	1
Provincial Total	72,062	73,888	72,994	39	46	48

8.3.3 Projection of the Number of Public Utilities

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

There is no proposed construction for the medium term. However, the on-going ADB assisted project is proposing 7 public toilets to be constructed in the province between the years 2000 and 2002, hence this is included in Phase I development. For year 2010, two (2) public toilets in public markets are proposed. Refer to Table 8.3.2 for the number of public utilities by municipality by target year (details are referred to Supporting Report).

8.3.4 Planning Area and Its Projected Population for Sewerage

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

Two (2) municipalities with a total urban population of about 26,847 are considered (refer to Table 8.5.4).

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

The number of urban households in 2004 is the potential households for the planning (refer to Table 8.3.5, Supporting Report).

8.4 Types of Facilities and Implementation Criteria

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

8.4.1 Water Supply

The following are the major conditions and assumptions applied to urban and rural water supply, which are intended as a guide for the implementation of sector projects.

(1) Urban water supply

Prevailing situation of urban water supply in each municipality was first reviewed mainly

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

Aforementioned studies were carried out by the following sequence:

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

Table 8.4.1 presents a summary of the study results by municipality.

1) Review of existing water supply systems and water sources

The municipalities of Maasin and Sogod are served by WDs.

While the municipalities of Anahawan, Bontoc, Hinunangan, Hinundayan, Libagon, Liloan, Macrohon, Malitbog, Padre Burgos, Pintuyan, St. Bernard, San Francisco, San Ricardo, Silago and Tomas Oppus are served by Level III systems operated either by the municipal government or the local community.

Population served by existing Level III systems supplying to urban areas range from about 1,000 persons at Puntana WWs in Silago to 16,000 persons at the Maasin Water District. The average size of served population is about 5,000 persons/system. Majority of the existing Level III systems in urban areas is utilizing spring sources.

The remaining 2 municipalities, out of the total 19 municipalities/city, namely: Limasawa and San Juan have no Level III system in their urban areas and are presently served by Level II systems and/or Level I facilities.

2) Review of planned/on-going projects

There is no available information on planned/on-going projects except for rehabilitation of spring box and construction of water treatment plant at Maasin WD during the course of PW4SP preparation.

Table 8.4.1 Summary of Urban Water Supply Development by Municipality

Municipality	Existing Condition	On-going/Planned Project	Water Source Availability	Future Requirements
Anahawan	There is a LGU-managed Level III system in provision of spring source. About 1,500 population (53% of urban population) are served at present. The system needs rehabilitation of worn-out pipes.	None	Rich spring fields are located near urban barangays. Spring water is potable. Deep and shallow well development are very risky.	System expansion using spring source with rehabilitation of pipelines is required.
Bontoc	There is a LGU-managed Level III system. About 1,100 population (28% of urban population) are served at present. Water source is a combination of deep well and spring source. Current issue is replacement of old pipelines. Spring source is not sufficient during dry season.	None	Spring fields are located near urban barangays with potable quality. Deep well development is available in urban area. Deep well design specifications are: depth of about 40m, production capacity of 500 cu.m/d or less.	System expansion using spring source is required. Rehabilitation of pipelines is a requisite. Study on water source development is a requisite. Merging with Sogod WD shall be considered.
Hinunangan	There is a LGU-managed Level III system in provision of spring source. About 1,300 population (30% of urban population) are served by Level III at present. The system needs improvement/rehabilitation of deteriorated pipelines.	None	Spring fields are located near urban barangays with potable quality. Deep well development is available in alluvial plain with high yielding but water quality has slightly acidic. Deep well specifications are: depth of about 50m to 80m, production capacity of 1,000 cu.m/d or more.	System expansion with rehabilitation of pipelines is required.
Hinundayan	There is a LGU-managed Level III system in provision of spring source. About 1,300 population (30% of urban population) are served at present. Rehabilitation of the system together with water source augmentation are current issues.	None	Spring fields are located near urban barangays with potable quality. Deep well development is available in alluvial plain with high yielding but water quality has slightly acidic. Deep well specifications are: depth of about 50m to 80m, production capacity of 1,000 cu.m/d or more.	System expansion with water source augmentation is required. Upgrading from existing Level II system shall be considered. Technical and financial study on additional water source development is also necessary.
Libagon	There is a LGU-managed Level III system in provision of spring source. About 400 population (28% of urban population) are served at present. Rehabilitation of old pipelines is current issue.	None	Spring fields are located near urban barangays. Spring water is potable. Deep well development is available in alluvial plain with high yielding but water quality has slightly acidic. Deep well specifications are: depth of about 40m, production capacity of 1,000 cu.m/d or more.	System expansion in use of combination of deep well and spring source shall be required. Rehabilitation of existing pipelines is a requisite. Upgrading from existing Level II system with concurrence from beneficiaries shall be sought.
Liloan	Liloan is located in Panaon Island. There is a LGU-managed Level III system in provision of spring source. About 1,100 population (24% of urban population) are served at present. Insufficient water supply during dry season is current problem.	None	Spring fields are located near urban barangays. Spring water is potable. Deep well development is available with slightly ironie quality. Deep well specifications are: depth of about 40m, production capacity of 500 cu.m/d or more.	System expansion with water source augmentation is required. High yielding spring source shall be sought.

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

Municipality	Existing Condition	On-going/Planned Project	Water Source Availability	Future Requirements
Limasawa	Limasawa is an island municipality. There is no Level III system in urban area at present. Urban population is about 1,200. They use Level II system with deep well and Level I facilities.	None	Spring is only potential water source for Level III water supply. Deep and shallow well development are very risky.	New system using deep well shall be created. Study on deep well development including verification of availability of existing deep well is a requisite.
Maasin (Capital)	There is Maasin Water District serving for 10 urban with served population of 11,500 (45% of urban population). Others use Level II systems using spring sources and Level I facilities. Water source of the WD is a combination of 2 groups of springs, surface water from Canlit River and 4 deep wells. Discharge of spring sources is a total of 2,800 m ³ /d. Surface water is treated by using slow sand filters with treatment capacity of 350 m ³ /d. Deep wells are used for supplementary water source at present. The WD practices scheduled water supply due to insufficient capacity of the facilities and insufficient water source especially during dry season. The WD is now undertaking rehabilitation of spring intake box and construction of water treatment plant/pipelines. For long-term plan, the WD is seeking system expansion with tapping spring source located at Balok-balak.	On-going (rehabilitation of spring box and construction of water treatment plant)	Spring fields are scattered near urban barangays. Water is potable and has a large discharge. Deep well development is also available in urban area. Deep well specifications are: depth of about 40m, production capacity of 500 cu.m/d or less. Groundwater has slightly iron contents.	System expansion with water source augmentation is required. Technical study (discharge, water quality, topographical survey, etc.) on the development of untapped spring source is a requisite.
Macrohon	There are three (3) Level II systems managed by associations in urban area. Total population served is about 2,100 (32% of urban population). Their water sources are springs.	None	Spring fields are located near urban barangays with potable quality and large discharge. Deep well development is available in urban area. Deep well specifications are: depth of about 40m, production capacity of 500 cu.m/d or less.	System expansion is required. Upgrading from existing Level II system shall be studied. Integrated management system for small Level III systems in the municipality shall be studied.
Malitbog	There is a LGU-managed Level III system in provision of deep well. About 1,200 population (43% of urban population) are served at present.	None	Spring fields are located near urban barangays with potable quality and large discharge. Deep well development is available in urban area. Deep well specifications are: depth of about 40m, production capacity of 500 cu.m/d or less.	System expansion is required. Study on additional deep well development is a requisite.
Padre Burgos	There is a LGU-managed Level III system in provision of spring source. About 2,100 population (81% of urban population) are served at present. The waterworks practices rationing water supply due to insufficient water source and facilities.	None	Spring fields are scattered near urban barangays with potable water quality and small discharge. Deep well development is available in urban area. Deep well specifications are: depth of about 40m, production capacity of 500 cu.m/d or less. Saline water intrusion is reported.	System expansion with water source augmentation is required. Study on additional water source development is a requisite. Improvement/replacement of existing distribution pipes shall be considered.

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

Municipality	Existing Condition	On-going/Planned Project	Water Source Availability	Future Requirements
Pintuyan	Pintuyan is located in Panaon Island. There is a LGU-managed Level III system in provision of spring source. About 300 population (27% of urban population) are served at present. The current issues are additional water source development to provide sufficient water supply to increasing population and repair of leaking distribution pipes.	None	Rich spring fields are located near urban barangays. Water is potable. Deep and shallow well development are very risky.	System expansion with additional spring source development is required. Study on water source development is a requisite. Rehabilitation of distribution pipelines is also required.
Saint Bernard	There is a LGU-managed Level III system in provision of spring source. About 3,400 population (98% of urban population) are served at present. The waterworks had experience of rationing water supply due to insufficient water source when El Nino phenomenon occurred. Rehabilitation/replacement and extension of distribution pipelines are current issues.	None	Spring fields are located near urban barangays. Water is potable. Deep well development is also available in fluvial deposits with high yielding but water quality has slight acidic. Deep well specifications are: depth of about 40m, production capacity of 1,000 cu.m/d or	System expansion with additional water source development is required. Study on water source (free flowing wells are available, but private property) is a requisite. Rehabilitation of the current system is also required.
San Francisco	San Francisco is located in Panaon Island. There is a LGU-managed Level III system in provision of spring source. About 1,800 population (83% of urban population) are served at present. Current problems are insufficient water supply during dry season.	None	Spring fields are located near urban barangays. Water is potable with high yield. Deep well specifications are: 40 m in depth and production capacity of 500 cu.m/d or more.	System expansion with water source augmentation (spring) is required. Improvement of spring box is a requisite. Study on additional spring development shall be considered.
San Juan (Cabalian)	There is no Level III system in urban area at present. Urban population is about 3,800.	None	Rich spring fields are located near urban barangays. Deep well development is available in alluvial plain with high yielding but water quality has slightly acidic. Deep well specifications are: depth of about 40m, production capacity of 1,000 cu.m/d or more.	New system shall be created. Study on water source development is a requisite. Upgrading from existing Level II system shall be studied. Integrated system with neighboring municipality shall be considered.
San Ricardo	San Ricardo is located in Panaon Island. There is a LGU-managed Level III system in provision of spring source. About 500 population (70% of urban population) are served at present. The waterworks practices scheduling water supply at present.	None	Rich spring fields are located near urban barangays. Spring water is potable. Deep and shallow well development are very risky.	System expansion with water source augmentation is required.

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

Municipality	Existing Condition	On-going/Planned Project	Water Source Availability	Future Requirements
Silago	There is a Level III system managed by association. About 800 population (38% of urban population) are served at present. Water source is spring.	None	Spring fields are located near urban barangays. Water is potable. Deep well development is available in northern alluvial plain with high yielding but water quality has slightly ionic contents.	System expansion using spring source is required. Improvement of existing system shall be considered.
Sogod	There is Sogod WD serving for 5 urban barangays with served population of 5,600 (63% of urban population). Water source is spring. Water supply is insufficient during dry season.	None	Spring fields are located near urban barangays. Water is potable. Deep well development is also available in alluvial plain with high yielding. Deep well specifications are: depth of about 40m, production capacity of 1,000 cu.m/d or more.	System expansion with water source augmentation is required. Study on water source development (spring source) is a requisite. Improvement/replacement of existing distribution pipes shall be considered.
Tomas Oppus	There is a LGU-managed Level III system in provision of spring source. About 800 population (42% of urban population) are served at present. The current issue is expansion of distribution pipelines. There is sufficient water source.	None	Spring fields are located near urban barangays. Water is potable. Deep well development is also available in urban area. Deep well specifications are: depth of about 40m, production capacity of 500 cu.m/d or less.	System expansion (distribution pipelines) is required. Technical and financial study on additional spring development is a requisite.

3) Establishment of planning conditions

a. Service level

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

b. Utilization of existing facilities

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

c. Water sources

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

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

d. Number of systems

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

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

- water source constraints, and
- economical development/scale merit of water supply system by cost reduc-

tion of water source development and other common facilities as well as O&M cost/minimized number of technical staff.

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

e. Rehabilitation

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

4) Overall development strategy

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

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

- Bontoc and Sogod
- Saint Bernard and San Juan

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

Some municipalities have high potential for spring development due to the presence of a number of untapped spring sources favorable for urban water supply that were identified during the course of PW4SP preparation. However, a detailed survey to ensure appropriate development of spring sources shall be conducted in the implementation of the projects.

(2) Rural water supply

1) Service level

Level I systems (deep well/shallow well/developed spring) are generally planned for rural areas where houses are scattered. In the PW4SP, all of the required Level I facilities will be implemented under the on-going ADB-assisted project.

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

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

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

2) Utilization of existing facilities

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

3) Water source

For Level I facilities, deep well construction is given priority wherever applicable considering safety against possible contamination and stable water supply. Standard specifications of shallow and deep wells are summarized in Table 8.4.2 based on the water source evaluation results presented in Chapter 7. Conventional construction method (driven well) may be employed under favorable substrata or hydrogeological conditions. The standard structure of wells in application of "open-hole drilling and gravel pack" is presented in Figure 8.4.1, Supporting Report. In addition to this, for deep well with high iron content, application of iron removal facility is recommended. The standard structure of iron removal facility is presented in Figures 8.4.2 (a) and 8.4.2 (b), Supporting Report.

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

Table 8.4.2 Standard Specifications of Level I Wells

Specification	Shallow Well	Deep Well
Construction Method	Open-hole drilling and gravel pack	
Casing Diameter	50mm	100mm
Borehole Diameter	150mm	200mm
Ranges of Well Depth	Standard Depth	
0 - 20m	20m	Not Applicable
21 - 50m	Not Applicable	40m
51 - 100m	Not Applicable	80m
101 - 150m	Not Applicable	120m

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

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

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

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

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

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

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

4) Number of systems/facilities

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

5) Rehabilitation

Rehabilitation of existing Level I wells is not considered, since most of the wells constructed by driving method are not suitable for rehabilitation to recover their functions. Still, minor repair work for hand-pump and concrete apron is a requisite.

8.4.2 Sanitation

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

(1) Household toilets

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

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

(2) School toilets

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

The standard toilet facility (1 building) with 5 units of toilet bowl to serve for 200 students is adopted for the planning purpose, which is modified from FW4SP design to provide a shallow well as a water source. Since DECS is currently promoting the "one classroom-one toilet" concept, the PW4SP also adopts this concept on a 50-50 basis, that is 50% of the school toilet requirements will be allocated using the JICA-RESP design and the other 50% will be adopting the new concept.

(3) Public toilets

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

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

8.4.3 Urban Sewerage

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

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

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

8.4.4 Solid Waste

In terms of facility requirements, this PW4SP only studied the number of refuse collection trucks required for the year 2004. A rated capacity of 5 cu.m truck/vehicle is considered for calculation of required units of truck. Disposal of solid waste shall be studied in detail through investigations, F/S and D/D. Unit solid waste generation for urban area is assumed to be 0.418 kg. per capita per day.

8.5 Service Coverage by Target Year

8.5.1 Water Supply

The service coverage in terms of population to be served by target year was estimated by urban and rural area by municipality. The service coverage in rural area was further subdivided by service level (Level I & II) to finally come up with physical requirements.

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

- provincial sector targets;
- physical targets under on-going ADB-assisted project;

- population projection by target year; and
- base year service coverage (served population) by existing facilities.

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

(1) Phase I requirements

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

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

The physical targets of the province under the ADB-assisted project are construction of shallow well (109 units), deep well (95 units) and developed spring (66 units). Although a total of 270 units were allocated to the recipient municipalities, actual construction has not yet started to date. Accordingly, these physical targets may be included in the Phase I requirements of this plan (details are referred to Supporting Report).

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

Table 8.5.1 presents the service coverage by target year and by level of service as well as the additional population to be served (details are referred to Supporting Report).

Through Phase I development, approximately 39,600 persons in the province will be served by additional water supply services, of which 15,300 persons or 39% of the total will be urban population and 24,300 persons or 61% will be rural population.

For Phase II period, a total of 74,200 persons, of which 48,500 persons or 65% in urban area and 25,700 persons or 35% in rural area, will be further benefited by water supply services. This additional service coverage in urban area includes the upgrade of service level for 30,200 persons served by Level I and II facilities in 1998.

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

Name of Municipality	Area	Phase I Coverage (2004)					Phase II Coverage (2010)				
		Total Population		Service Coverage		Total Population to be Served	Service Coverage		Additional Population to be Served		Total
		Level III	Level II	Level III	Level II		Level III	Level II	Level III	Level II	
Anahawan	Urban	2,936	2,022	186	2,208	539	2,743	2,601	142	579	3,320
	Rural	2,936	2,022	186	2,208	539	2,743	2,601	142	579	3,320
	Total	5,872	4,044	372	4,216	1,078	5,486	5,202	284	1,158	6,644
Bontoc	Urban	1,943	1,660	283	1,377	694	2,654	2,361	293	393	3,047
	Rural	1,943	1,660	283	1,377	694	2,654	2,361	293	393	3,047
	Total	3,886	3,320	566	2,754	1,388	5,308	4,722	586	786	6,094
Hinunangan	Urban	1,993	1,590	403	1,187	644	2,637	2,227	410	410	3,047
	Rural	1,993	1,590	403	1,187	644	2,637	2,227	410	410	3,047
	Total	3,986	3,180	806	2,374	1,288	5,274	4,454	820	820	6,094
Hinundayan	Urban	5,876	5,238	638	5,970	992	6,962	6,324	638	638	7,600
	Rural	5,876	5,238	638	5,970	992	6,962	6,324	638	638	7,600
	Total	11,752	10,476	1,276	11,940	1,984	13,924	12,648	1,276	1,276	15,220
Lubang	Urban	4,012	3,552	460	3,992	712	4,704	4,244	460	460	5,164
	Rural	4,012	3,552	460	3,992	712	4,704	4,244	460	460	5,164
	Total	8,024	7,104	920	7,984	1,424	9,408	8,488	920	920	10,328
Liliuan	Urban	4,726	4,076	650	4,626	926	5,552	4,902	650	650	6,202
	Rural	4,726	4,076	650	4,626	926	5,552	4,902	650	650	6,202
	Total	9,452	8,152	1,300	9,252	1,852	11,104	9,804	1,300	1,300	12,404
Limaueva	Urban	4,012	3,552	460	3,992	712	4,704	4,244	460	460	5,164
	Rural	4,012	3,552	460	3,992	712	4,704	4,244	460	460	5,164
	Total	8,024	7,104	920	7,984	1,424	9,408	8,488	920	920	10,328
Masin (Capital)	Urban	42,311	37,000	5,311	42,311	7,311	49,622	44,311	5,311	5,311	54,933
	Rural	42,311	37,000	5,311	42,311	7,311	49,622	44,311	5,311	5,311	54,933
	Total	84,622	74,000	10,622	84,622	14,622	99,244	88,622	10,622	10,622	109,866
Macaron	Urban	13,099	11,500	1,599	13,099	2,599	15,698	14,099	1,599	1,599	17,297
	Rural	13,099	11,500	1,599	13,099	2,599	15,698	14,099	1,599	1,599	17,297
	Total	26,198	23,000	3,198	26,198	5,198	31,396	28,198	3,198	3,198	34,594
Malibog	Urban	16,360	14,360	2,000	16,360	3,000	19,360	17,360	2,000	2,000	21,360
	Rural	16,360	14,360	2,000	16,360	3,000	19,360	17,360	2,000	2,000	21,360
	Total	32,720	28,720	4,000	32,720	6,000	38,720	34,720	4,000	4,000	42,720
Padre Burgos	Urban	3,021	2,665	356	3,021	506	3,527	3,171	356	356	3,877
	Rural	3,021	2,665	356	3,021	506	3,527	3,171	356	356	3,877
	Total	6,042	5,330	712	6,042	1,012	7,054	6,342	712	712	7,764
Pintuyan	Urban	1,129	990	139	1,129	239	1,368	1,229	139	139	1,508
	Rural	1,129	990	139	1,129	239	1,368	1,229	139	139	1,508
	Total	2,258	1,980	278	2,258	478	2,736	2,458	278	278	3,016
Saint Bernard	Urban	17,413	15,360	2,053	17,413	3,053	20,466	18,413	2,053	2,053	22,466
	Rural	17,413	15,360	2,053	17,413	3,053	20,466	18,413	2,053	2,053	22,466
	Total	34,826	30,720	4,106	34,826	6,106	40,932	36,826	4,106	4,106	44,932
San Francisco	Urban	2,272	1,984	288	2,272	488	2,760	2,472	288	288	3,050
	Rural	2,272	1,984	288	2,272	488	2,760	2,472	288	288	3,050
	Total	4,544	3,968	576	4,544	976	5,520	4,944	576	576	6,100
San Juan (Chablan)	Urban	7,276	6,400	876	7,276	1,476	8,752	7,876	876	876	9,652
	Rural	7,276	6,400	876	7,276	1,476	8,752	7,876	876	876	9,652
	Total	14,552	12,800	1,752	14,552	2,952	17,504	15,752	1,752	1,752	20,304
San Ricardo	Urban	5,001	4,400	601	5,001	1,001	6,002	5,401	601	601	6,602
	Rural	5,001	4,400	601	5,001	1,001	6,002	5,401	601	601	6,602
	Total	10,002	8,800	1,202	10,002	2,002	12,004	10,802	1,202	1,202	13,204
Sislag	Urban	7,538	6,600	938	7,538	1,538	9,076	8,140	938	938	10,014
	Rural	7,538	6,600	938	7,538	1,538	9,076	8,140	938	938	10,014
	Total	15,076	13,200	1,876	15,076	3,076	18,152	16,280	1,876	1,876	20,028
Sogod	Urban	11,857	10,400	1,457	11,857	2,457	14,314	12,857	1,457	1,457	15,811
	Rural	11,857	10,400	1,457	11,857	2,457	14,314	12,857	1,457	1,457	15,811
	Total	23,714	20,800	2,914	23,714	4,914	28,628	25,714	2,914	2,914	31,622
Tomas Oppus	Urban	10,080	8,800	1,280	10,080	2,280	12,360	11,120	1,240	1,240	13,600
	Rural	10,080	8,800	1,280	10,080	2,280	12,360	11,120	1,240	1,240	13,600
	Total	20,160	17,600	2,560	20,160	4,560	24,720	22,240	2,560	2,560	27,280
Provincial Total	Urban	105,792	91,200	14,592	105,792	21,592	127,384	112,792	14,592	14,592	141,976
	Rural	105,792	91,200	14,592	105,792	21,592	127,384	112,792	14,592	14,592	141,976
	Total	211,584	182,400	29,184	211,584	43,184	254,768	225,584	29,184	29,184	283,952

8.5.2 Sanitation

(1) Household toilets

The service coverage (number of households to be served) by different types of sanitary facility is estimated by urban and rural area by municipality for the years 2004 and 2010. The future service coverage and additional households to be served are estimated to meet the provincial targets using the number of household served in the base year and the number of households in target years.

Phase I service coverage will include the proposed household toilets of the on-going ADB assisted project in the province with a total of 1,800 units of pour-flush toilets. Construction/installation is expected to commence in 2000 and to end in 2002.

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

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

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

The projected number of served households at the end of the Phase I period is 60,988. Additional households to be served totaled to 8,096 of which 76% is urban households and 24% is rural households. Of this requirement, a total of 1,800 units of pour flush toilets will be absorbed by the on-going ADB assisted project. While at the end of Phase II period, the number of served households are 73,680 with an additional households to be served at 19,257. Table 8.5.2 provides the number of households to be served by target year for urban and rural areas by municipality.

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

Name of Municipality	Area	Phase I Coverage (2006)										Phase II Coverage (2010)									
		Total Households					No. of Served Households					Add'l. No. of Households to be Served					Total				
		Household	Flush	Pour	VIP/Dry	Total	Household	Flush	Pour	VIP/Dry	Total	Household	Flush	Pour	VIP/Dry	Total	Household	Flush	Pour	VIP/Dry	Total
Anahawan	Urban	620	10	567		577						685	376	223		651					
	Rural	644	5	650		655						685	5	690		695					
	Total	1,264	15	1,217		1,232						1,370	381	713		1,346					
Bontoc	Urban	588	100	585		685						924	896	3,445		4,369					
	Rural	3,829	34	3,336		3,370						4,300	4,064	3,445		7,764					
	Total	4,417	134	3,921		4,055						9,224	4,960	6,890		12,133					
Hinunangan	Urban	4,557	36	3,455		3,491						94	401	233		465					
	Rural	4,557	20	4,156		4,176						94	401	233		465					
	Total	9,114	56	7,611		7,667						188	802	466		930					
Himudayan	Urban	1,141	103	924		1,027						227	1,536	784	1,135	2,751					
	Rural	1,229	171	1,403		1,574						227	1,536	784	1,135	2,751					
	Total	2,370	274	2,327		2,601						454	3,072	1,568	2,270	5,502					
Lubagan	Urban	2,500	4	273		277						227	2,428	920	1,801	3,329					
	Rural	1,821	2	1,005		1,007						227	2,428	920	1,801	3,329					
	Total	4,321	6	1,278		1,284						454	4,856	1,840	3,602	6,658					
Lubun	Urban	968	67	764		831						64	1,121	533	532	1,654					
	Rural	3,331	8	2,344		2,352						64	1,121	533	532	1,654					
	Total	4,299	75	3,108		3,183						128	2,242	1,066	1,064	3,308					
Linauwa	Urban	1,828	25	709		734						227	2,428	920	1,801	3,329					
	Rural	1,060	25	931		956						227	2,428	920	1,801	3,329					
	Total	2,888	50	1,640		1,690						454	4,856	1,840	3,602	6,658					
Masin (Capital)	Urban	3,081	64	3,289		3,353						3,681	15,539	10,334	16,333	41,857					
	Rural	3,794	57	4,681		4,738						3,681	15,539	10,334	16,333	41,857					
	Total	6,875	121	7,970		8,091						7,362	31,078	20,668	32,666	83,714					
Macabon	Urban	1,410	127	1,162		1,289						227	2,428	920	1,801	3,329					
	Rural	2,706	24	2,357		2,381						227	2,428	920	1,801	3,329					
	Total	4,116	151	3,499		3,670						454	4,856	1,840	3,602	6,658					
Malibog	Urban	713	64	578		642						227	2,428	920	1,801	3,329					
	Rural	3,081	27	2,711		2,738						227	2,428	920	1,801	3,329					
	Total	3,794	91	3,289		3,380						454	4,856	1,840	3,602	6,658					
Padre Burgos	Urban	578	57	468		525						336	1,900	593	1,274	2,769					
	Rural	938	4	942		946						336	1,900	593	1,274	2,769					
	Total	1,516	61	1,410		1,471						672	3,800	1,186	2,548	5,538					
Pinoyan	Urban	1,423	20	1,347		1,367						58	3,146	493	1,549	4,787					
	Rural	1,645	20	1,527		1,547						58	3,146	493	1,549	4,787					
	Total	3,068	40	2,874		2,914						116	6,292	986	3,098	9,574					
Saint Bernard	Urban	946	95	766		861						217	1,611	835	1,786	3,213					
	Rural	3,518	31	2,065		2,096						217	1,611	835	1,786	3,213					
	Total	4,464	126	2,831		2,957						434	3,222	1,670	3,571	6,426					
San Francisco	Urban	486	44	395		439						53	517	246	245	763					
	Rural	1,411	9	1,349		1,358						53	517	246	245	763					
	Total	1,897	53	1,744		1,807						106	1,034	491	490	1,526					
San Juan (Cabalihan)	Urban	835	75	677		752						372	1,785	443	442	2,600					
	Rural	1,369	25	1,398		1,398						372	1,785	443	442	2,600					
	Total	2,424	100	2,075		2,150						744	3,570	886	884	5,200					
San Ricardo	Urban	1,036	14	1,210		1,224						20	1,18	14	124	136					
	Rural	1,209	14	1,410		1,424						20	1,18	14	124	136					
	Total	2,245	28	2,620		2,648						40	2,362	28	248	272					
Sillago	Urban	485	44	395		439						44	1,880	333	1,410	2,213					
	Rural	1,645	20	1,527		1,547						44	1,880	333	1,410	2,213					
	Total	2,130	64	1,922		1,986						88	3,760	666	2,820	4,426					
Sogod	Urban	2,420	218	1,960		2,178						772	3,553	1,601	4,001	5,324					
	Rural	3,833	31	3,359		3,390						668	4,059	833	3,491	4,952					
	Total	6,253	249	5,319		5,568						1,440	7,612	2,434	7,492	10,276					
Tomas Oppa	Urban	388	11	368		379						227	2,428	920	1,801	3,329					
	Rural	2,080	36	1,996		2,032						227	2,428	920	1,801	3,329					
	Total	2,468	47	2,364		2,411						454	4,856	1,840	3,602	6,658					
Provincial Total	Urban	21,863	1,908	19,740		21,748						6,124	26,233	12,411	32,509	44,758					
	Rural	42,865	280	40,974		41,244						1,968	51,335	9,161	62,500	63,463					
	Total	64,728	2,177	60,714		62,992						8,092	77,568	21,572	95,009	108,221					

(2) School toilets

The service coverage or the number of public school students to be served is estimated by municipality for the years 2004 and 2010.

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

Phase I development will include the proposed school toilets under the on-going ADB assisted project in the province with a total of about 90 units of school toilets to be situated in each classroom.

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

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

The projected number of served students at the end of Phase I period is 66,500. The additional students to be served are 6,131 inclusive of about 3,600 students to be covered by the on-going ADB assisted project. While at the end of Phase II period, the projected number of served students are 69,877 with an additional students to be served at 5,224. Table 8.5.3 summarizes the number of public school students to be served by target year.

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

Name of Municipality	Phase I Coverage (2004)			Phase II Coverage (2010)		
	Total No. of Public School Student	Std. No. of Public School Students to be Served	Add'l. No. of Public School Student to be Served	Total No. of Public School Student	Std. No. of Public School Students to be Served	Add'l. No. of Public School Student to be Served
Anahawan	1,114	1,114	-75	1,040	1,040	
Bontoc	6,603	4,500	900	6,457	6,134	1,634
Hinunangan	5,098	4,705	105	5,054	4,801	96
Hinundayan	2,495	2,140	340	2,591	2,461	321
Libagon	2,464	2,371	51	2,386	2,267	
Liloan	3,728	3,728	-605	3,536	3,536	
Limasawa	1,375	1,359	159	1,445	1,373	14

Table 8.5.3 Additional Number of Public School Student to be Served by Target Year (School Toilets)
(Cont'd)

Name of Municipality	Phase I Coverage (2004)			Phase II Coverage (2010)		
	Total No. of Public School Student	Std. No. of Public School Students to be Served	Add'l. No. of Public School Student to be Served	Total No. of Public School Student	Std. No. of Public School Students to be Served	Add'l. No. of Public School Student to be Served
Maasin (Capital)	14,130	11,685	2,325	13,988	13,289	1,604
Macarhon	4,678	4,296	296	4,627	4,396	100
Malitbog	4,038	3,830	550	4,582	4,353	523
Padre Burgos	1,879	1,576	456	1,914	1,818	242
Pintuyan	1,834	1,706	38	1,981	1,882	176
Saint Bernard	4,886	4,741	100	4,976	4,727	
San Francisco	2,130	2,360	200	1,762	1,762	
San Juan (Cabalian)	2,709	2,289	369	2,805	2,665	376
San Ricardo	1,694	1,694	-566	1,277	1,277	
Silago	2,273	2,149	47	2,407	2,287	138
Sogod	7,642	6,801	1,041	7,149	6,792	
Tomas Oppus	3,118	3,456	400	3,017	3,017	
Provincial Total	73,888	66,500	6,131	72,994	69,877	5,224

(3) Public toilets

The service coverage of public utilities with sanitary toilet facility by municipality is estimated for the years 2004 and 2010.

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

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

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

There are no proposed public utilities for the medium-term plan. However, the ADB assisted project proposes 7 units of public toilets in the province to be constructed within the Phase I period. Two (2) public toilets to be located in public markets are to be constructed by year 2010. Table 8.5.4 reflects the distribution of these public toilets by municipality

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

Name of Municipality	Type	Phase I Coverage (2004)		Phase II Coverage (2010)	
		Add'l. No. of Public Utility with Sanitary Toilets	No. of Public Utility with Sanitary Toilets	Add'l. No. of Public Utility with Sanitary Toilets	No. of Public Utilities with Sanitary Toilets
Anahawan	Public Market		1		1
	Bus/Jeepney Terminal				
	Parks/Playground				
	Total		1		1
Bontoc	Public Market	1	2		2
	Bus/Jeepney Terminal				
	Parks/Playground				
	Total	1	2		2
Hinunangan	Public Market		1		1
	Bus/Jeepney Terminal	1	2		2
	Parks/Playground				
	Total	1	3		3
Hinundayan	Public Market		1		1
	Bus/Jeepney Terminal				
	Parks/Playground		1		1
	Total		2		2
Libagon	Public Market		1		1
	Bus/Jeepney Terminal				
	Parks/Playground		1		1
	Total		2		2
Liloan	Public Market	1	2		2
	Bus/Jeepney Terminal		1		1
	Parks/Playground		1		1
	Total	1	4		4
Limasawa	Public Market				
	Bus/Jeepney Terminal				
	Parks/Playground		2		2
	Total		2		2
Maasin (Capital)	Public Market		3		3
	Bus/Jeepney Terminal	1	2		2
	Parks/Playground		1		1
	Total	1	6		6
Macrohon	Public Market				
	Bus/Jeepney Terminal				
	Parks/Playground		1		1
	Total		1		1
Malitbog	Public Market	1	2		2
	Bus/Jeepney Terminal				
	Parks/Playground		1		1
	Total	1	3		3
Padre Burgos	Public Market		1		1
	Bus/Jeepney Terminal		1		1
	Parks/Playground		1		1
	Total		3		3
Pintuyan	Public Market			1	1
	Bus/Jeepney Terminal				
	Parks/Playground				
	Total				
Saint Bernard	Public Market		1		1
	Bus/Jeepney Terminal	1	2		2
	Parks/Playground		1		1
	Total	1	4		4

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

(Cont'd)

Name of Municipality	Type	Phase I Coverage (2004)		Phase II Coverage (2010)	
		Add'l. No. of Public Utility with Sanitary Toilets	No. of Public Utility with Sanitary Toilets	Add'l. No. of Public Utility with Sanitary Toilets	No. of Public Utilities with Sanitary Toilets
San Francisco	Public Market		1		1
	Bus/JEEPNEY Terminal		1		1
	Parks/Playground		1		1
	Total		3		3
San Juan (Cabalian)	Public Market		1		1
	Bus/JEEPNEY Terminal		1		1
	Parks/Playground		1		1
	Total		3		3
San Ricardo	Public Market			1	1
	Bus/JEEPNEY Terminal				
	Parks/Playground				
	Total				
Silago	Public Market				
	Bus/JEEPNEY Terminal		1		1
	Parks/Playground		1		1
	Total		2		2
Sogod	Public Market	1	3		3
	Bus/JEEPNEY Terminal		1		1
	Parks/Playground				
	Total	1	4		4
Tomas Oppus	Public Market		1		1
	Bus/JEEPNEY Terminal				
	Parks/Playground				
	Total		1		1
Provincial Total	Public Market	4	21	2	23
	Bus/JEEPNEY Terminal	3	12		12
	Parks/Playground		13		13
	Total	7	46	2	48

8.5.3 Urban Sewerage

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

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

Name of Municipality	Urban Population in 2010	Level III Water Supply Coverage	Population to be Served
Maasin (Capital)	41,883	39,789	20,942
Sogod	11,810	11,220	5,905
Provincial Total	104,892	99,662	26,847

8.5.4 Solid Waste

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

Service coverage in Phase I was assumed at 60% with reference to the present service coverage of 56% in urban area. Additional service coverage in Phase I is calculated as a shortfall of target coverage in Phase I comparing with current service coverage. Table 8.5.6 presents additional service coverage for Phase I in the urban area.

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

Name of Municipality	No. of Urban Households Served in the Base Year	Phase I Coverage (2004)		
		No. of Urban Households	Urban Households Coverage	Add'l. No. of Urban Households to be Served
Anahawan		598	359	359
Bontoc	440	758	455	15
Hinunangan		339	204	204
Hinundayan	726	911	726	
Libagon		290	174	174
Liloan	598	934	598	
Limasawa		253	152	152
Maasin (Capital)	5,298	6,264	5,298	
Macrohon		1,410	846	846
Malitbog	639	561	639	
Padre Burgos		486	292	292
Pintuyan		206	124	124
Saint Bernard	337	721	433	96
San Francisco	210	488	293	83
San Juan (Cabalian)	639	835	639	
San Ricardo		153	92	92
Silago		461	277	277
Sogod	1,166	1,801	1,166	
Tomas Oppus		388	233	233
Provincial Total	10,053	17,857	13,000	2,947

8.6 Facilities, Equipment and Rehabilitation to Meet the Target Services

8.6.1 Water Supply

(1) Required facilities

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

Table 8.6.1 Water Supply Facilities Required by Target Year

Name of Municipality	Phase I (2004) Requirements										Phase I (2010) Requirements										
	Urban Water Supply (Level III)				Rural Water Supply						Urban WS (Level III)		Rural Water Supply								
	Mode of Project	No. of Add'l. Water Source	No. of HHs Connection	Level II			Level I					No. of Add'l. Water Source	No. of HHs Connection	Level I			Level I			Total No. of Wells	
				No. of System	No. of Communal Faucets	Number of Deep Wells			No. of Shallow Wells	Total No. of Wells	Number of Deep Wells			Number of Deep Wells							
						40 m	80 m	120 m			Sub-total			40 m	80 m	120 m	Sub-total				
Anahawan	Expansion	1	115							17	17	1	145								
Bontoc	Expansion	1	139						22	22	2	24	1	437		56		56	6	62	
Hinunangan	Expansion	1	78						1	1	1	2	1	69		6		6	22	28	
Hinundayan	Expansion	1	210						1		2	3	1	767							
Libagon	N/A								2	2		2	1	231			6		6	6	
Liloan	N/A								1	1		1	1	796							
Limasawa	New	1	50								24	24	1	270					8	8	
Maasin (Capital)	Expansion	2	1,606						50	50	5	55	3	5,301			22	22	2	24	
Macorohan	N/A								16	16	1	17	1	1,045		3		3		3	
Malibog	Expansion	1	131						19	19	8	27	1	451		59		59	25	84	
Padre Burgos	N/A								39	39	4	43	1	215							
Pintuyan	Expansion	1	41								3	3	1	150					63	63	
Saint Bernard	Expansion	1	174						1	1		1	1	44		17		17	25	42	
San Francisco	N/A								1		1	2	1	30		11		11	25	36	
San Juan (Cabanian)	New	1	153								1	1	1	711					24	24	
San Ricardo	Expansion	1	28																		
Silago	N/A								2		10	12	1	338							
Sogod	Expansion	1	445							14	14	8	22	1	864			35	35	22	
Tomas Oppus	N/A								12		12	2	14	1	251						
Provincial Total	Exp.-10 New-2	13	3,170						4	113	64	181	89	20	12,115	11	147	57	215	222	437

Urban water supply:

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

Rural water supply:

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

Furthermore, as for Level I facilities, 50% of the total required facilities will be implemented by public (LGUs) and 20% of these public Level I facilities will be allocated to spring development.

(2) Rehabilitation

Rehabilitation requirements were estimated as 10% of the total number of deep wells to be constructed under PW4SP. Rehabilitation work will be mainly redevelopment of wells by means of air surging, while minor repair of concrete apron and hand-pump will be undertaken by respective beneficiary organizations.

(3) Equipment

Logistic support:

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

Transportation- service vehicle

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

Field equipment- sound system, tape recorder and tools for maintenance

For urban water supply, no hardware was considered.

Well drilling and rehabilitation equipment:

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

During Phase I, a total of 95 Level I deep wells shall be newly constructed under ADB-assisted project and 10% of these deep wells shall be rehabilitated annually. Presently, the DPWH-DEO (Maasin) has 1 unit of percussion type drilling rig (applicable for more than 8" of bit diameter and 300 ft of well depth), but it is not operational.

Therefore, at least 2 sets of drilling rigs (medium size percussion type) together with 2 units of service truck for deep well construction shall be mobilized by private sector to implement ADB-assisted project. Aside from this, one set of well rehabilitation equipment and one unit of support vehicle for well rehabilitation shall be procured either by LGUs (details are referred to Supporting Report).

Selection of well drilling machine

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

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

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

(4) Laboratory

The provincial government is a recipient of the on-going ADB-assisted project. This project will provide 3 water laboratories and 4 portable water test kits that are considered sufficient for the medium term requirement.

8.6.2 Sanitation

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

(1) Household toilets

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

(2) School toilets

The future requirements in the number of toilet facilities were estimated based on the standard number of students to be served by a 5-unit standard facility or a toilet in every classroom (50-50 sharing) and the additional students to be served by target (details are referred to Supporting Report).

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

8.6.3 Urban Sewerage and Solid Waste

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

As reference information, the number of refuse collection trucks is estimated for the urban area in Phase I. Fourteen (14) additional units of truck are required to meet assumed service coverage as reflected in Table 8.6.3.

8.7 Identification of Priority Projects for Medium-Term Development Plan

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

Specific projects shall be selected subject to detailed studies and will not be discussed in the provincial master plan. In addition, pertinent information to identify priority projects is not

Table 8.6.2 Sanitation Facilities Required by Target Year

[illegible]

Table 8.6.3 Number of Refuse Collection Trucks Required in Phase I

Name of Municipality	Additional Urban Households to be Served	Estimated Daily Amount of Refuse to be Generated, (Kg)	Number of Collection Truck Required
Anahawan	376	151	1
Bontoc	15	7	1
Hinunangan	256	86	1
Hinundayan			
Libagon	174	73	1
Liloan			
Limasawa	165	61	1
Maasin (Capital)			
Macrohon	816	354	1
Malitbog			
Padre Burgos	347	123	1
Pintuyan	134	52	1
Saint Bernard	231	41	1
San Francisco	83	35	1
San Juan (Cabalian)			
San Ricardo	92	39	1
Sitago	291	116	1
Sogod	286		1
Tomas Oppus	233	98	1
Provincial Total	3,529	1,239	14

available both at provincial and municipal level during this PW4SP preparation, except some future expansion work for WDs.

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

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

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

Chapter

**SECTOR MANAGEMENT FOR
MEDIUM-TERM DEVELOPMENT**



9. Sector Management for Medium-Term Development

9.1 General

In order to manage the water and sanitation sector effectively, the provincial and municipal governments of Southern Leyte will have to make some adjustments in their current policies and structures.

9.1.1 Purpose of Policy and Structural Adjustment

The adjustments should be aimed at coordinating these local policies and structures more closely with the overall policies, institutional and regulatory frameworks, and resource-sharing systems of the water sector, so that the Province and its municipalities would be in the best position to realize available opportunities to improve water services, specifically:

- (1) to effect immediate improvements in the physical infrastructure for water, sanitation, and related environmental services; and
- (2) to acquire permanent capabilities to (a) plan, manage and institutionalize gains in sector services, (b) to nurture constructive partnerships with the private sector, and (c) to set in place and maintain the mechanisms for sustainability.

To the extent that additional resources are provided by programs like the World Bank-assisted LGU Urban Water and Sanitation Sector Project; and to the extent that the national government has instituted facilitative mechanisms to improve the sector, the provincial and municipal governments must seize the opportunities that, for the present, are available in order to achieve and expand current sectoral targets, and to ensure the long-term sustainability of sectoral gains.

9.1.2 Perspectives

In making the needed adjustments, the LGUs will do well to keep the following realities in clear perspective:

- (1) That the nature of public accountability dictates certain rigidities and procedural constraints in all governmental systems. Thus, while government must fulfill its mandate as the necessary and enabling institution for the provision of basic services, it is not the most responsive, efficient, and cost-effective agent for directly implementing these services. For this reason, local governments must clearly define their role in the investment, operation, and maintenance of water service utilities;

- (2) That the public -- and even many local officials -- still lack a deep realization of the importance of institutionalizing water services. This lack of realization reflects the transitional stage of most of Philippine society, to which the pervasive effects of urbanization (effects that extend even to the rural areas) and their demands on social participation in sustaining basic services are very recent and unfamiliar experiences. For this reason, the sector's social marketing endeavor must include a primary thrust of helping the community and all LGU officials understand the fundamental role of safe water and sanitation in the actualization of their most cherished of aspirations -- that is, to secure a better future for their children.
- (3) That large sectors in many communities, as well as some entire communities, do not have the capacity to shoulder the full cost of institutionalized water and sanitation services. LGUs are especially challenged to devise ways and means to ensure their disadvantaged constituents basic access to safe water and related services -- even as they seek fair participation from those who can afford to pay, and as they continue to exert efforts to establish these services on a permanent, self-sustaining basis.

This Chapter proposes the mechanisms, processes and structures needed in the medium-term to achieve the coverage targets with sustainability. Not all recommendations can be laid out with the same level of detail at this time as some are dependent on further policy guidelines being formulated at the national level. These include the on-going study on access of LGUs to external financing assistance and the sector devolution process.

9.2 Sector Management

9.2.1 Development of the Vision

One glaring institutional need at the local level is a common vision that could focus and mobilize the water sector's resources and the efforts of the different shareholders within a practical structure that delivers the desired services effectively in a sustainable manner. Such a common, shared vision can only be achieved if all the share shareholders realize the importance of managing water as a basic economic commodity and place value on their family's access to safe water within the framework of their own needs and aspiration.

Both the policy makers and the officials at all levels of governance and public service and a critical mass of the consumers themselves must internalize and share in the vision so that their efforts and resources could be mobilized for project implementation. Local planners need to focus on the long-term requirements i.e., beyond the technical requirements of forming users'

associations, drilling wells, distributing bowls, etc. They need to work as "change agents" to prepare themselves and their constituents to participate in ensuring that basic services like water and sanitation become available and are placed on a sustainable basis in their respective communities. With these considerations, and based on a realistic assessment of constraints, opportunities and demand, the province has set its vision and mission for the sector.

Initial vision statement: The province will adopt a two-phased plan, which seeks to dramatically improve the provision of water supply and sanitation. In the medium-term (2000-2004) plan, the province expects to maintain present service level: water supply coverage in urban areas 77% and in rural areas an increase to 83%. On the other hand, household toilets will be made available to 90% of the urban population and 88% of the rural population; 90% of the students in public schools will have adequate sanitary toilet facilities; 100% of public utilities will have sanitary toilets; and 60% of the urban population will be covered by solid waste collection services. For its long-term (2005-2010) plan, the province will pursue a more vigorous program to increase water supply coverage in urban areas to 95% and in rural areas to 93%. For the sanitation sub-sector, individual household toilets will increase up to 95% in urban areas and 93% in rural areas; public school toilets will rise up to 95%; public utilities will have 100% sanitary toilet coverage; while sewerage service will cover 50% of the urban population.

9.2.2 Sector Management

A Sector Management Model is presented in Figure 9.2.1 for sector management and project development. It is envisaged that this PW4SP will be used as a basis for the Annual Sector Plan and/or as input into Loan or Grant Negotiations in the future. The Annual Sector Plan, together with the budgets, will be reviewed by the Governor and passed upon by the legislature as part of the provincial budget approval process.

The sector level implementation activities consist principally of three broad areas: social marketing; technical assistance; and monitoring. Project selection follows on from a self-selection process that includes the identification of a responsible community-based association and the preparation of technical studies, as needed. Construction or rehabilitation will take place only after the institutional, financial and technical studies have been done. Operation and maintenance, including arrangements for finances of the system, will be the responsibility of the community organization. The Monitoring Function, on the other hand, will be implemented as a sectoral program, augmented with water quality surveillance by the Provincial Health Office (PHO) and operational audits done by the LGU.

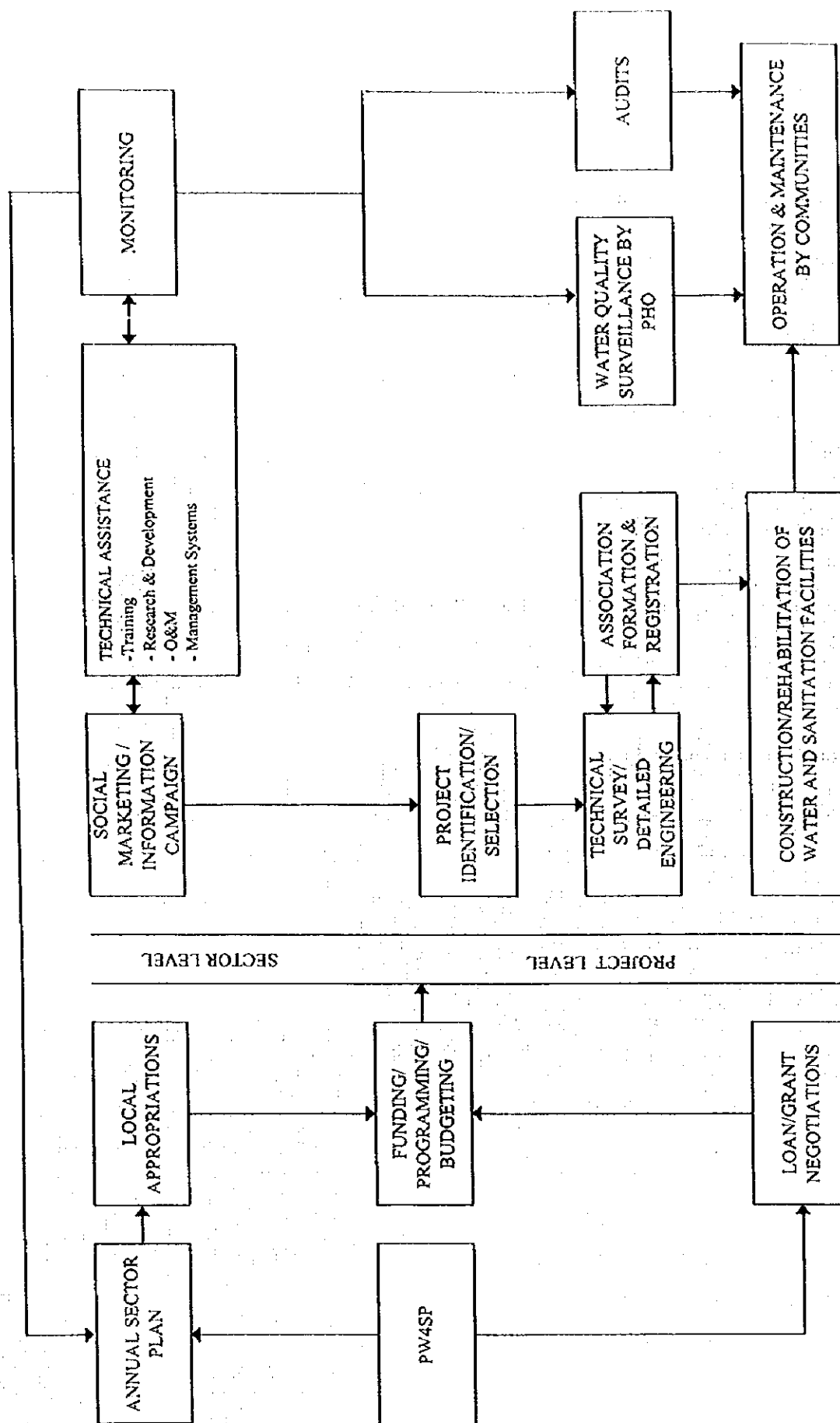


Figure 9.2.1 Sector Management Model

9.2.3 Service Provision Policies and Objectives

The LGU seeks to provide an adequate level of water and sanitation facilities defined as follows:

- Level I facilities serve at most 15 (fifteen) households per source; Level II public taps serve 5 (five) households per faucet; and Level III systems provide individual household connections.
- Water supply provision will be at least 20 lpcd for Level I; 60 lpcd for Level II; and 100 lpcd for Level III.
- A critical mass of 90% of the individual households in every barangay has sanitary toilet facilities.
- All schools shall have adequate water supply and at least one sanitary toilet facility for every 40 students.

9.2.4 Operating Policies

The following policy and strategy statements are adopted by the Provincial Government. These may be reviewed and revised from time to time by the Provincial Government. The key policy statements include the following:

- (1) Sustainability shall be promoted through increased community responsibility for management of facilities. Unless potential users demonstrate initiative and commitment (beyond making the request for assistance) to maintain the systems, no support shall be provided by the LGUs. To the extent possible, the LGUs should utilize existing local resources (self-reliance).
- (2) Selection and prioritization of projects shall be based on demonstrated commitment of the beneficiaries to participate in the project and their willingness to pay; the current water, sanitation and overall health conditions; potentials for growth; and cost implications.
- (3) Technology to be used for the projects shall be appropriate to local conditions and resources. While economical facilities should be the objective of design and selection, construction costs should not compromise quality, reliability, and provisions for future upgrading and expansion. Phased upward integration and future upgrading of systems and facilities shall also be promoted utilizing to the extent possible previously constructed facilities. In urban centers, a range of technologies may be adopted for wastewater collection and treatment, as well as for drainage.

- (4) An integrated approach to the provision of potable water supply, sanitation and hygiene education shall be promoted. All projects to be developed by the LGU must involve these three elements.
- (5) As part of the overall social marketing efforts for the sector, the Province shall implement an "Information, Education and Communication Program" with the primary thrust of promoting safe water and sanitation values. A nationwide IEC Program to Create "Safe Water" Value among communities is described in the Supporting Report. At the provincial level, the IEC Program shall start with the orientation of all local government officials down to the barangay level, and be coordinated with and draw the participation of other agencies, NGOs, and civic groups throughout the province, particularly those involved in community development, social projects, and health and education services. The program shall include, among others, a component to train individuals selected from the LGUs, participating agencies and organizations, and volunteers from the communities themselves as communicators/change agents for safe water values. Figure 9.2.2 shows the schematic design of the IEC Program.

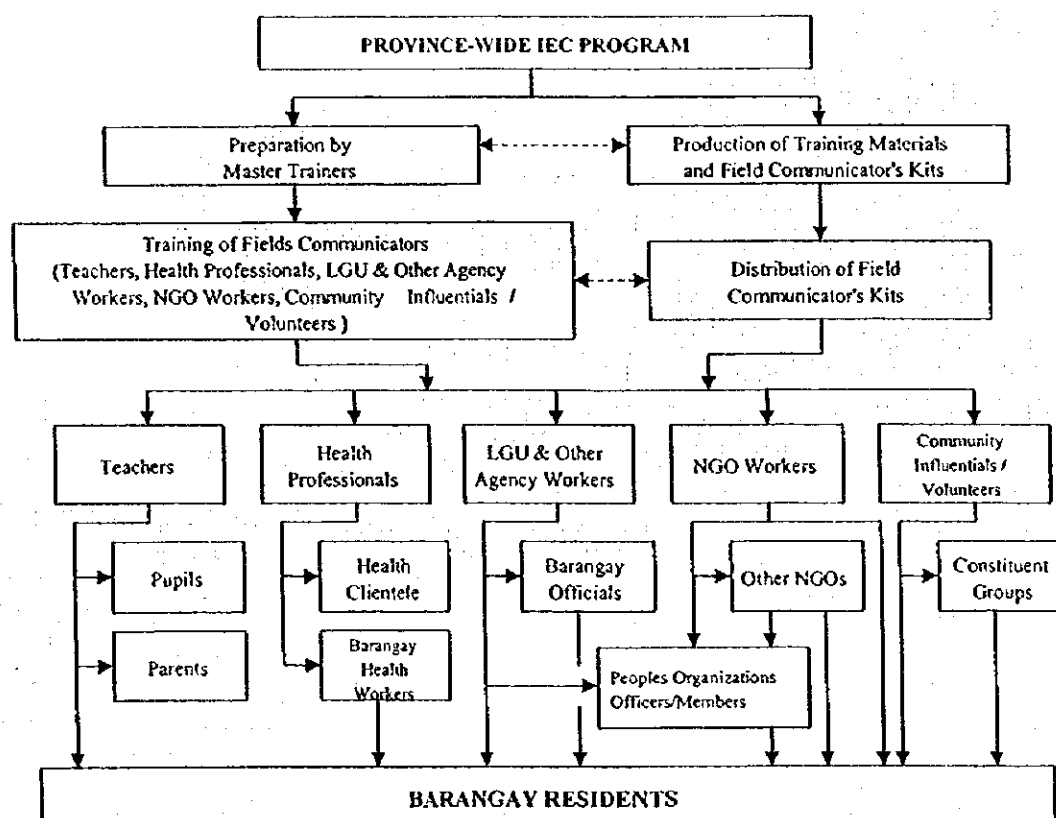


Figure 9.2.2 IEC Program Implementation Flow (Provincial Level)

- (6) The LGU shall seek, to the extent possible, to provide water and sanitation services equally to all their constituents, whether they reside in rural or urban areas, or in wealthy or depressed areas.
- (7) Cost Recovery and Cost Sharing (Subsidy Policies): The LGU shall enforce a rational and consistent policy on the application of subsidies and loans for water supply and sanitation. In May 1996, the Investment Coordination Committee (ICC) of the NEDA adopted a policy "to support the financing of devolved activities with social and/or environmental objectives" based on three considerations namely: Equity, Externalities and Economics of Scale. Accordingly, NEDA advised DILG of the revised cost-sharing arrangement which clearly limited the national government subsidy to Level I water supply systems for 5th and 6th class municipalities up to a maximum 50% of the total project cost. No subsidy from GOP is provided for Level II and III. For sanitation facilities, the national government subsidy for the 3rd to 6th class municipalities shall be from 50% to 70% of the total project cost.
- (8) Private Sector Participation: The government shall give the private sector a substantial and preferential role in the attainment of the PW4SP objectives. In harnessing their participation, less government intervention shall be exercised in areas where the private sector is or can be a key player. An environment designed to empower them to absorb new social responsibilities and proactively convey to the government their aspirations and interests shall be established. The formation of private sector groups, NGOs, community organizations, cooperatives and people's organizations shall be encouraged. The implementation of programs to develop their capabilities in the sector development programs shall be promoted.
- (9) The province's fiscal management, in terms of capital funds generation capability, budget and disbursement, shall be improved. The assistance of the legislative branch in the enactment of the proposed revenue-generating measures shall be sought. Financing through the private sector will also be encouraged.
- (10) Sector development shall be consistent with broader concerns for environmental protection and management. Pollution control, conservation and proper utilization of water and land resources are critical issues to be considered in development plans at all levels, including municipal land use plans. Among the specific concerns in relation to water resources that the LGUs shall address through a proactive, environmentally responsive management approach to resource use, are the preservation and enhancement

of watersheds, the prevention of pollution of streams and groundwater resources, and the protection of riverbanks and natural hydro-geological formations.

- (11) Disaster Response and Emergency Coordination: The LGU shall formulate, as part of its contingency plans, a program to address emergency conditions. The program shall include maintenance of stocks of chlorine, organization and training of local communities on restoration of water supplies, and provision of emergency sanitary facilities. The LGU should coordinate closely and regularly with the local officials of the Regional Disaster Coordinating Council (RDCC).

9.2.5 Regulatory Policies

In coordination with appropriate national and local agencies, the LGU shall endeavor to set up an effective regulatory framework considering the following:

- (1) Water allocation and water rights policies (conflict resolution) which are within the mandate of the National Water Resources Board. The LGUs or the concerned water utility shall apply for water rights from the Board, prior to implementing a project that would require extraction of water.
- (2) Water Rate Review: While the rate setting and approval functions remain largely a concern of the associations or the Water Districts (and LWUA), a vehicle for resolving grievances against unrealistic tariffs (or other practices) can be instituted by the LGUs. The court system, of course, remains as the final arbiter in conflicts.
- (3) Association Registration: The LGUs shall likewise adopt a registration and franchising system for associations responsible for water supply facilities outside the WD franchise areas. Annual reporting requirements will have to be established for monitoring and possibly, auditing purposes.
- (4) Water Quality: The National Drinking Water Standards have been established. The LGUs will have to establish a viable mechanism, including water testing and standards enforcement, to ensure that water delivered meets the potability standards. The DOH currently has the responsibility and the regulatory power to stop the operations of water systems not delivering potable water.

9.2.6 Financing System

(1) Water supply investment financing

In financing water supply investments, the LGUs may tap their Internal Revenue Allotment (or IRA) and/or locally generated revenues, or leverage these resources to borrow from government and private financial institutions. Overall, it is the LGU's responsibility to raise funds to support capital development sector projects and to ensure that adequate O&M reserves are raised by the beneficiary communities.

In the medium-term, the primary sources of funds are envisaged to be provincial and local taxes, allocation from the IRA 20% Development Funds, and the Municipal Development Fund. Also, in the medium-term, it is envisaged that national and external funds will continue to be channeled through local offices of central agencies.

Studies are underway to look into the feasibility of direct access of LGUs to external funds. The LGU will continue to monitor the developments and policy decisions to be established, as these will invariably affect local financing mechanisms. (For reference, "Accessing the ODA Funds" is presented in the Supporting Report.)

(2) Financing for sanitation activities

To support sanitation activities, housing improvement loans for installing in-house sanitary facilities should be studied and instituted by the LGU. Such a mechanism can be organized with the rural banks or the existing credit cooperatives. Seed funding for this revolving fund also needs to be raised. Upon agreement by the parties, the enabling local legislation establishing the sanitation revolving fund will have to be enacted.

The total resources for the above purpose could be augmented by establishing formal linkages with the home improvement loan facilities available through the Social Security Service (SSS), the Government Service Insurance System (GSIS), and the Pag Ibig Fund.

- (3) Project owners should be fully responsible for providing sufficient funds for the sewerage, waste treatment and disposal, and sanitation requirements of their projects. Through their Municipal Engineering Office (MEO) and Health Office (MHO), and in coordination with the DENR, municipalities should strictly enforce the sanitation and sewerage requirements of the Building Code and environmental laws in issuing building permits, approving subdivision plans, and inspecting buildings and constructions.