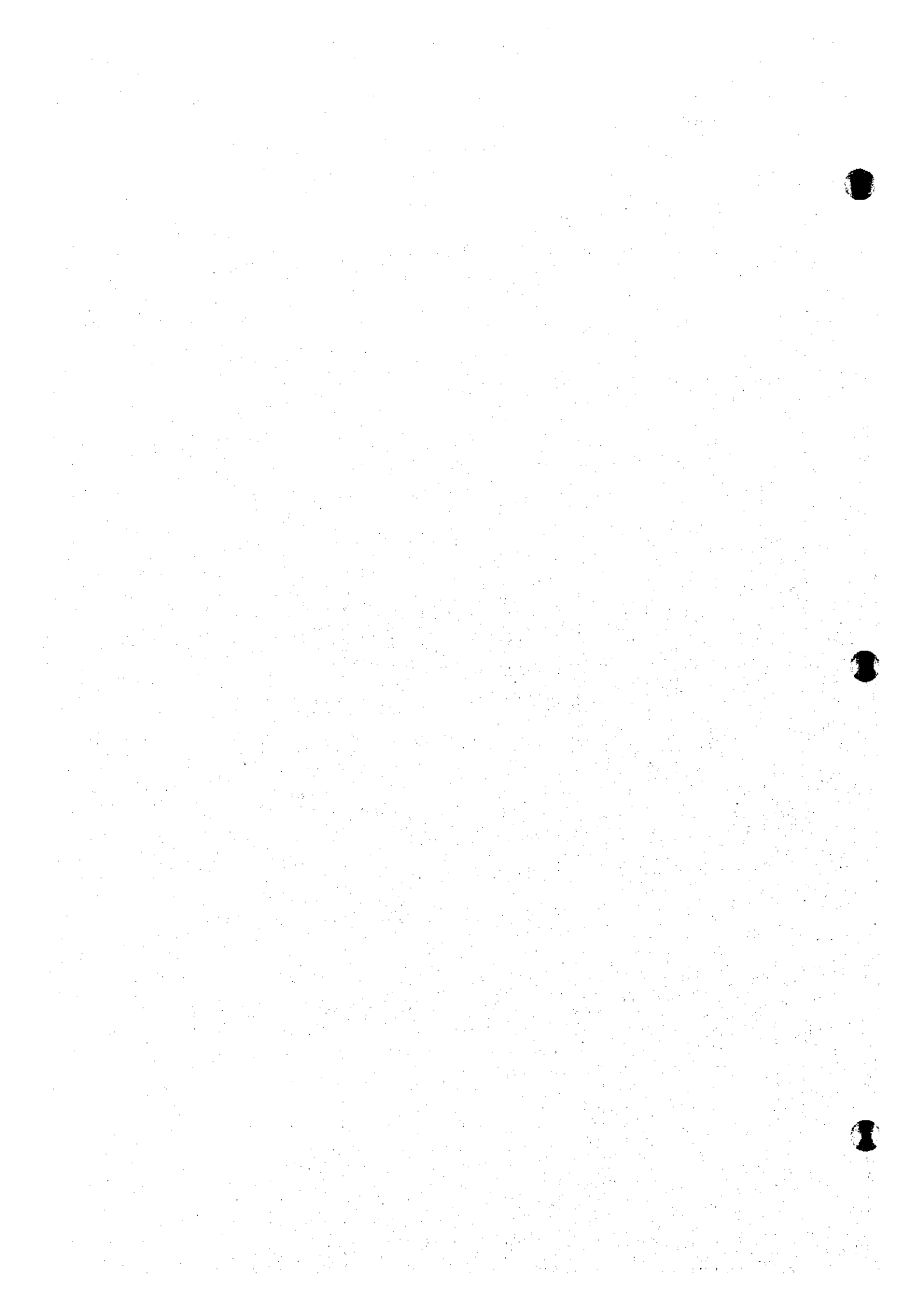


Chapter

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PROVINCIAL PROFILE

3



### 3. PROVINCIAL PROFILE

#### 3.1 General

Surigao del Norte is located along the northeastern coast of Mindanao. Surigao City, a component city, is the provincial capital. The province is composed of mainland Surigao, the major islands of Siargao and Dinagat and other small islands. It is bounded on the north and east by the Pacific Ocean, on the west by Surigao Strait and on the south by Agusan del Norte and Surigao del Sur as shown in the Location Map.

The province has a total land area of 2,739km<sup>2</sup> that is 0.94% of the Philippine total land area of about 300,000sq.km. It is composed of 27 municipalities. There are 434 barangays, of which, 25% is urban and 75% rural. Provincial total population was 442,753 in 1995. About 72% of the population resided in rural areas while the remaining 28% in urban areas. At present, there are 2 water districts and 32 other Level III systems managed by various LGUs and associations in the province. Table 3.1.1 presents the breakdown per municipality of the land area, population and density, as well as administrative composition.

Table 3.1.1 Outline of Municipalities

Municipality		Land Area (km <sup>2</sup> )	1995 Population		Number of Barangay		
Name	Class		Number	Density (person/km <sup>2</sup> )	Urban	Rural	Total
Alegria	6 <sup>th</sup>	66.70	12,157	182	3	9	12
Bacuag	6 <sup>th</sup>	44.80	12,309	275	3	6	9
Basilisa	5 <sup>th</sup>	61.80	24,141	390	3	24	27
Burgos	6 <sup>th</sup>	18.95	2,785	147	3	3	6
Cagdianao	5 <sup>th</sup>	207.04	11,175	54		14	14
Claver	5 <sup>th</sup>	273.14	14,300	52	5	9	14
Dapa	5 <sup>th</sup>	98.08	16,435	168	17	12	29
Del Carmen	6 <sup>th</sup>	139.94	12,316	88	2	18	20
Dinagat	5 <sup>th</sup>	12.05	8,609	714	3	9	12
General Luna	6 <sup>th</sup>	41.26	12,554	304	6	13	19
Gigaquit	5 <sup>th</sup>	129.06	15,261	118	4	9	13
Libjo (Albot)	5 <sup>th</sup>	165.57	14,928	90	2	14	16
Loreto	5 <sup>th</sup>	215.87	8,048	37	5	5	10
Mainit	5 <sup>th</sup>	107.76	21,780	202	4	17	21
Malimono	5 <sup>th</sup>	109.43	14,191	130	5	9	14
Pilar	6 <sup>th</sup>	77.06	8,299	108	4	11	15
Placer	5 <sup>th</sup>	89.89	20,712	230	5	15	20
San Benito	6 <sup>th</sup>	39.70	4,498	113	2	4	6
San Francisco	6 <sup>th</sup>	43.76	10,005	229	4	7	11
San Isidro	6 <sup>th</sup>	58.34	5,791	99	1	11	12
San Jose	6 <sup>th</sup>	37.47	27,481	733	4	8	12
Santa Monica	6 <sup>th</sup>	37.99	7,219	190	2	9	11
Sison	6 <sup>th</sup>	54.70	8,853	162	1	11	12
Socorro	5 <sup>th</sup>	114.45	15,208	133	2	11	13
Surigao City	1 <sup>st</sup>	245.34	104,909	428	11	43	54
Tagana-An	6 <sup>th</sup>	85.45	12,159	142	4	10	14
Tubajon	6 <sup>th</sup>	114.95	6,155	54	2	7	9
Tubod	6 <sup>th</sup>	48.47	10,318	213	1	8	9
<b>Provincial Total</b>	<b>2<sup>nd</sup></b>	<b>2,739.02</b>	<b>442,596</b>	<b>158</b>	<b>108</b>	<b>326</b>	<b>434</b>

## 3.2 Natural Conditions and Geographical Features

### 3.2.1 Meteorology

The province has Type II climate under the Coronas classification. It is characterized by no dry season with very pronounced maximum rain period as reflected in the Location Map. Using the 1996 rainfall records, the average annual rainfall was registered at 3,639.50mm. Maximum rainfall was observed during November to January, while the minimum was experienced during August to September.

Mean annual air temperature is 27.3°C. The hottest month is June (32.5°C), while the coldest months are January and February (22.6°C). The province is situated between 125° 15' to 126° 15' east longitude and 9° 18' to 10° 30' north latitude which is considered as an area frequently visited by typhoons.

### 3.2.2 Land Use

Forest area constitutes only 44% of the total land area of the province located mostly in the mountain ranges of Mt. Legaspi. Agricultural land comprises about 55% while Built-up area is limited to 1%. Most of the settlements are along the coasts and plains in major transport routes. The existing land use pattern is presented in Table 3.2.1. The remaining forest cover primarily serves as watershed rather than as source of timber. An efficiently managed watershed collects and regulates flow of water, controls soil erosion and minimizes water pollution. Conversion of forestlands to other uses will restrict its function as a watershed. Correspondingly, a significant increase in agricultural area will result in a high demand of water for agricultural use.

Table 3.2.1 Current Land Use

Land Use	Area (km <sup>2</sup> )	Percentage over Total Land Area (%)
Forest Land	1,193	44
Built-up	38	1
Agricultural	1,508	55
<b>Provincial Total</b>	<b>2,739</b>	<b>100</b>

### 3.2.3 Topography and Drainage

Surigao mainland has varied terrain ranging from flat to mountainous. The mountain ranges of Mt. Diwata with elevation of 750m dominate the southeastern part of the province. On the northeastern part, is Mt. Buhangin with an elevation of 664m and flanking the western side along the Mainit-San Francisco boundary is Mt. Buhangin with an elevation of 865m. The alluvial plains are located in the north side along the shoreline of Surigao City, in the northeast side and the southwest side. The topography of Siargao island is predominantly rolling to steep. The highest elevation is 291m above sea level. The alluvial plains are widely distributed in the central, the northeast and the southeast sides. On the western and southern sides are broad expanse of mangrove swamps and fringing reef flats. Dinagat island is mostly mountainous with elevations ranging from 200m to 700m. The alluvial plains are few and very narrow.

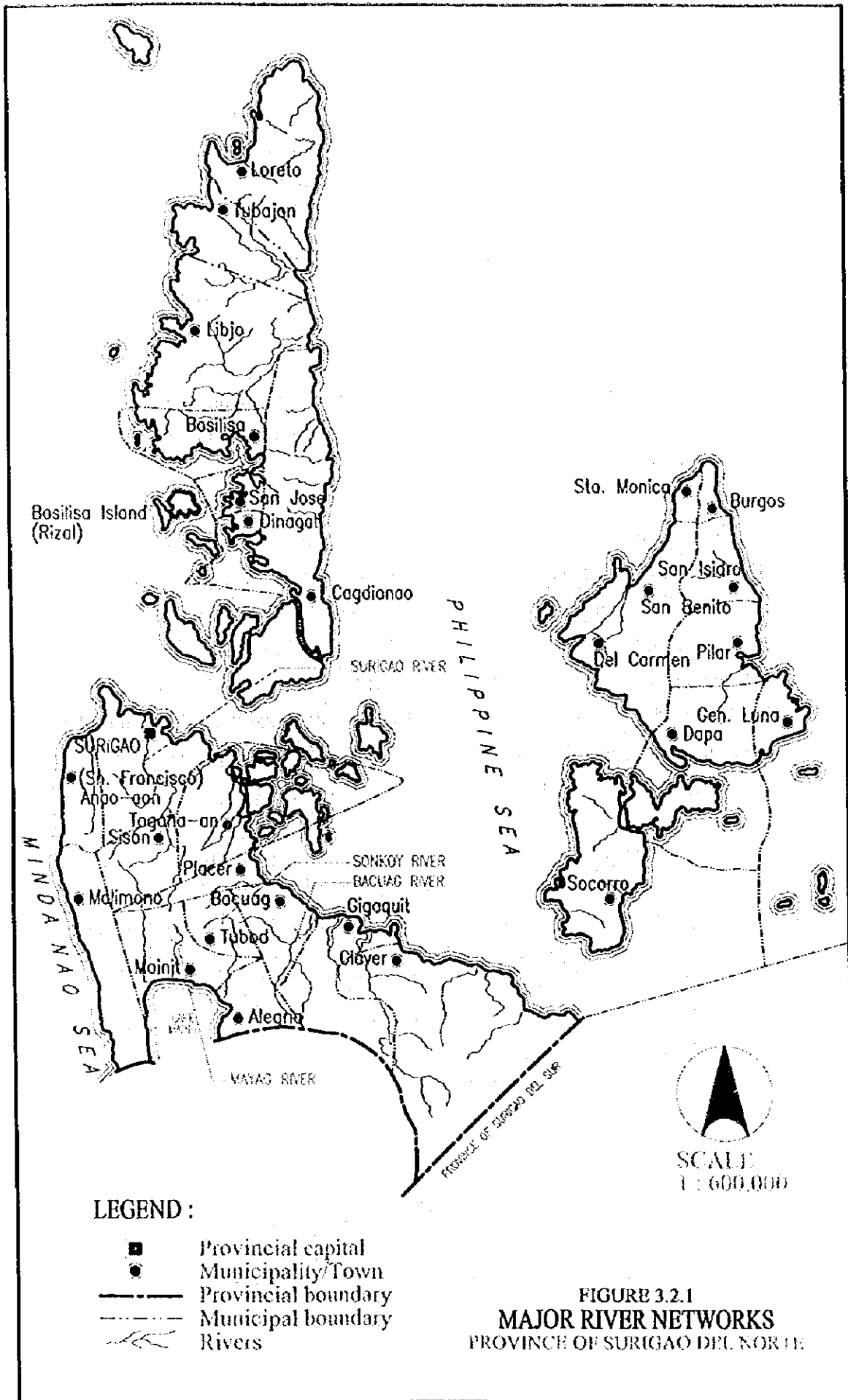
The natural drainage systems generally flow northward and empty into Surigao Strait or Hinatuan Passage. Major rivers are Surigao, Mayag, Sonkoy, Bacuag and Gigaquit in the mainland and Valencia in Dinagat island. Figure 3.2.1 shows the drainage systems of Surigao del Norte and Table 3.2.2 is a list of the main rivers and their corresponding drainage areas with recorded flow rates. Only Surigao River was selected for water quality analysis. The result of the analysis showed that the river has considerable amounts of iron and manganese, exceeding the maximum limit for Class "A" fresh surface water classification (details are referred to 7.5, Data Report).

**Table 3.2.2 Drainage Areas and Flow Rates of Major Rivers**

River Name	Drainage Area (km <sup>2</sup> )	Flow Rate (m <sup>3</sup> /sec)			Water Districts (using river water)
		Peak	Maximum	Minimum	
Surigao	101	356.65	160.72	2.67	Surigao City WD
Bacuag	64	147.03	85.41	1.26	None
Mayag	41	110.73	54.20	1.59	None
Sonkoy	No gauging station in the watershed				None
Gigaquit	No gauging station in the watershed				None
Valencia	No gauging station in the watershed				None

Source: Philippine Water Resources Summary Data, established January 1980 by NWRC

Notes: Peak - Peak discharge of Daily Maximum Discharge  
 Maximum - Maximum Daily Discharge of Weighted Daily Discharge  
 Minimum - Minimum Daily Discharge of Weighted Daily Discharge  
 Inc. - Incomplete/Lacks record



DATA NAME : SURIGAO DEL NORTE (2011)  
 FILENAME : SURIGAO-DEL-NORTE (2011)

### **3.3 Socio-economic Conditions**

#### **3.3.1 Economic Activities and Household Income**

Agriculture is the major economic activity in the province. Major crops cultivated are rice, coconut and rootcrops. Fishing and mining are also important livelihoods. The greater bulk of commercial activities are seen in Surigao City. Tourism and cottage industry are also promising economic activities in the province.

The National Statistics Office (NSO) Family Income and Expenditures Survey in 1994 showed that the mean annual family income of the province was ₱ 55,857, while the median was at ₱ 39,543. Distribution of families by income class in the region and province is shown in Figure 3.3.1 (refer to Table 3.3.1, Supporting Report). Percentages of households of lower income levels were greater than that of the region. Based on the established poverty threshold income of ₱ 43,659 in Region 10 for 1994, approximately 60% of the total number of families lived within and below the poverty threshold.

As to the number of workers by major industry group, agriculture, fishery and forestry had the dominant share followed by community, social and personal services, and wholesale and retail trade (refer to Table 3.3.2, Supporting Report). By class of worker, those who are self-employed without any paid employee had the highest share of 37%, followed by those worked without pay in own family operated farm or business as shown in Figure 3.3.2.

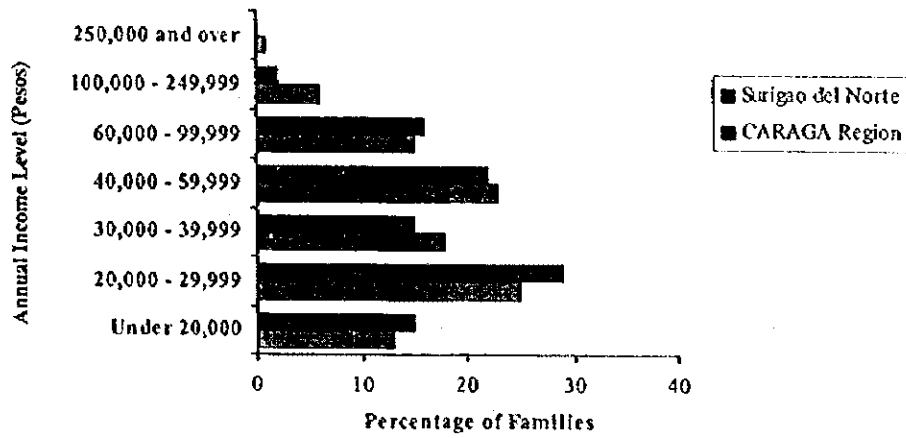
#### **3.3.2 Basic Infrastructure**

The total road length of the province is 2,361km, of which half (50%) are barangay roads. Land transportation is available by means of bus, jeepneys and tricycles. The province has one airport and 32 post offices or stations. There are 22 tourism-related facilities. Table 3.3.1 presents a provincial outline of public services and Table 3.3.2 reflects the number of public facilities and services by municipality.

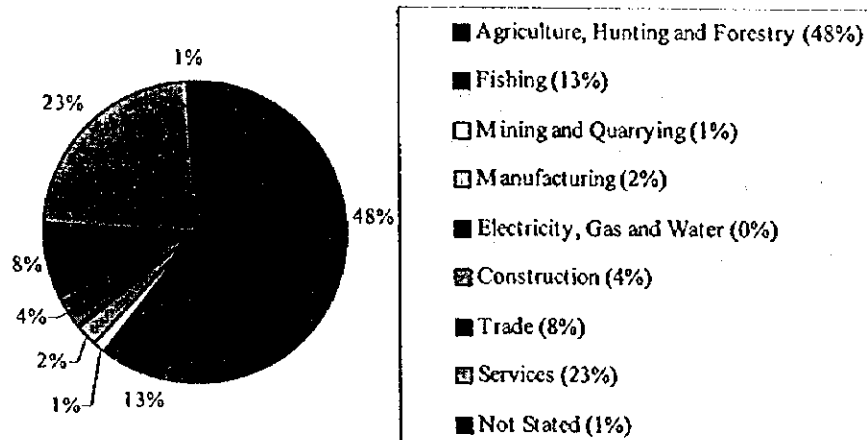
#### **3.3.3 Education**

The province has a total of 490 schools consisting of 415 elementary schools, 61 high schools and 14 colleges/vocational institutions. A large part of the population had attained elementary or high school levels of education as reflected in Figure 3.3.3 (refer to Table 3.3.3, Supporting Report).

**Figure 3.3.1 Distribution of Families by Income Class**



**Figure 3.3.2 Employment Distribution by Major Industry Group**



**Figure 3.3.3 Population Distribution by Highest Educational Attainment**

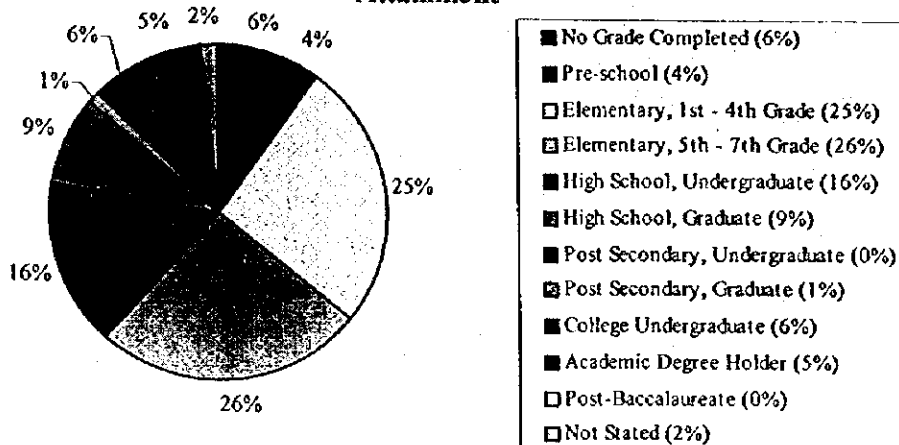




Table 3.3.1 Provincial Outline on Public Services

Items	Unit	Qty.	Items	Unit	Qty.
(1) Roads			(7) Tourism-related facilities (Hotel resort, lodges, recreational facilities, etc.)	Number	22
a) Total Length	Km	2,361			
b) Barangay roads	Percent	50.96			
(2) Electricity service coverage			(8) Schools		
a) Municipality	Percent	N.D.	a) Elementary level	Number	415
b) Barangay	Percent	N.D.	b) Secondary level	Number	61
c) Household	Percent	N.D.	c) Tertiary level	Number	14
(3) Telecommunication Services			(9) Health Facilities		
a) Availability in municipality	Percent	N.D.	a) Hospital/clinics	Number	16
b) Telegraph station	Number	4	b) Main health centers, rural health units, barangay health center, etc	Number	201
c) Telephone station	Number	4			
(4) Post Office	Number	32	(10) Labor		
(5) Transportation services	Mode (ex. Bus, jeep, taxi,)	Bus, Jeepneys, Pumpboats	a) Labor force participation ratio	Percent	N.D.
			b) Employment rate	Percent	N.D.
(6) Banking Facilities	Number	17	(11) Average family income		
			a) Monthly income	Pesos/Month	P 3,963
			b) Monthly expenditure	Pesos/Month	P 3,369

Note: N.D. - No data available

Table 3.3.2 Public Facilities and Services by Municipality

Name of Municipality	High School			Vocational School	College	Hospital	Public Market	Bank and Financing Institutions
	Public	Private	Total					
	nos.	nos.	nos.					
Alegria	1		1				1	1
Bacuag	1	1	2				2	
Basilisa (Rizal)	4		4				1	
Burgos	1		1				2	
Cagdianao	2		2				2	
Claver	1		1				2	
Dapa	2	1	3		2	1	2	1
Del Carmen	2		2		1	1	2	
Dinagat	1		1			1	2	
General Luna	1		1				1	
Gigaquit	1	1	2			1	2	1
Libjo (Albor)	1		1			1	1	
Loreto	1	1	2			1	2	1
Mainit	3	1	4		1	1	1	1
Malimono	4		4	1		1	2	
Pilar	1		1		1	1	1	
Placer	2	1	3	1		1	1	1
San Benito	1		1				2	
San Francisco	2	1	3				2	
San Isidro	1		1				2	
San Jose	1	1	2	1	1		1	
Santa Monica (Sapao)	1		1		1	1	2	
Sison	1		1				2	
Socorro	1		1		1	1	1	
Surigao City (Capital)	7	4	11	4	6	4	2	11
Tagana-An	1		1				1	
Tubajon	2		2				1	
Tubod	1	1	2				1	
<b>Provincial Total</b>	<b>48</b>	<b>13</b>	<b>41</b>	<b>7</b>	<b>14</b>	<b>16</b>	<b>44</b>	<b>17</b>

### 3.4 Population

#### 3.4.1 Previous Population Development

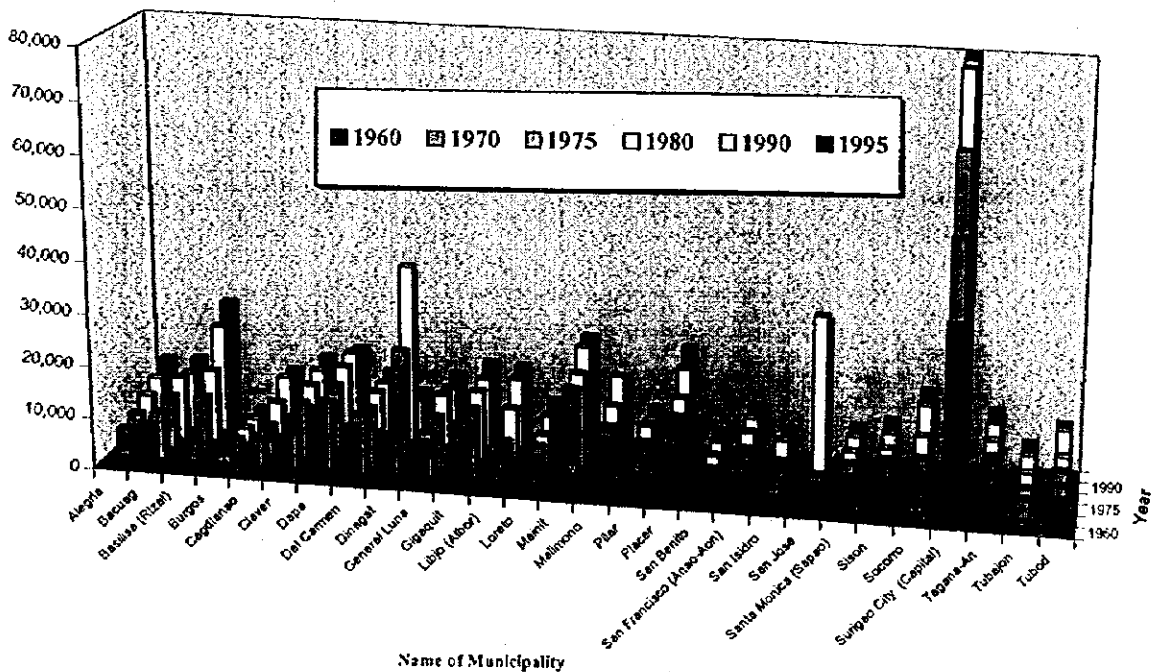
A fluctuating provincial population growth rate had been experienced since the last 6 census years (1960-1995) as indicated in Figure 3.4.1. From an average annual growth rate of 2.00% during the period 1960 to 1970, it increased to 4.54% (1970-1975) and declined to a low 1.60% (1980-1990). A summary of the average annual growth rates is as follows:

<u>Year</u>	<u>Population</u>	<u>Ave. Annual Growth Rate (%)</u>	<u>Period</u>
1970	238,714	2.00	1960 - 1970
1975	298,080	4.54	1970 - 1975
1980	363,414	4.04	1975 - 1980
1990	425,978	1.60	1980 - 1990
1995	442,203	0.70	1990 - 1995

A consideration on how the population growth behaved in the past and how it is likely to behave in the future is important because of the issue of resource allocation including the water supply and sanitation sector requirements.

The 1997 population was estimated to provide the planning base for the Master Plan (refer to Section 8.3.1, Population Projection, Main Report). Table 3.4.1 shows a breakdown of the past population development by municipality including the 1997 projected population.

Figure 3.4.1 Previous Population Development of the Province



**Table 3.4.1 Previous Population Development by Municipality**

Municipality	Previous Population						
	1948	1960	1970	1975	1980	1990	1995
Alegria			5,346	6,330	8,129	9,704	11,764
Bacuag	7,062	8,579	9,021	10,318	12,135	11,050	12,309
Basilisa (Rizal)			5,047	10,614	13,900	20,948	24,141
Burgos			1,958	2,584	2,798	2,617	2,785
Cagdianao		4,342	4,827	5,789	8,435	11,551	11,175
Claver		7,744	9,659	10,755	12,232	13,449	14,300
Dapa	14,492	13,878	13,309	14,628	16,481	17,383	16,435
Del Carmen	16,746	10,830	11,186	10,597	11,768	11,777	12,316
Dinagat	11,105	10,095	6,714	22,284	36,726	8,650	8,609
General Luna	5,719	8,614	8,476	9,768	12,075	11,534	12,554
Gigaquit	14,431	8,368	11,097	11,810	13,186	13,713	15,261
Libjo (Albor)			6,959	5,801	10,290	14,166	14,928
Loreto	6,212	8,324	5,020	5,270	5,530	7,335	8,048
Mainit	17,681	18,542	14,759	17,064	18,078	21,483	21,780
Malimono		6,537	9,412	10,074	12,109	16,157	14,191
Pilar		5,227	6,291	7,504	8,646	7,860	8,299
Placer	9,330	10,849	11,673	12,931	14,470	18,400	20,712
San Benito				3,202	3,748	4,315	4,498
San Francisco (Anao-Aon)		6,272	6,486	7,572	8,674	9,434	10,005
San Isidro		2,630	3,829	5,609	7,513	5,245	5,791
San Jose						30,348	27,481
Santa Monica (Sapao)		6,522	5,438	5,993	6,272	7,160	7,219
Sison		6,532	5,377	7,316	7,400	8,266	8,853
Socorro			6,946	7,904	10,267	14,162	15,208
Surigao City (Capital)	46,109	37,439	51,496	66,027	79,745	100,071	104,909
Tagana-An	6,116	7,460	8,063	9,285	10,290	11,570	12,159
Tubajon			3,660	3,685	4,461	5,778	6,155
Tubod		6,197	6,665	7,366	8,056	11,144	10,318
<b>Provincial Total</b>	<b>155,003</b>	<b>194,981</b>	<b>238,714</b>	<b>298,080</b>	<b>363,414</b>	<b>425,270</b>	<b>442,203</b>

### 3.4.2 Classification of Urban and Rural Areas

NSO classifies a barangay as urban when it satisfies any of the following conditions on the economic and social functions:

- (1) In their entirety, all municipal jurisdictions which, whether designated as chartered cities, provincial capital or not, have a population density of at least 1,000 persons per square kilometer.
- (2) Poblaciones or central districts of municipalities and cities, which have a population density of at least 500 persons per square kilometer.
- (3) Poblaciones or central districts (not included in nos. 1 and 2) regardless of population size which have the following:

- 1) Street pattern, i.e., network of streets either at parallel or in right angle orientation;
- 2) At least six establishments (commercial, manufacturing, recreational and/or personal services); and
- 3) At least three of the following:
  - a) a town hall, church or chapel with religious services at least once a month;
  - b) a public plaza, park or cemetery;
  - c) a market place or building where trading activities are carried on at least once a week; and
  - d) a public building like school, hospital, puericulture and health center or library.
- (4) Barangays having at least 1,000 inhabitants that meet the condition set forth in no. 3 above, and in which the occupation of the inhabitants is predominantly non-farming/fishing.

All areas not falling under the urban classification are defined as rural area. Distribution of the classified area is shown in Figure 3.4.1, Supporting Report.

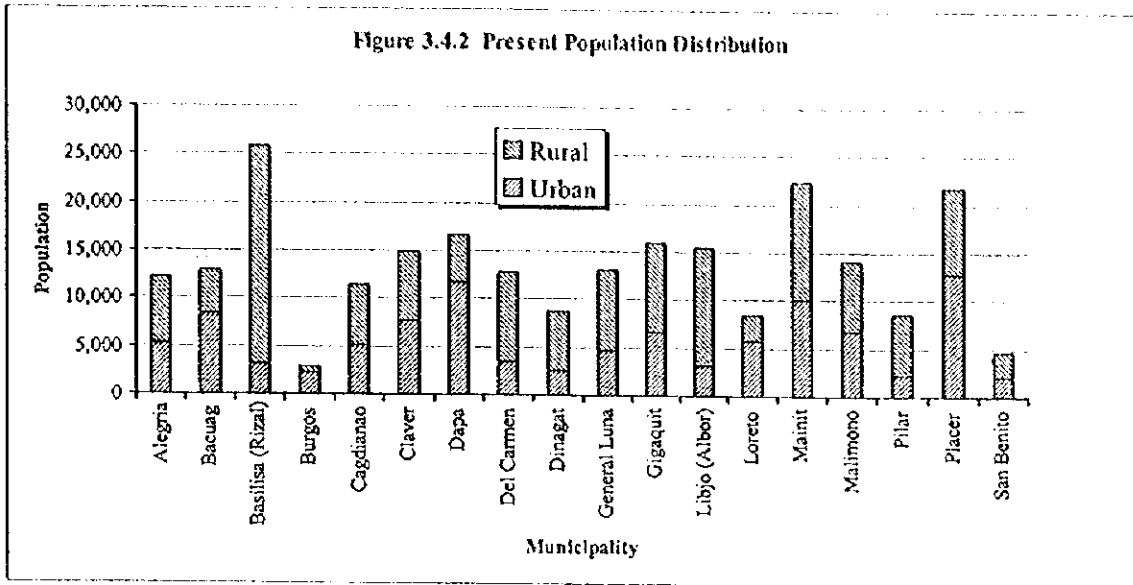
For this Master Plan, however, the 1995 NSO classification of urban and rural barangays was modified by the PPDO to reflect the actual conditions prevailing in the area. A total of 6 rural barangays was re-classified as urban. With the re-classification, there are 114 urban barangays and 320 rural barangays for a total of 434 barangays in Surigao del Norte.

### **3.4.3 Present Population Distribution**

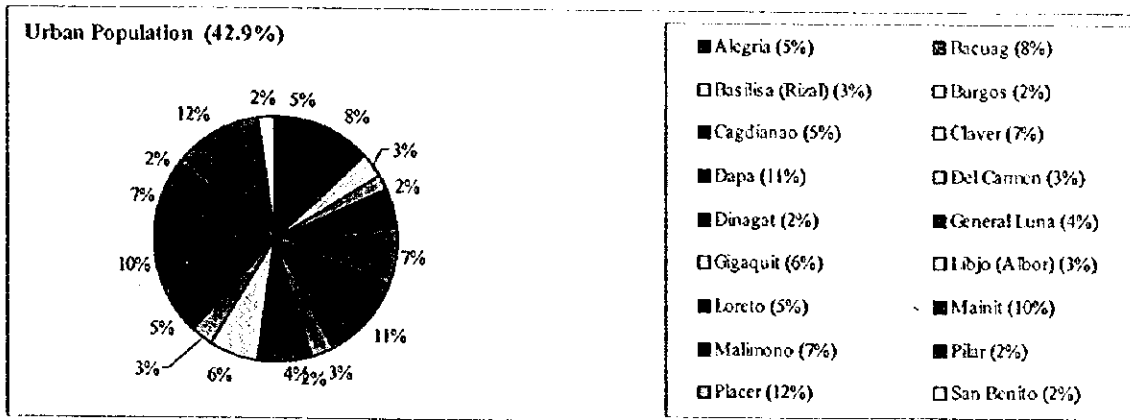
Utilizing the modified classification of the barangays, the urban-rural population was estimated. Rural population accounts for 57% of the provincial total, while 43% is urban as reflected in Figure 3.4.2. Table 3.4.2 presents the breakdown of the number of urban and rural barangays by municipality and its corresponding present population distribution.

There are 86,254 households with 52% residing in rural areas and 48% households in urban areas. The average provincial household size is 5.29 persons/household. Table 3.4.3 presents a breakdown per municipality in the number of households and household sizes by urban and rural area.

Figure 3.4.2 Present Population Distribution



Urban Population (42.9%)



Rural Population (57.1%)

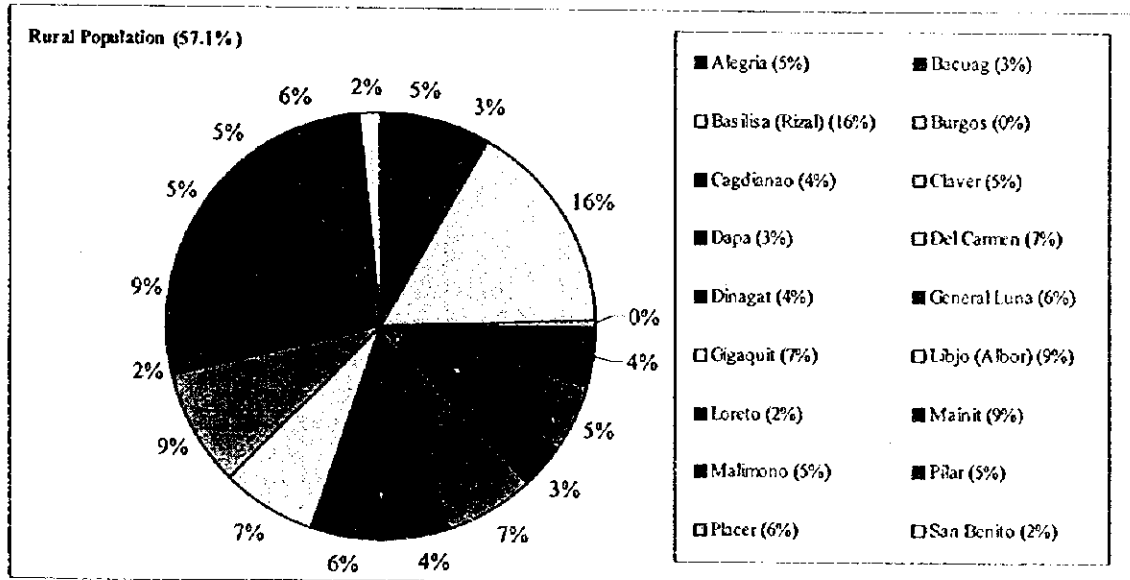


Table 3.4.2 Outline of Urban and Rural Areas in the Province

Name of Municipality	Land Area (km <sup>2</sup> )	Number of Barangay			Population (1997)		
		Urban	Rural	Total	Urban	Rural	Total
Alegria	67	3	9	12	5,264	6,893	12,157
Bacuag	45	3	6	9	8,395	4,440	12,835
Basilisa (Rizal)	80	3	24	27	3,209	22,596	25,805
Burgos	20	3	3	6	2,213	667	2,880
Cagdianao	207	5	9	14	5,172	6,186	11,358
Claver	273	5	9	14	7,668	7,118	14,786
Dapa	98	17	12	29	11,760	4,818	16,578
Del Carmen	148	2	18	20	3,437	9,273	12,710
Dinagat	24	3	9	12	2,550	6,175	8,725
General Luna	49	6	13	19	4,632	8,404	13,036
Gigaquit	129	4	9	13	6,594	9,317	15,911
Libjo (Albor)	166	2	14	16	3,094	12,358	15,452
Loreto	216	5	5	10	5,662	2,789	8,451
Mainit	108	4	17	21	10,125	12,198	22,323
Malimono	109	5	9	14	6,777	7,385	14,162
Pilar	84	4	11	15	2,289	6,279	8,568
Placer	90	5	15	20	12,774	8,906	21,680
San Benito	42	2	4	6	2,174	2,460	4,634
San Francisco	44	4	7	11	4,036	6,303	10,339
San Isidro	58	1	11	12	1,800	4,229	6,029
San Jose	48	4	8	12	16,011	11,574	27,585
Santa Monica (Sapao)	37	2	9	11	1,815	5,581	7,396
Sison	38	1	11	12	2,896	6,270	9,166
Socorro	55	2	11	13	7,775	8,069	15,844
Surigao City (Capital)	114	12	42	54	70,705	37,570	108,275
Tagana-An	245	4	10	14	5,676	6,867	12,543
Tubajon	85	2	7	9	1,910	4,485	6,395
Tubod	115	1	8	9	1,526	8,869	10,395
<b>Provincial Total</b>	<b>2,794</b>	<b>114</b>	<b>320</b>	<b>434</b>	<b>217,939</b>	<b>238,079</b>	<b>456,018</b>

Table 3.4.3 Household Numbers and Household Size

Municipality	Number of Households (1995)			Number of Households (1997)			1995 Household Size (person/household)		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Alegria	864	1,227	2,091	892	1,267	2,159	5.90	5.44	5.63
Bacuag	1,440	693	2,133	1,502	723	2,225	5.59	6.14	5.77
Basilisa (Rizal)	531	3,817	4,348	568	4,079	4,647	5.65	5.54	5.55
Burgos	443	120	563	458	124	582	4.83	5.38	4.95
Cagdianao	1,042	1,195	2,237	1,060	1,215	2,275	4.88	5.09	5.00
Claver	1,475	1,371	2,846	1,524	1,418	2,942	5.03	5.02	5.02
Dapa	2,377	943	3,320	2,400	952	3,352	4.90	5.06	4.95
Del Carmen	651	1,729	2,380	671	1,783	2,454	5.12	5.20	5.17
Dinagat	516	1,189	1,705	523	1,206	1,729	4.88	5.12	5.05
General Luna	885	1,499	2,384	919	1,556	2,475	5.04	5.40	5.27
Gigaquit	1,168	1,636	2,804	1,217	1,706	2,923	5.42	5.46	5.44
Libjo (Albor)	581	2,239	2,820	602	2,319	2,921	5.14	5.33	5.29
Loreto	1,145	541	1,686	1,202	568	1,770	4.71	4.91	4.77
Mainit	1,892	2,198	4,090	1,940	2,255	4,195	5.22	5.41	5.33
Malimono	1,339	1,412	2,751	1,337	1,409	2,746	5.07	5.24	5.16
Pilar	427	1,079	1,506	441	1,113	1,554	5.19	5.64	5.51
Placer	2,258	1,722	3,980	2,366	1,803	4,169	5.40	4.94	5.20
San Benito	377	451	828	388	465	853	5.60	5.29	5.43
San Francisco	801	1,171	1,972	827	1,210	2,037	4.88	5.21	5.07
San Isidro	302	707	1,009	314	735	1,049	5.73	5.75	5.74
San Jose	2,884	1,948	4,832	2,895	1,955	4,850	5.53	5.92	5.69
Santa Monica (Sapao)	333	942	1,275	341	966	1,307	5.32	5.78	5.66
Sison	543	1,108	1,651	562	1,146	1,708	5.15	5.47	5.36
Socorro	1,305	1,313	2,618	1,359	1,368	2,727	5.72	5.90	5.81
Surigao City (Capital)	13,160	7,080	20,240	13,571	7,309	20,880	5.21	5.14	5.18
Tagana-An	1,072	1,273	2,345	1,106	1,313	2,419	5.13	5.23	5.19
Tubajon	383	839	1,222	398	871	1,269	4.80	5.15	5.04
Tubod	293	1,729	2,022	295	1,742	2,037	5.17	5.09	5.10
<b>Provincial Total</b>	<b>40,487</b>	<b>43,171</b>	<b>83,658</b>	<b>41,678</b>	<b>44,576</b>	<b>86,254</b>	<b>5.23</b>	<b>5.34</b>	<b>5.29</b>

### **3.5 Health Status**

#### **3.5.1 Morbidity, Mortality and Infant Mortality**

The number one cause of morbidity was influenza, followed by pneumonia and diarrhea. Tetanus and bronchitis ranked fourth and fifth, respectively. Other causes of morbidity in descending order were: whooping cough, ARI, and urinary infections. Regarding mortality, the number one cause was tuberculosis, followed by pneumonia. Other accidents and vascular diseases ranked third and fourth, respectively. Other causes include nutritional deficiencies, diarrhea, tetanus, septicemia, meningitis and typhoid/paratyphoid. Pneumonia, prematurity and gastroenteritis were the 3 leading causes of infant mortality in the province.

The general health status of the populace of the province was relatively poor as compared with the national condition. The incidence of diseases was higher in Surigao del Norte than the Philippines as a whole. Table 3.5.1 presents a comparative statistics on the ten leading causes of morbidity, mortality and infant mortality of the province as well as of the Philippines (details are referred to Table 3.5.1, Data Report).

Water-related disease in the ten leading causes of morbidity and mortality was diarrhea, ranked 3<sup>rd</sup> and 10<sup>th</sup> respectively. Gastroenteritis (ranked 3<sup>rd</sup>), diarrhea (6<sup>th</sup>) and typhoid (10<sup>th</sup>) were among the leading causes of infant mortality.

#### **3.5.2 Water Related Diseases**

An indicator of health problems related to water supply and sanitation is the incidence of water-related diseases. The World Health Organization (WHO) has classified diseases related to water into 4 categories: 1) water-borne diseases e.g., cholera, typhoid, hepatitis A, diarrhea and dysentery; 2) water-based diseases e.g., schistosomiasis; 3) water-washed diseases e.g., diarrhea, intestinal parasites, scabies, conjunctivitis (sore eyes), and skin diseases; and 4) water-vector related diseases i.e., malaria, filariasis and dengue or H-fever, although the control of malaria and filariasis is beyond the scope of this Master Plan. A safe water supply, sanitary latrine and proper hygiene practices are conditions necessary for the control and prevention of these diseases.

Water-related diseases reported in the province were typhoid/paratyphoid, diarrhea, cholera, dengue fever, viral hepatitis, malaria, schistosomiasis, filariasis and skin diseases. Table 3.5.2 presents the reported cases and deaths of notifiable water-related diseases in the province.



Table 3.5.1 Number and Rates of Ten Leading Causes of Morbidity, Mortality and Infant Mortality

Rate: 1/100,000

Causes	Surigao del Norte 1995		Philippines			
	Number	Rate	Number	Rate	Ranking	
Morbidity	1. Influenza	23,247	5,257	609,471	910	3
	2. Pneumonia	13,306	3,009	470,574	703	4
	3. Diarrhea	12,559	2,840	1,337,449	1,997	1
	4. Tetanus	11,904	2,692	-	-	-
	5. Bronchitis	11,002	2,488	903,508	1,349	2
	6. Whooping Cough	6,301	1,425	-	-	-
	7. ARI	5,452	1,233	-	-	-
	8. Urinary Infections	2,388	540	-	-	-
	9. Tuberculosis	1,667	377	159,049	238	6
	10. Anemias	1,397	316	-	-	-
Mortality	1. Tuberculosis	1,136	257	24,580	37	5
	2. Pneumonia	522	118	35,582	53	3
	3. Other Accidents	402	91	13,477	20	6
	4. Vascular Diseases	265	60	37,358	56	2
	5. Malignant Neoplasms	208	47	25,399	38	4
	6. Other Prenatal Causes	208	47	-	-	-
	7. Kidney/ Nephritis	142	32	5,510	8	10
	8. Septicemia	119	27	-	-	-
	9. Chronic Liver Disease	97	22	-	-	-
	10. Diarrhea	71	16	5,759	9	9
Infant Mortality	1. Pneumonia	57	13	7,631	5	1
	2. Prematurity	35	8	1,190	0.7	5
	3. Gastroent. Colitis	22	5	-	-	-
	4. Heart Diseases	18	4	-	-	-
	5. Nutritional Deficiencies	9	2	925	0.6	6
	6. Diarrhea	4	1	1,661	1	4
	7. Tetanus	4	1	-	-	-
	8. Septicemia	4	1	1,252	.0.7	5
	9. Meningitis	4	1	-	-	-
	10. Typhoid/Paratyphoid	0	0	-	-	-

**Table 3.5.2 Reported Cases and Deaths of Notifiable Water Related Diseases**

Diseases	Morblidity		Mortality		Infant Mortality	
	Number	Rate	Number	Rate	Number	Rate
<b>Water-borne</b>						
1. Typhoid/Parathyphoid	64	14	1	Nil		
2. Diarrhea	2,840	641	16	4	5	1
3. Vital hepatitis	43	10	3	1		
4. Cholera	167	38				
<b>Water-based</b>						
1. Schistosomiasis	54		11			
<b>Water-washed</b>						
1. Skin disease	73	16				
<b>Water vector</b>						
1. Filariasis	159	36				
1. Dengue fever	22	5	3	1		
2. Malaria	12	3				

### 3.5.3 Health Facilities and Practitioners

Present facilities servicing the health care of the population are 16 hospitals, 72 rural health units and 129 barangay health stations. The number and ratio to population of health facilities and/or medical practitioners in the province as well as in the Philippines are presented in Table 3.5.1, Supporting Report (details are referred to Table 3.5.2, Data Report).

### 3.6 Environmental Conditions

#### 3.6.1 General

Environmental issues and problems directly affecting the sector and/or how the sector affects these environmental concerns are dealt with in this sub-section. Specifically, the problems of water pollution and solid waste disposal spawned by rapid population growth and increasing industrial and economic activities are discussed. These problems put a strain on the provincial water resources and hinder their optimum utilization.

#### 3.6.2 Water Pollution

There are no sewerage systems in other urban areas of the province. Majority of the drainage facilities is open canals or ditches. The rivers and streams function as the drainage system. These rivers receive the domestic wastewater and storm water collected by the segmented drainage facilities in urban centers or poblacions.

A major water pollution source in the province is domestic wastewater. Graywater generated by households is simply allowed to discharge into nearby channels. Effluent from septic tanks/cesspool is also flowing into the streams. The other major pollutant is dumped refuse that finds its way to the river systems during rain or is thrown indiscriminately into the rivers and seashores. In rural areas, natural assimilation may be expected to purify organic substances. However, pollution or contamination is anticipated caused by agricultural activities especially with reference to fertilizers and pesticides.

Mining and its processing are identified as potential sources of water pollution in Surigao del Norte. As of now, the rivers of the province have not been classified as to their usage by the Department of Environment and Natural Resources (refer to general information in Table 3.6.1 DENR Water Quality Criteria/Water Usage and Classification, Supporting Report).

### **3.6.3 Solid Waste Disposal**

Of the 28 municipalities/city, 11 have no municipal refuse collection and disposal service. The 16 municipalities and Surigao City with service have 1 to 15 units of open/closed dump truck. In the province, only 39% of the households is served, while majority (61%) is unserved. Table 3.6.1 reflects the breakdown of the manner of solid waste collection and disposal, and service coverage by municipality (details are referred to Table 3.6.1, Data Report).

Open dumping is commonly practiced by the LGUs as a disposal of solid wastes. The dumped refuse is usually burned or left unattended. Some significant negative effects associated with this unsanitary method are surface and groundwater pollution, air pollution, scattered solid waste, breeding grounds for insects, rodents and other disease vectors and fire hazard. At the household level, unserved households by the LGUs primarily depend on individual disposal such as dumping in vacant lots or body of water, burying and composting.

Table 3.6.1 Municipal Solid Waste Collection and Disposal, and Service Coverage, 1997

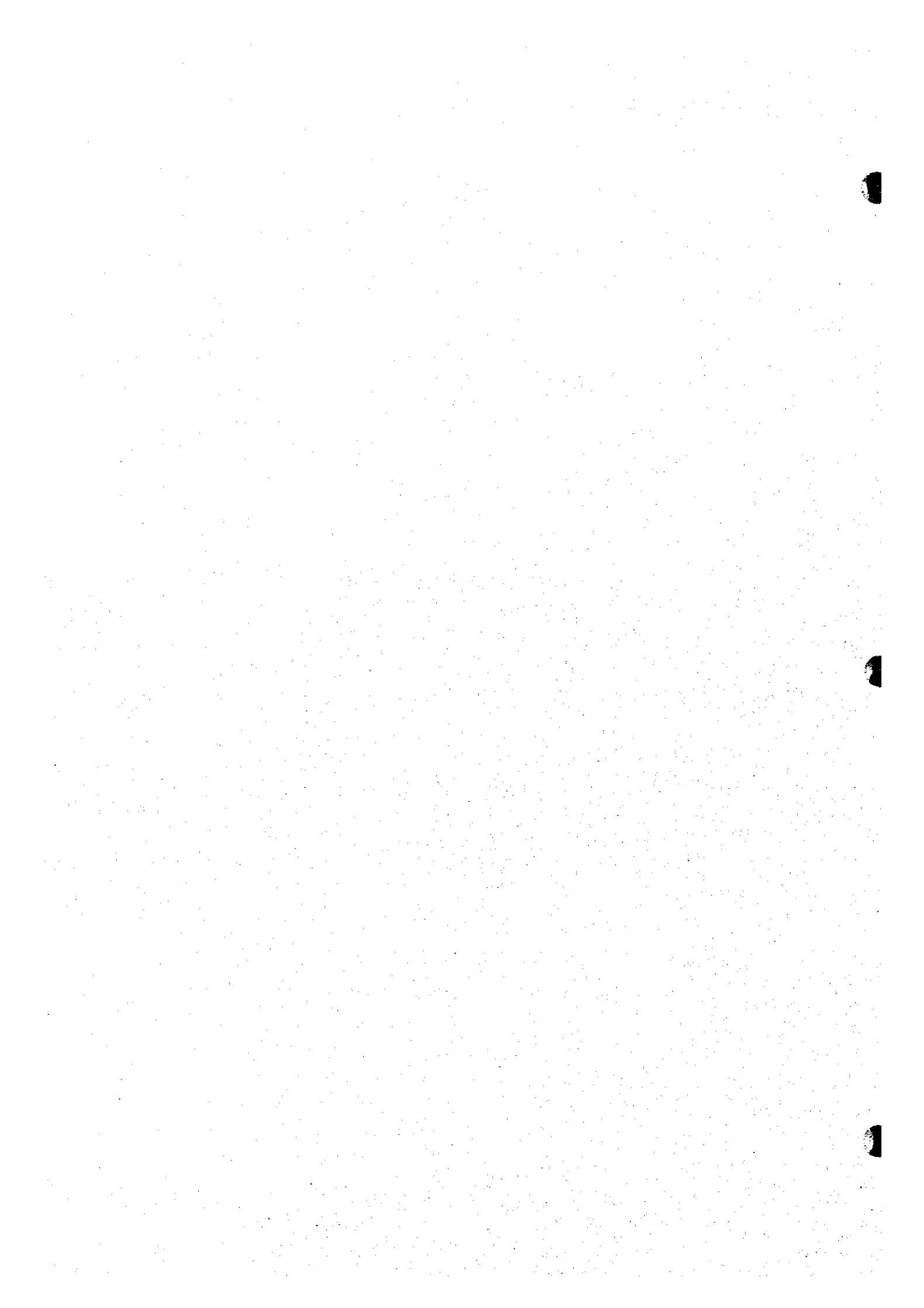
Name of Municipality	Number of Households 1997	With Service					Without Service					Percentage of Households Served	Percentage of Households Unserved	
		Number of Collection Trucks			Disposal		Manner of Disposal (Number of Household)							
		Open Dump Trucks	Closed Type Trucks	Total Units	Number of Households Served by Open Dump Site	Number of Households Served by Sanitary Landfill	Total Households Served	Dumping (Land and Water)	Burying	Composting	Total Households Unserved			
Alegria	2,159								1,466	408	285	2,159		100
Bacuag	2,225	1		1	943			943	1,026	190	66	1,282	42	58
Basilisa (Rizal)	4,647							1,566	960	993	1,126	3,081	34	66
Burgos	582								290	88	204	582		100
Cagdianao	2,275				1,137			1,137	145	374	619	1,138	50	50
Claver	2,942	1		1	691			691	1,560			1,560	47	53
Dapa	3,352				20			20	793	950	1,589	3,332	1	99
Del Carmen	2,454								1,742	350	362	2,454		100
Dinaigat	1,729								1,108	225	396	1,729		100
General Luna	2,475	2		2	729			81	185	1,230	250	1,665	33	67
Gisgquit	2,923								1,966	587	370	2,923		100
Libio (Albor)	2,921	1		1				510	2,411			2,411	17	83
Loreto	1,770								1,182	353	230	1,770		100
Mainit	4,195				611			611	1,839	550	1,195	3,584	15	85
Malimono	2,746				170			170	258	720	1,598	2,576	6	94
Plar	1,554	1		1	120			120	1,275		159	1,434	8	92
Placer	4,169	1		1	883			883	1,032	108	2,146	3,286	21	79
San Benito	853	1		1					580	173	100	853		100
San Francisco (Anao-Ano)	2,037				1,018			1,018	853		166	1,019	50	50
San Isidro	1,049										1,049	1,049		100
San Jose	4,850	1		1	1,817			1,817	1,705	664	664	3,033	37	63
Santa Monica (Sapao)	1,307	1		1	654			653					100	
Sison	1,708	1		1	560			560	1,148			1,148	33	67
Socorro	2,727								1,822	548	357	2,727		100
Surigao City (Capital)	20,880	3	12	15	20,499			20,499	381	491	320	2,419	98	2
Tagana-An	2,419				338			338	1,608	297	634	931	27	73
Tubigon	1,269													
Tubod	2,037									201	2,017	2,037		100
Provincial Total	86,254	14	12	26	30,190			3,501	27,632	9,029	15,902	52,563	39	61

Chapter

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**EXISTING FACILITIES AND  
SERVICE COVERAGE**

**4**



## **4. EXISTING FACILITIES AND SERVICE COVERAGE**

### **4.1 Water Supply**

#### **4.1.1 General**

Existing water supply facilities and conditions were surveyed by municipality under the category of urban and rural areas (as of April 1998 and regarded as the figures in 1997). Facilities are classified into three service levels, of which Level I facilities are further classified into safe and unsafe for drinking purpose.

The percentages of service coverage by different service level were estimated covering urban and rural areas by municipality. The served population is defined as "population served adequately with access to safe water sources/facilities." The rest of the population with unsafe sources/facilities and without access to water supply facilities was then defined as "underserved population" and "unserved population," respectively. The service coverage was figured out using estimated population in 1997.

Service profile and operating conditions of existing facilities are summarized by service level to come up with problem areas and need of rehabilitation to reflect in the development plan.

As a provincial total, approximately 75% of the present population (of which 48% in urban area and 52% in rural area) is considered as adequately served (refer to detailed study in Supporting Report). Under the area classification, 74% of urban population and 75% of rural population have access to safe water sources/facilities, while the rest is underserved and/or unserved. About 169,100 persons or 37% of the served population depend on Level I facilities, while 172,000 persons or 38% are served by Level III and/or Level II systems.

#### **4.1.2 Types of Facilities and Definition of Service Level Standard**

##### **(1) Composition of water supply system/facility**

The NSMP defines service level and system components of the water supply systems/facilities as shown in Table 4.1.1. NEDA Board Resolution No. 12 (s. 1995) also provides the approved definition of terms relative to water supply including levels of service (refer to 4.1.2, Data Report). These terms are to be adopted by all government agencies including LGUs.

**Table 4.1.1 Composition of Water Supply System/Facility by Service Level**

Description	Level I (Point Source Facility)	Level II (Communal Faucet System)	Level III (Individual House Connection)
1. Water Source	Drilled/driven shallow well Drilled/driven deep well Dug well Spring Rain collector	Drilled shallow/deep well Spring Infiltration gallery	Drilled deep well Spring Infiltration gallery Surface water intake
2. Water Treatment	Generally none. Disinfection of wells is conducted periodically by local health authorities. Iron removal facilities are provided in problem areas.	Generally none	Disinfection is provided. Systems with surface water source have series of water treatment facilities.
3. Distribution	None	Piped system provided with reservoir/s	Piped system provided with reservoir/s and pumping facilities.
4. Delivery & Service Level	At point (within 250m radius)	Communal faucet (within 25m radius)	Individual house connection/household tap
5. Consumption Rate (Adequately Served)	At least 20 lpcd	At least 60 lpcd	At least 100 lpcd

**(2) Safe and unsafe classification of water sources**

DOH has classified Level I water source facilities as safe (reliable water source) and unsafe sources/facilities based on the National Standard for Drinking Water (NSDW).

**Safe source:** Protected deep well, protected shallow well, improved/covered dug well and developed spring

**Unsafe source:** Unprotected deep well, unprotected shallow well, open dug well, undeveloped/unprotected spring and rain collector

Water sources other than the above, such as untreated surface water of rivers, lakes and ponds are also considered unsafe sources. On the other hand, Levels II and III water supply systems are regarded to have safe/reliable sources with provision of adequate treatment.

**(3) Service level standard**

The NSMP and NEDA Resolution No. 12 define "adequate service level" by different water supply system. Improvement in the number of households per water source/facility may be expected for Level I service in the future. On the contrary, the number of households served by a unit of private/public source is sometimes beyond the standard on a current basis.

**Level III:** 1 household/connection

**Level II:** 5 (4 to 6) households/communal faucet

**Level I:** 15 households/point source

1 household/private well



### 4.1.3 Level III Systems

Level III (individual house connection) systems at municipal level are usually established and operated by WD under the technical and financial assistance of LWUA. Some IGUs also implement and operate Level III systems commonly at barangay level.

There are 35 Level III systems in the province operated under different kinds of ownership (authority or association) as shown in Table 4.1.2 together with their service coverage in 1997. These are:

- 3 Water Districts in the municipality of Bacuag, Placer and Surigao City;
- 8 Municipal waterworks catering the municipalities of Burgos, Cagdianao, Loreto, Mainit, Malomono, San Benito, Santa Monica and Sison;
- 23 Barangay waterworks in the municipality of Algeria, Dapa, Gigaquit (6 systems), Placer (2 systems), San Francisco (6 system), San Jose, Santa Monica, Sison and Tubod (4 systems); and
- Del Caruwas Inc., a private enterprise being operated by the Pastoral Council at the municipality of Del Carmen covering 2 urban and 1 rural barangays.

The Surigao Metro Water District is the largest system in the province that covers 4 urban barangays and 5 rural barangays in provision of 4 deep wells and 3 surface water sources. The WD supplies water to 45,700 persons corresponding to the total population in its service area. Unaccounted-for water ratio was recorded at 46% in 1997. As for water quality, aside from dirty water found occasionally due to high turbidity of surface water during heavy rains, the heavy metals may be an issue since a small gold mining company is located upstream of Surigao River.

Mainit waterworks, being operated by the municipal government, is the second largest system. The waterworks adopts the combined system with communal faucets to cover 2 urban barangays and 19 rural barangays with served population of 11,500.

Other water systems in the province utilize spring water as major water sources. (details are referred to in Table 4.1.1, Supporting Report).

Most of these waterworks with population coverage ranging from 400 to 4,300 adopts the combined system with communal faucets and operate the systems with flat rate. These systems are deemed very vulnerable to sustain regular maintenance works due to lack of funds

and technical capability. Disinfection practice in these waterworks is not sufficiently undertaken and can hardly cope when outbreaks of epidemic start.

**Table 4.1.2 Information on Existing Level III Systems**

Name of Municipality	Name of System (Operating Body)	Type of Water Source <sup>1</sup>	Water Consumption		Service Coverage								
			Water Consumption (cu. m/day)	Domestic Supply (%)	No. of Brgys. Served		No. of Household Served		No. of Population Served				
					Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Alegria	Brgy. Ouano	SP			1		1	200		200	1,040		1,040
Bacuag	Bacuag WD	SP	1,040	96	1		1	502		502	2,875		2,875
Burgos	LGS-Burgos	SP			2		2	60		60	321		321
Cagdianao	LGU-Cagdianao	SP				1	1		105	105		544	544
Dapa	Consolacion	SP			1		1	277		277	1,389		1,389
Del Carmen	Del Caruasa Inc.	SP/Surf			2	1	3	13	50	63	65	300	365
Gigaquit	Alambique	DgW			1		1	73		73	393		393
	Ipil	DgW			1		1	99		99	556		556
	Mahanob	SP				1	1		286	286		1,503	1,503
	Poniente	SP				1	1		209	209		1,597	1,597
	San Antonio	SP			1		1	116		116	702		702
	San Isidro	DgW			1		1	154		154	794		794
	<b>Municipal Total</b>					<b>4</b>	<b>2</b>	<b>6</b>	<b>442</b>	<b>495</b>	<b>937</b>	<b>2,445</b>	<b>3,100</b>
Loreto	LGU-Loreto	SP			4		4	765		765	499		499
Mainit	Mun. Government		158	100	2	19	21	340	1,020	1,360	1,698	5,297	6,995
Malimono	Government				1		1	145		145	735		735
Placer	Anislagan	SP				1	1		112	112		675	675
	Bugas-bugas	SP				1	1		10	10		60	60
	<b>Municipal Total</b>		<b>158</b>			<b>2</b>	<b>2</b>		<b>122</b>	<b>122</b>		<b>735</b>	<b>735</b>
San Benito	LGU-San Benito				2		2	72		72	420		420
San Francisco (Arao-Aon)	Bafite	SP	197	97		1	1		100	100		600	600
	Banbanon		30	83		1	1						
	Hugas		350	94	1	1	2	250	150	400	1,442	1,034	2,476
	Jubgan	SP	29	83	1		1	27		27	161		161
	Magtangale	SP	245	98		1	1		180	180		804	804
	Oslao	SP	120	80		1	1		140	140		700	700
	<b>Municipal Total</b>		<b>971</b>	<b>93</b>	<b>2</b>	<b>5</b>	<b>7</b>	<b>277</b>	<b>570</b>	<b>847</b>	<b>1,603</b>	<b>3,138</b>	<b>4,741</b>
San Jose	Brgy. Cuarinta	SP			1		1	70		70	356		386
Santa Monica (Sapao)	Garcia	SP				1	1		15	15		90	90
	LGU-Santa Monica	SP			2		2	270		270	1,459		1,459
	<b>Municipal Total</b>				<b>2</b>	<b>1</b>	<b>3</b>	<b>270</b>	<b>15</b>	<b>285</b>	<b>1,459</b>	<b>90</b>	<b>1,549</b>
Sison	LGU-Sison	SP	136	99	1	2	3	17	495	512	85	2,475	2,560
	Mabuhay	SP				1	1		208	208		1,040	1,040
	<b>Municipal Total</b>		<b>136</b>	<b>99</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>17</b>	<b>703</b>	<b>720</b>	<b>85</b>	<b>3,515</b>	<b>3,600</b>
Surigao City (Capital)	Surigao Metro WD	DW/Surf	5,830	91	4	5	9	9,036	100	9,136	45,180	500	45,680
Tubod	LGU-Brgys	SP				2	2		520	520		2,194	2,194
	Marga	SP				1	1		200	200		1,099	1,099
	Poplacion	SP			1	2	3	293	200	493	1,526	1,009	2,535
	Timamana	SP				1	1		250	250		1,485	1,485
<b>Municipal Total</b>		<b>5,830</b>		<b>1</b>	<b>6</b>	<b>7</b>	<b>293</b>	<b>1,170</b>	<b>1,463</b>	<b>1,526</b>	<b>5,787</b>	<b>7,313</b>	
<b>Provincial Total</b>			<b>8,135</b>	<b>91</b>	<b>31</b>	<b>45</b>	<b>76</b>	<b>12,779</b>	<b>4,350</b>	<b>17,129</b>	<b>61,726</b>	<b>23,006</b>	<b>84,732</b>

Note: 1. Type of Water Source: DW - Deep Well, Surf - Surface Water (River), SP - Spring, IG - Infiltration Gallery.  
 2. \* - Estimated at 100 lpcd.  
 3. No data available from Placer WD.

**Table 4.1.3 Information on Water District**

Name of Water District	Number of Connections						Production (cu. m/month)	Accounted for Water (cu. m/month)
	Domestic	Inst.	Comm.	Inds.	Total	Metered		
Bacuag WD	463	10	29		502	502	51,840	31,200
Surigao Metro WD	6,588	95	546		7,229	7,229	321,420	174,900

Note: No data available from Placer WD.

#### 4.1.4 Level II Systems

Level II (communal faucet) systems are designed to cater for barangay level water supply with a limited service coverage and supply capacity. These systems have been implemented by different agencies (DPWH, LWUA, LGUs) encouraging the use of spring sources and are operated by LGUs, RWSAs or NGOs.

There are 136 Level II systems in the province and all of these, except 2 waterworks, are utilizing spring sources. Surigao City has the largest number, 38 systems or 28% of the total as shown in Table 4.1.4 together with service coverage in 1997 (details are referred to in Table 4.1.2, Supporting Report).

Some of these systems have encountered supply interruption caused by bursting of pipes due to inappropriate pipe installation. Inadequate supply quantity has also been experienced during dry season.

Problem areas, both in managerial and technical aspects, identified on existing Level II systems and necessary countermeasures for the improvement are discussed hereunder.

##### (1) Management practice

Although most of the Level II systems are presently operational to some extent under current management practices, the prevailing practice of flat rate water bill at the minimum level will lead to any one of these system to become non-operational sooner or later. This is because financial savings to cope with future repair and depreciation of existing facilities are not duly considered under the current management practice, while cost recovery by the operating bodies is a prerequisite in the sector management.

To attain financial and managerial sustainability, reinforcement of RWSA or other operating body shall be promoted with reference to the institutional development.

##### (2) Technical skill for O&M of facilities

Utilization of spring source usually leads to less attention to the daily O&M practice, owing to gravity flow of water to the service area. However, inappropriate care of spring box and pipeline results to various problems, e.g. turbid water, less water flow by clogging at spring box and pipeline, etc. Physical damage may also happen to the transmission line exposed on the ground in the mountainous area due to landslide, etc. associated with heavy rainfall, when proper protection of pipeline is not taken up.

Table 4.1.4 Information on Existing Level II System

Name of Municipality	Name of System (Operating Body)	Service Coverage									
		No. of Brgvs. Served			No. of Household Served			No. of Population Served			
		Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	
Alegria	Alipao BWSA		1	1		30	30		180	180	
	Budlingin		1	1		30	30		150	150	
	Cp Edward BWSA		1	1		15	15		60	60	
	Ferida		1	1		52	52		543	543	
	Ombong BWSA		1	1		20	20		120	120	
	Pongtud		1	1		36	36		180	180	
	<b>Municipal Total</b>		6	6		183	183		1,233	1,233	
Bacuag	Cambuayon		1	1		36	36		180	180	
	Campo		1	1		90	90		450	450	
	Payapag		1	1		42	42		210	210	
	Pungtod		1	1		36	36		180	180	
	Sfo. Rosario		1	1		24	24		120	120	
	<b>Municipal Total</b>		5	5		228	228		1,140	1,140	
	Burgos	Baybay, Burgos		1	1		20	20		120	120
Bitang			1	1		10	10		60	60	
Poblacion 1		1		1	45	45	250		250		
Poblacion 2		1		1	35	35	250		250		
San Mateo			1	1		15	15		90	90	
<b>Municipal Total</b>		2	3	5	80	45	125	500	270	770	
Cagdianao		Cabintan-an BWSA		1	1		24	24		120	120
	Maatas BWSA		1	1		30	30		150	150	
	San Jose, Cagdianao		1	1		42	42		189	189	
	Sfo. Rita BWSA		1	1		30	30		150	150	
	Sfo. Niño BWSA		1	1		20	20		100	100	
	<b>Municipal Total</b>		5	5		146	146		709	709	

Table 4.1.4 Information on Existing Level II System

Name of Municipality	Name of System (Operating Body)	Service Coverage									
		No. of Brgys. Served		No. of Household Served		No. of Population Served					
		Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	
Claver	Cabugo BWSA		1	1		50		281		281	
	Sapa BWSA		1	1		25		150		150	
Del Carmen	<b>Municipal Total</b>		2	2		75		431		431	
	Del Caruwasa Inc.	2	2	4	651	191	842	3,255	955	4,210	
	Bagakay		1	1		73		364		364	
	Buenvista, Dapa		1	1		46		275		275	
	Cabawa		1	1		93		416		416	
	Corregidor		1	1		60		300		300	
	Jubang		1	1		71		349		349	
	San Carlos		1	1		69		385		385	
	San Miguel		1	1		60		326		326	
	<b>Municipal Total</b>		7	7		472		2,415		2,415	
Dinagat Libjo (Albor)	LGU-Dinagat	7	1	8	270	786	1,056	2,515	1,351	3,866	
	Albor	1		1	42		42	210		210	
	Arellano BWSA		4	4		40		200		200	
	Bayamban		1	1		15		75		75	
	Doña Helen		1	1		40		240		240	
	Garcia		1	1		55		330		330	
	Gen. Aguinaldo		1	1		25		150		150	
	Kanihaan BWSA		1	1		25		126		126	
	Llanera BWSA		1	1		30		120		120	
	Magsaysay, Libjo		1	1		60		300		300	
	Osmeña		1	1		12		61		61	
	Plaridel		1	1		85		425		425	
	Quezon BWSA		1	1		55		275		275	
	Rosita		1	1		50		250		250	
	San Antonio		1	1		125		625		625	
San Jose, Libjo		1	1		90		450		450		

Table 4.1.4 Information on Existing Level II System

Name of Municipality	Name of System (Operating Body)	Service Coverage											
		No. of Brgys. Served			No. of Household Served			No. of Population Served					
		Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total			
Libjo (Albor)	Sto. Niño		1	1		85		85		425		425	
	<b>Municipal Total</b>	2	14	16	167	667	834	834	835	3,427	4,262	4,262	
	Loreto	LGU-Loreto		5	5		579		579		2,773		2,773
		Binocaran		1	1		30		30		150		150
		Bunyasán (Gov)		1	1		37		37		185		185
		Bunyasán (Pvt)		1	1		12		12		60		60
		Cagtinae, Brgy. Proper		1	1		84		84		420		420
		Can-aga, Brgy. Proper		1	1		30		30		150		150
		Cansayong		1	1		152		152		760		760
		Cantapoy, Brgy. Proper		1	1		96		96		480		480
Cayawan, Brgy. Proper			1	1		106		106		530		530	
Hanagdong, Brgy. Prop			1	1		120		120		600		600	
Malimono	Karhatag, Brgy. Proper		1	1		72		72		360		360	
	Magdad, Ad-on		1	1		200		200		1,000		1,000	
	Pili, Brgy. Proper		1	1		69		69		345		345	
	Tinago		1	1		42		42		210		210	
	Villariza, Op. 1-4		1	1		60		60		300		300	
	<b>Municipal Total</b>	3	14	14	320	1,110	1,110	1,110	1,886	5,550	5,550	5,550	
	Pilar	Asin, Centro, Pilaring, Pu	3	1	4	24	77	397	397	1,886	434	2,320	2,320
		Mabini, Pilar		1	1		24		24		120		120
		San Roque, Pilar		1	1		18		18		90		90
		<b>Municipal Total</b>	3	3	6	320	119	439	439	1,886	644	2,530	2,530
Placer		Boyongan		1	1		66		66		303		303
		Central	1		1	100		100	528		528		528
		Ellaperal		1	1		66		66		348		348
		Ipil, Placer	1		1	25		25	132		132		132
		Magupange		1	1		50		50		234		234
		<b>Municipal Total</b>	2	3	5	125	182	307	307	660	885	1,545	1,545

Table 4.1.4 Information on Existing Level II System

Name of Municipality	Name of System (Operating Body)	Service Coverage									
		No. of Brgys. Served		No. of Household Served		No. of Population Served					
		Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	
San Francisco (Anao-Aon)	Amonay		1	1		50	50		250	250	
	Honrado		1	1		20	20		100	100	
	Linonggan		1	1		20	20		100	100	
	Macopa		1	1		40	40		240	240	
	<b>Municipal Total</b>		4	4		130	130		690	690	
San Isidro		1	1		316	316		1,720	1,720		
San Jose	Aurelio	2		2	84	84		420		420	
	Don Ruben	1		1	12	12		60		60	
	Jacquez		1	1		30	30		180	180	
	Luna	1		1	50	50		262		262	
	Matingbe	1		1	6	6		30		30	
Santa Monica (Sapao)	Wilson	1		1	6	6		30		30	
	<b>Municipal Total</b>	6	1	7	158	188		802	180	982	
	Alegria, Santa Monica		1	1		131	131		793	793	
	Libertad		2	2		155	155		930	930	
	Magsaysay		1	1		66	66		401	401	
Sison	<b>Municipal Total</b>		4	4		352	352		2,124	2,124	
	Biyabid		1	1		15	15		75	75	
	Ima		1	1		30	30		150	150	
	Mabuhay		1	1		60	60		240	240	
	San Isidro		1	1		68	68		387	387	
Tinigpahan	San Pablo		1	1		43	43		233	233	
	Tagbayam		1	1		66	66		396	396	
	Tinigpahan		1	1		49	49		308	308	
	<b>Municipal Total</b>		7	7		331	331		1,789	1,789	

Table 4.1.4 Information on Existing Level II System

Name of Municipality	Name of System (Operating Body)	Service Coverage									
		No. of Brgys. Served			No. of Household Served			No. of Population Served			
		Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	
Sungao City (Capital)	Alegria		1	1		110	110			522	522
	Anomar		1	1		173	173			865	865
	Aurora		1	1		124	124			706	706
	Balibayon		1	1		24	24			120	120
	Baybay		1	1		54	54			283	283
	BoniEacio		1	1		218	218			1,190	1,190
	Buenvista	1		1	217		217	1,015			1,015
	Cabongbongan		1	1		110	110			588	588
	Cagnio		1	1		334	334			1,697	1,697
	Cantiasay		1	1		152	152			801	801
	Capalayan		1	1		60	60			347	347
	Danao		1	1		75	75			374	374
	Danawan		1	1		98	98			510	510
	Ipil		1	1		156	156			780	780
	Libuac		1	1		195	195			1,019	1,019
	Lipata		1	1		239	239			1,326	1,326
	Lisondra		1	1		115	115			639	639
	Mabini		1	1		30	30			150	150
	Mabua		1	1		305	305			1,518	1,518
	Mapawa		1	1		139	139			727	727
Mat-i		1	1		120	120			600	600	
Nabago		1	1		54	54			270	270	
Nonoc		1	1		154	154			910	910	
Orok		1	1		154	154			725	725	
Poctoy		1	1		199	199			959	959	
Punta Pilar		1	1		104	104			635	635	
Quezon		1	1		48	48			240	240	
Rizal		1	1		42	42			210	210	



Table 4.1.4 Information on Existing Level II System

Name of Municipality	Name of System (Operating Body)	Service Coverage											
		No. of Brgys. Served		No. of Household Served		No. of Population Served		No. of Brgys. Served		No. of Household Served		No. of Population Served	
		Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Surigao City (Capital)	San Jose	1		1	227		227	1,202		1,202		1,202	
	San Pedro		1	1		106	106				632	632	
	San Roque		1	1		133	133				652	652	
	Serra		1	1		36	36				180	180	
	Silop		1	1		129	129				785	785	
	Sukailang		1	1		118	118				571	571	
	Talisay	1		1	42		42	210		210		210	
	Togbongon		1	1		265	265				1,395	1,395	
	Trinidad		1	1		329	329				1,603	1,603	
	Zaragosa		1	1		124	124				698	698	
	<b>Municipal Total</b>		3	35	38	486	4,826	5,312	2,427	25,227	27,654		
	Tubajon		1	1	2	150	176	326	708	885	1,593		
Tubod				1		25	25		150	150			
	Capayahan BWSA		1	1		42	42		230	230			
	Cawilan BWSA		1	1		38	38		195	195			
	Del Rosario BWSA		1	1		47	47		230	230			
	Motorpool		1	1		159	159		742	742			
	San Isidro, Tubod		5	5		311	311		1,547	1,547			
	<b>Municipal Total</b>		29	127	156	2,723	10,939	13,662	15,308	54,225	69,533		
	<b>Provincial Total</b>												

Expansion of distribution line and installation of additional public faucets are usually undertaken without appropriate technical study on the capacities of water sources and distribution facilities, resulting to decrease of supply pressure and quantity.

To attain technical sustainability of existing facilities, an appropriate technical guidance and skills training for operating bodies shall be arranged by concerned agencies/LGUs.

#### 4.1.5 Level I Facilities

Level I facilities (point source) are common in rural barangays, majority of which are owned privately. Major facilities are different types of wells equipped with handpumps or developed spring with transmission line and one communal faucet. Rain collector is also used in some areas.

Level I facilities are classified in terms of safe and unsafe sources referring to the water quality examination results conducted by PPDO as presented in Table 4.1.5 (details are referred to in Supporting Report). Served population in 1997 is also estimated as shown in the same table.

Of the 2,444 operational Level I facilities, 40% are shallow wells. According to the PPDO water quality analysis results from random sampling, 20% of Level I facilities, as the provincial average, is determined to be unsafe. All deep wells were regarded as safe water sources. In application of the unsafe percentage to shallow wells for each municipality, 1,584 Level I facilities are classified as safe sources, while 860 facilities are under unsafe category.

Percentage shares between public and private Level I facilities for rural water supplies are 75% and 25%, respectively. The share of developed springs in public facilities is 16% of public facilities (details are referred to in Supporting Report).

Problem areas observed on Level I facilities and necessary countermeasures for the improvement are summarized in terms of potable condition and functioning.

##### (1) Unsafe water sources

Most of the cases declared as unsafe sources are driven shallow wells which are unprotected against seepage of surface water and usually located nearby potential pollution sources, such as septic tank and piggery. (The Code on Sanitation of DOH requires a minimum 25 m distance between water source and pollution sources.)

Table 4.1.5 Information on Existing Level I Facilities

Name of Municipality	Number of Safe Water Sources						Number of Unsafe Water Sources						Served by Safe Source				
	Deep Well	Shallow Well	Covered/Improved Dug Well	Developed Spring	Total	Shallow Well	Open Dug Well	Undeveloped Spring	Rain Water Collector	Total	Urban	Rural	Total	Number of Household		Number of Population	
														Urban	Rural	Urban	Rural
Alegria	2	150	30	1	183	38				38	383	818	1,201	2,258	4,453	6,710	
Bacuag	6	37	16		59	9	91			100		224	224		1,377	1,377	
Basilisa (Rizal)	23		12	35	70		15		1	16	301	3,740	4,041	1,699	20,719	22,418	
Burgos	26	17			43	4				4					266	266	
Caadianao																	
Claver		122	2		124	31	15			46	1,026	939	1,965	5,161	4,716	9,877	
Dapa		17	70	4	91	4				4	1,421		1,421	6,962		6,962	
Del Carmen	5	10	9	14	38	2	9		21	32	2	664	666	9	3,432	3,461	
Dinagat	2	166	44	6	52						7	893	901	35	4,575	4,610	
General Luna	2		136		142	41	91			132	591	1,207	1,799	2,981	6,519	9,500	
Gigaquit	6	5			11	2	123			125	220	686	906	1,193	3,744	4,937	
Libjo (Albor)																	
Loreto	6	2		5	13	1	17		6	24	166		166	780		780	
Mamit	8	36			44	9				9	627	531	1,158	3,274	2,873	6,147	
Malimono	7			32	39												
Pilar	11	9	37	7	64	2			15	17		474	474		2,675	2,675	
Placer	7	2		9	18		3			3	2,117	1,032	3,149	11,429	5,098	16,528	
San Benito	2		1		3		18			24		108	108		570	570	
San Francisco (Anao-Aon)		4			4	1				1	346	240	586	1,688	1,251	2,939	
San Isidro	11		3	6	20		6		4	10		520	520		2,988	2,988	
San Jose	38	24			62	10	190		4	200	643	403	1,046	3,553	2,386	5,940	
Santa Monica (Sapao)	22	27		3	52	7	4		3	14		250	250		1,447	1,447	
Sison	8			1	9		13			13	238	6	244	1,227	33	1,260	
Socorro		1	37	10	48		0		11	11	1,197	903	2,099	6,845	5,325	12,170	
Sungao City (Capital)	54	142			196	35			35	35	3,861	1,251	5,113	20,117	6,432	26,549	
Tagana-An	26	4		2	32	1				1	954	1,093	2,047	4,893	5,718	10,611	
Tubajon																	
Tubod	5				5							543	543		2,798	2,798	
Provincial Total	233	793	423	135	1,584	198	595		67	860	14,099	17,820	31,718	74,105	94,955	169,059	

These shallow wells shall be provided with concrete apron on the ground surface and proper drainage facility at the surrounding area. Relocation of wells or pollution sources may be another countermeasure. For new construction of shallow wells, proper site selection and appropriate construction method shall be applied together with periodic monitoring of water quality.

(2) Non-functioning/abandoned wells

There are a lot of non-functioning public wells in the province as shown in Table 4.1.6.

**Table 4.1.6 Operating Status of Existing Wells in the Province**

Operating Status	Unit	Public Facility		Private Facility		Total
		Deep Well	Shallow Well	Deep Well	Shallow Well	
Functioning	No.	181	573	52	418	1,224
	Percentage	78	92	100	99	92
Non-Functioning	No.	52	49		3	104
	Percentage	22	8		1	8
<b>Total Number</b>		233	622	52	421	1,328

Note: Number of non-functioning wells includes abandoned wells, but details in number and reasons are not available.

Among others, deep wells usually necessitate repair/replacement of mechanical parts and redevelopment of the well itself. Apart from the same problems as deep wells, shallow wells have primary disadvantages such as the use of shallow aquifer which is easily affected by surrounding environmental conditions and the simple construction method (driving well point) that makes rehabilitation works difficult. There exist water quality problems such as saltwater intrusion in the barangays of islets.

To prolong the service life of public deep wells, periodic check-up entailing preventive maintenance and redevelopment of wells are to be performed. Meanwhile, proper site selection and protection of well sources are requisites for shallow wells.

**4.1.6 Water Supply Service Coverage**

According to the definition of DOH in terms of safe and unsafe sources, service coverage was studied under "served", "underserved" and "unserved" categories.

The present population of the municipalities as of 1997, base year for planning purpose, was estimated referring to NSO's projection method. However, population distribution in 1995 census by urban and rural barangay prepared by NSO was adjusted to meet actual conditions in the classification of barangays. Details are referred to section 8.3.1 Population Projection.

Water supply service coverage by service level is estimated for urban and rural areas covering all municipalities under the following conditions and assumptions:

- Service percentage/population by Level III and Level II systems was estimated based on the questionnaire survey results.
- Unserved population was estimated using the percentages of unserved households to the total number of households by urban and rural area based on the 1995 population census data; "Households by Main Source of Drinking Water and City/Municipality."
- The rest of the population was considered to be served by Level I facilities assuming that 50% of private facilities was shared by neighbors to supplement insufficiency of public facilities.

The number of households sharing at each Level I public/private facility was calculated at 23 households/facility as a provincial average under the above assumptions (details are referred to in Supporting Report).

Table 4.1.7 presents the profile of service coverage in terms of served, underserved and unserved. As a provincial total, 75% of the population is adequately served (74% of urban population and 75% of rural population). Among the unserved population, considerable number of population depending on non-reported Level I facilities would be included. The provincial service coverage at present is exhibited in Figure 4.1.1 (details are referred to Supporting Report).

Among different service levels, Level I facilities have a dominant role in service coverage over 9 municipalities out of 27 municipalities and 1 city in the province. As a whole, 37% of the total population (34% of urban population and 40% of rural population) relies on Level I facilities.

The proportions of population coverage between public and private Level I facilities in rural water supply are estimated at 85% and 15%, respectively (details are referred to in Supporting Report).

Level III systems take a major role in Surigao City covering 64% of the total urban population, Santa Monica (80% of urban population), Sison (56% of rural population) and Tubod (100% of urban and 65% of rural population). As a provincial total, 19% of the total population (28% of urban population and 10% of rural population) is covered by Level III service.

Table 4.1.7 Water Supply Service Coverage by Municipality

Name of Municipality	Area	Population (1997)	Population Coverage						Percentage of Population Coverage							
			Served by Safe Source			Underserved/Unserved			Served by Safe Source			Underserved/Unserved				
			Level III	Level II	Level I	Total	Unsafe Source	Unserved	Total	Level III	Level II	Level I	Total	Unsafe Source	Unserved	Total
			Level III	Level II	Level I	Total	Unsafe Source	Unserved	Total	Level III	Level II	Level I	Total	Unsafe Source	Unserved	Total
Alegria	Urban	5,264	1,040	1,500	2,258	4,798	162	305	466	20	28	43	91	3	6	9
	Rural	6,893		1,233	4,453	5,686	719	489	1,207		18	65	82	10	7	18
	Total	12,157	1,040	2,733	6,710	10,483	880	793	1,674	9	22	55	86	7	7	14
Bacung	Urban	8,395	2,875			2,875	5,322	198	5,520	34			34	63	2	66
	Rural	4,440		1,140	1,377	2,517	1,545	378	1,923		26	31	57	35	9	43
	Total	12,835	2,875	1,140	1,377	5,392	6,867	576	7,443	22	9	11	42	54	4	58
Basilisa (Rizal)	Urban	3,209			1,699	1,699	1,359	151	1,510			53	53	42	5	47
	Rural	22,596			20,719	20,719	1,877	1,877	1,877			92	92		8	8
	Total	25,805			22,418	22,418	3,387	3,387	3,387			87	87	5	8	13
Burgos	Urban	2,213	321	1,188	1,509	639	65	704	15	54		68	29	3	32	
	Rural	667		270	266	536	9	122	131		40	40	80	1	18	20
	Total	2,880	321	1,458	266	2,045	648	187	835	11	51	9	71	23	7	29
Cagdianao	Urban	5,172				4,075	1,097	5,172				79	79	21	100	
	Rural	6,186	544	1,945	2,489	1,704	1,993	3,697	9	31		40	28	32	60	
	Total	11,358	544	1,945		2,489	5,779	3,090	8,869	5	17		22	51	27	78
Claver	Urban	7,668			5,161	5,161	2,080	426	2,507			67	67	27	6	33
	Rural	7,118		431	4,716	5,147	1,234	737	1,971		6	66	72	17	10	28
	Total	14,786		431	9,877	10,308	3,315	1,164	4,478		3	67	70	22	8	50
Dapa	Urban	11,760	1,389	6,962	8,351	366	3,043	3,409	12		59	71	3	26	29	
	Rural	4,818			2,415	2,415	2,403	2,403		50		50	50	50	50	
	Total	16,578	1,389	2,415	6,962	10,766	366	5,446	5,812	8	15	42	65	2	33	35
Del Carmen	Urban	3,437	65	3,255	9	3,329	108	108	2	95	0	97	3	3	3	
	Rural	9,273	300	1,955	3,452	5,707	509	3,057	3,566	3	21	37	62	5	33	38
	Total	12,710	365	5,210	3,461	9,036	617	3,057	3,674	3	41	27	71	5	24	29
Dinagat	Urban	2,550			35	2,550					99	1	100			
	Rural	6,175		1,351	4,575	5,926	249	249	249		22	74	96		4	4
	Total	8,725		3,866	4,610	8,476	249	249	249		44	53	97		3	3
General Luna	Urban	4,632			2,981	2,981	1,510	1,41	1,651			64	64	33	3	36
	Rural	8,404			6,519	6,519	1,627	258	1,885			78	78	19	3	22
	Total	13,036			9,500	9,500	3,137	399	3,536			73	73	24	3	27

Table 4.1.7 Water Supply Service Coverage by Municipality

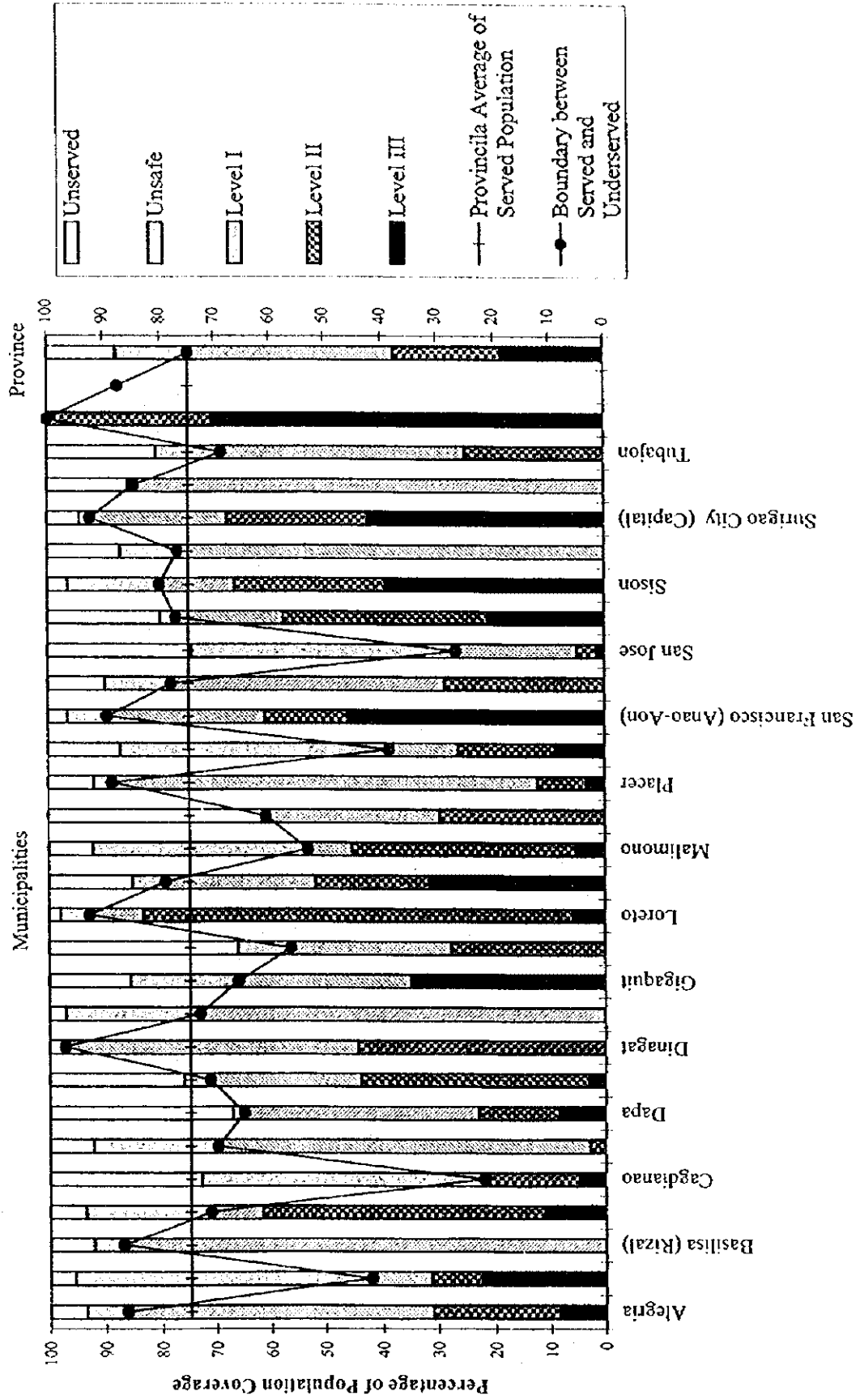
Name of Municipality	Area	Population (1997)	Population Coverage						Percentage of Population Coverage							
			Served by Safe Source			Underserved/Unserved			Served by Safe Source			Underserved/Unserved				
			Level III	Level II	Level I	Total	Unsafe Source	Unserved	Total	Level III	Level II	Level I	Total	Unsafe Source	Unserved	Total
Gigaquit	Urban	6,594	2,445		1,193	3,638	2,126	830	2,956	37		18	55	32	13	45
	Rural	9,317	3,100		3,744	6,844	1,015	1,458	2,473	33		40	73	11	16	27
	Total	15,911	5,545		4,937	10,482	3,141	2,288	5,429	35		31	66	20	14	34
Libjo (Albor)	Urban	3,094		835	835	379	1,880	2,259			27		27	12	61	73
	Rural	12,358		3,427	4,438	7,865	1,110	3,383	4,493			28		9	27	36
	Total	15,452		4,262	4,438	8,700	1,489	5,263	6,752			28		10	34	44
Loreto	Urban	5,662	499	3,773	780	5,052	432	178	610	9		67	14	8	3	11
	Rural	2,789		2,773	2,773	16		16			99		99	1		1
	Total	8,451	499	6,546	780	7,825	448	178	626	6		77	9	5	2	7
Mainit	Urban	10,125	1,698	3,373	3,274	8,345	597	1,183	1,780	17		33	32	6	12	18
	Rural	12,198	5,297	1,179	2,873	9,349	718	2,131	2,849	43		10	24	77	6	17
	Total	22,323	6,995	4,552	6,147	17,694	1,315	3,314	4,629	31		20	28	6	15	21
Malimono	Urban	6,777	735	120	855	5,517	405	5,922	11		2		13	81	6	87
	Rural	7,385		5,550	1,103	6,653	732	732			75	15	90		10	10
	Total	14,162	735	5,670	1,103	7,508	5,517	1,137	6,654	5		40	8	39	8	47
Pilar	Urban	2,289		1,886	1,886		403	403			82		82		18	18
	Rural	6,279		644	2,675	3,319	68	2,892	2,960			10	43	1	46	47
	Total	8,568		2,530	2,675	5,205	68	3,295	3,363			30	31	1	38	39
Placer	Urban	12,774		660	11,429	12,089		685	685			5	89	5	5	5
	Rural	8,906	735	1,286	5,098	7,119	695	1,091	1,787	8		14	57	8	12	20
	Total	21,680	735	1,946	16,528	19,209	695	1,776	2,471	3		9	76	3	8	11
San Benito	Urban	2,174	420	800	1,220	729	225	954	19		37		56	34	10	44
	Rural	2,460		570	570	1,519	371	1,890				23	23	62	15	77
	Total	4,634	420	800	1,790	2,248	596	2,844	9		17	12	39	49	13	61
San Francisco (Anao-Aon)	Urban	4,036	1,603	200	1,688	3,491	419	126	545	40		5	42	10	3	14
	Rural	6,303	3,138	1,364	1,251	5,753	313	237	550	50		22	20	5	4	9
	Total	10,339	4,741	1,564	2,939	9,244	732	363	1,095	46		15	28	7	4	11
San Isidro	Urban	1,800		1,720	1,720		80	80			96		96	4	4	4
	Rural	4,229		2,988	2,988	703	538	1,241				29	71	17	13	29
	Total	6,029		1,720	2,988	4,708	703	618	1,321			50	78	12	10	22

Table 4.1.7 Water Supply Service Coverage by Municipality

Name of Municipality	Area	Population (1997)	Population Coverage										Percentage of Population Coverage					
			Served by Safe Source			Underseved/Unseved			Served by Safe Source				Underseved/Unseved					
			Level III	Level II	Level I	Total	Unsafe Source	Unseved	Total	Level III	Level II	Level I	Total	Unsafe Source	Unseved	Total		
San Jose	Urban	16,011	386	802	3,553	4,741	8,783	2,487	11,270	2	5	22	30	55	16	70		
	Rural	11,574		180	2,386	2,566	4,391	4,617	9,008		2	21	22	38	40	78		
	Total	27,585	386	982	5,940	7,308	13,174	7,104	20,277	1	4	22	26	48	26	74		
Santa Monica (Sapao)	Urban	1,815	1,459	356		1,815				80	20		100					
	Rural	5,581	90	2,355	1,447	3,892	213	1,475	1,689	2	42	26	70	4	26	30		
	Total	7,396	1,549	2,711	1,447	5,707	213	1,475	1,689	21	37	20	77	3	20	23		
Sison	Urban	2,896	85	1,227	1,312	1,467	117	1,584	3	45	42	45	51	4	55			
	Rural	6,270	3,515	2,489	33	6,037	18	215	233	56	40	1	96	0	3	4		
	Total	9,166	3,600	2,489	1,260	7,349	1,485	332	1,817	39	27	14	80	16	4	20		
Socorro	Urban	7,775			6,845	6,845	197	733	930			88	88	3	9	12		
	Rural	3,069			5,325	5,325	1,429	1,315	2,744			66	66	18	16	34		
	Total	15,844			12,170	12,170	1,626	2,048	3,674			77	77	10	13	23		
Surigao City (Capital)	Urban	70,705	45,180	2,427	20,117	67,724	639	2,343	2,981	64	3	28	96	1	3	4		
	Rural	37,570	500	25,227	6,432	32,159	1,394	4,017	5,411	1	67	17	86	4	11	14		
	Total	108,275	45,680	27,654	26,549	99,883	2,033	6,360	8,392	42	26	25	92	2	6	8		
Tagana-An	Urban	5,676			4,893	4,893	137	646	783			86	86	2	11	14		
	Rural	6,867			5,718	5,718	1,149	1,149	1,149			83	83		17	17		
	Total	12,543			10,611	10,611	137	1,795	1,932			85	85	1	14	15		
Tubajon	Urban	1,910			708	708	773	429	1,202			37	37	40	22	63		
	Rural	4,485			885	2,798	3,683	802	802			62	82		18	18		
	Total	6,395			1,593	2,798	4,391	773	1,231	2,004			44	69	19	31		
Tubod	Urban	1,526	1,526			1,526				100		100						
	Rural	8,869	5,787	3,082		8,869				65	35		100					
	Total	10,395	7,313	3,082		10,395				70	30		100					
Provincial Total	Urban	217,939	61,726	26,118	74,105	161,949	37,816	18,174	55,990	28	12	34	74	17	8	26		
	Rural	238,079	23,006	61,181	94,955	179,142	20,950	37,987	58,937	10	26	40	75	9	16	25		
	Total	456,018	84,732	87,299	169,059	341,090	58,766	56,161	114,928	19	19	37	75	13	12	25		



Figure 4.1.1.1 Water Supply Coverage of the Province



Level II systems assume on the majority of service coverage in the rural area of Surigao City (67%); urban area of Del Carmen (95%); urban area of Dinagat (99%); urban area (67%) and rural area (99%) of Loreto; and urban area of San Isidro (96%). As a provincial total, 19% of the total population are served by Level II systems (12% of urban population and 26% of rural population).

Taking into account the municipal service coverage, Tubod is the highest at 100%. Dinagat is the 2nd highest at 97% (100% of urban population and 96% of rural population), followed by Loreto and Surigao City at 93% and 92%, respectively. While, San Jose is the lowest at 26%. The unserved population (26% or about 7,100 persons) is most likely caused by a considerable number of non-reported Level I facilities. Other municipalities having higher service coverage are: Alegria (86%), Placer (89%), and San Francisco (89%).

## **4.2 Sanitation and Sewerage**

### **4.2.1 General**

The national strategy for sanitation and sewerage is demand-oriented. It aims to stimulate sustainable improvements in sanitation service coverage, public health, and environmental pollution abatement. To achieve this goal, the Government has made investment choices based on demand and the extent to which choices contribute to efficiency and cost-effectiveness.

This sub-sector focuses on household toilets, school toilets and public toilets (public markets, bus/jeepney terminals and parks/playgrounds). The latest data from the PHO on household and public toilets as well as from DECS on school toilets were gathered by municipality. In case of household toilets, data were consolidated by urban and rural area. These facilities were classified into sanitary and unsanitary in terms of structure rather than the surrounding conditions.

The Code on Sanitation of the Philippines provides the minimum standards for services dealing with public health. Specifically, Chapter XVII on Sewage Collection and Disposal, Excreta Disposal and Drainage defines alternatives for on-site sanitation and sewage collection and disposal. At present, the development of sewerage systems, even in the urban centers of the province is not given priority because of the huge investment cost it entails.

In the NEDA Board Resolution No. 12 (series of 1995), definitions of approved types of sanitary toilets were outlined (refer to 4.1.2, Data Report). There were 4 approved types of sanitary toilets including the sanitary pit privy where water is not used but provided with

cover to minimize the emission of foul odor and also to keep away flies and rodents. These definitions were applied in this Master Plan.

#### **4.2.2 Types of Facilities and Definition of Service Level Standard**

As set forth in the above-mentioned Resolution, the types of household toilet facilities commonly used are categorized into: 1) sanitary toilets - approved types of toilet facilities include water-sealed pour flush or flush-type toilets either with receiving pit or septic tanks/vaults, and ventilated improved pit latrines and sanitary pit privy (dry type) considering its low construction cost especially in rural areas and in areas where water is scarce; and 2) unsanitary facilities - include the types of facilities used for receiving and disposing human waste which do not fall under the category of approved types of toilet facilities such as open pit privy and over-hung latrines (refer to Figure 4.2.1 DOH standard structure of a household toilet that meets the minimum requirements of a sanitary facility, Supporting Report).

In terms of service level, households are classified into: 1) served households - households with at least one (1) sanitary toilet; 2) underserved households - households with unsanitary toilets; and 3) unserved households - households without toilet. Coverage of adequately served households (with sanitary toilets) was estimated by urban and rural area of municipalities. The remaining households were considered as underserved or unserved. The service coverage was determined using the estimated number of households in 1997.

Service level standard for both elementary and secondary school toilets is translated in terms of: 1) served students - students who are adequately covered by the DECS standard ratio of one (1) unit per 40 students with access to sanitary toilets (number of sanitary toilet units multiplied by 40); and (2) underserved or unserved students - those with unsanitary and without toilet facilities, and students unserved (based on the standard ratio) even though they have access to sanitary toilets. Service coverage of adequately served students was estimated both for public and private schools by municipality. Figure 4.2.2, Supporting Report shows a standard structure of a school toilet facility adopted by the DOH through the JICA-DPWII and DOH Rural Environmental Sanitation Project.

For public toilets, the service level is classified into: 1) served - utilities that have at least one (1) sanitary toilet, and 2) underserved or unserved - utilities that have unsanitary or without toilet facilities. Service coverage of public utilities was estimated as a percentage of sanitary facilities to the total number of utilities.

### 4.2.3 Sanitation Facilities and Service Coverage

#### (1) Household Toilets

The service coverage of sanitary toilets in the province is 69% of the total number of households. The rest is underserved or unserved. Of this, a high 16% is without toilet facilities (refer to Table 4.2.1, Supporting Report and 4.2.3 Sanitation Facilities and Service Coverage, Data Report).

Municipalities that have higher or equal service coverage than the provincial average of 69% are Sison (87%), Tubod (80%), Claver and Socorro (79%), Bacuag, Burgos, Mainit, Placer and Tagana-an (78%), Dapa and Gigaquit (74%), San Francisco (71%) and Pilar (70%). On the other hand, the first 3 municipalities that registered the lowest service coverage are Santa Monica (56%), Del Carmen and San Benito (62%) and Cagdianao and Libjo (63%). It was observed that in municipalities that have high water supply service coverage (Tubod, Placer), higher sanitation coverage occurs and correspondingly, in low water supply service coverage (San Benito, Cagdianao), lower sanitation coverage also occurs. This can be attributed by the fact that the development of water supply almost always follows the upgrading of the household sanitation facilities because of access to water.

In urban areas, approximately 70% of the total households are served. Served households of 69% exist in rural area. Table 4.2.1 shows the municipal breakdown in the number of urban and rural household toilets by category, and service coverage. Figure 4.2.1 reflects the provincial service coverage of household toilet facilities for urban and rural areas.

Figure 4.2.1 Provincial Service Coverage of Household Toilet Facilities, 1997

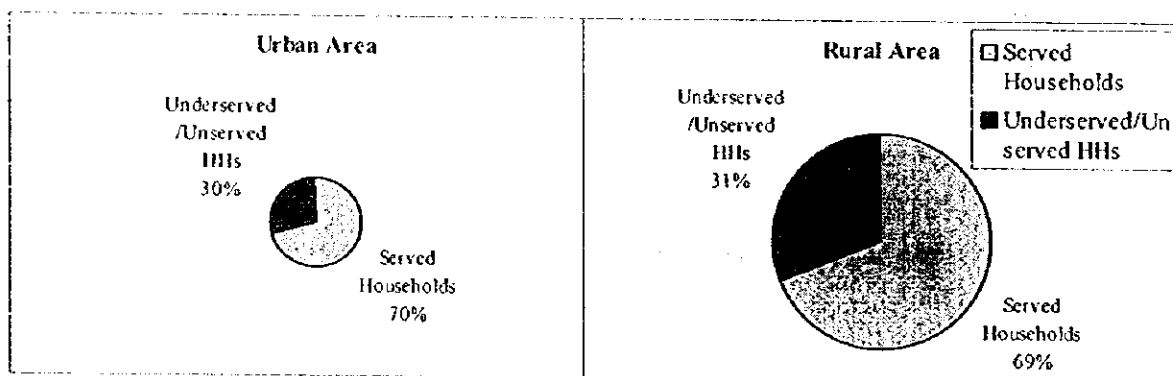


Table 4.2.1 Sanitation Facilities and Service Coverage of Household Toilets, Urban and Rural, 1997

Name of Municipality	Households, 1997		Household Toilets Facilities and Service Coverage														
	Urban	Rural	Total	Urban						Rural						Municipal Total	
				HHs Served by Sanitary Toilets		Underserved HHs		HHs Served by Sanitary Toilets		Underserved HHs		HHs Served by Sanitary Toilets		Underserved HHs		HHs Served by Sanitary Toilets	Underserved HHs
				Number	% of HHs	Number	% of HHs	Number	% of HHs	Number	% of HHs	Number	% of HHs	Number	% of HHs		
Alegria	892	1,267	2,159	690	77	202	23	775	61	492	39	1,465	68	694	32		
Bacuaug	1,502	723	2,225	1,200	80	302	20	527	73	196	27	1,727	78	498	22		
Basilisa (Rizal)	568	4,079	4,647	328	58	240	42	2,811	69	1,268	31	3,139	68	1,508	32		
Burgos	458	124	582	371	81	87	19	85	69	39	31	456	78	126	22		
Cagdianao	1,060	1,215	2,275	531	50	529	50	905	74	310	26	1,436	63	839	37		
Claver	1,524	1,418	2,942	1,371	90	153	10	963	68	455	32	2,334	79	608	21		
Dapa	2,400	952	3,352	1,829	76	571	24	654	69	298	31	2,483	74	869	26		
Del Carmen	671	1,783	2,454	646	96	25	4	367	49	916	51	1,513	62	941	38		
Dinagat	523	1,206	1,729	355	68	168	32	779	65	427	35	1,134	66	595	34		
General Luna	919	1,556	2,475	619	67	300	33	1,062	68	494	32	1,681	68	794	32		
Gigaquit	1,217	1,706	2,923	865	71	352	29	1,288	75	418	25	2,153	74	770	26		
Libjo (Albor)	602	2,319	2,921	578	96	24	4	1,259	54	1,060	46	1,837	63	1,084	37		
Loreto	1,202	568	1,770	959	80	243	20	222	39	346	61	1,181	67	589	33		
Mainit	1,940	2,255	4,195	1,415	73	525	27	1,854	82	401	18	3,269	78	926	22		
Mahimono	1,337	1,409	2,746	752	56	585	44	1,137	81	272	19	1,889	69	857	31		
Pilar	441	1,113	1,554	389	88	52	12	705	63	408	37	1,094	70	460	30		
Placer	2,366	1,803	4,169	2,072	88	294	12	1,175	65	628	35	3,247	78	922	22		
San Benito	388	465	853	373	96	15	4	158	34	307	66	531	62	322	38		
San Francisco (Anao-Aon)	827	1,210	2,037	552	67	275	33	888	73	322	27	1,440	71	597	29		
San Isidro	314	735	1,049	301	96	13	4	373	51	362	49	674	64	375	36		
San Jose	2,895	1,955	4,850	1,966	68	929	32	1,178	60	777	40	3,144	65	1,706	35		
Santa Monica (Sapao)	341	966	1,307	175	51	166	49	556	58	410	42	731	56	576	44		
Sison	562	1,146	1,708	540	96	22	4	946	83	200	17	1,486	87	222	13		
Surigao	1,359	1,368	2,727	1,301	96	58	4	862	63	506	37	2,163	79	564	21		
Surigao City (Capital)	13,571	7,309	20,880	7,538	56	6,033	44	5,845	80	1,464	20	13,383	64	7,497	36		
Tagana-An	1,106	1,313	2,419	938	85	168	15	942	72	371	28	1,880	78	539	22		
Tubajon	398	871	1,269	398	100			422	48	449	52	820	65	449	35		
Tubod	295	1,742	2,037	287	97	8	3	1,337	77	405	23	1,624	80	413	20		
Provincial Total	41,678	44,576	86,254	29,339	70	12,339	30	30,575	69	14,001	31	59,914	69	26,340	31		

Even if high percentages of sanitary toilets are revealed in the urban areas, problems arise from the unsatisfactory disposal of the effluent from the septic tanks or the direct discharge of wastewater to the local drains. Generally, there is little concern about the unsatisfactory disposal of wastes once it is outside their dwelling units. Practically, almost all the households dispose their wastes in the manner that poses risks to public health. Sullage waste management is unheard of.

## (2) School and Public Toilets

Toilet facilities in elementary and secondary schools for both public and private schools were investigated. The province has a total of 2,037 toilet units found in 489 schools. Sanitary toilets adequately serve only 60% of the students. The rest, 40% is underserved or unserved. Table 4.2.2 provides the number and service coverage of school toilet facilities.

The number of sanitary school toilets is very low to meet the service level standard of 40 students per sanitary facility. At present, the average ratio is 80 students per sanitary toilet, almost double the standard level. A number of school toilets constructed under FW4SP are not being used due to lack of water supply, destroyed plumbing fixtures and water tank seepage. In some areas, this problem is compounded when access to the sanitary facility is limited to only the teachers and guests.

DECS is currently promoting the practice of having one toilet within the classroom. This practice should be thoroughly reviewed with respect to maintaining sanitary condition, provision of water faucet/supply in every toilet/unit, proper design of depository to avoid groundwater pollution, and provision of regular sludge collection and disposal.

There are 78 public markets, bus/jeepney terminals and parks/playgrounds in the province. All these public utilities have sanitary public toilets resulting to 100% service coverage. Table 4.2.3 shows the number and service coverage of public utilities.

Public toilets at markets, bus/jeepney terminals and parks/playgrounds, although culturally acceptable, are improperly used and maintained resulting to unsanitary conditions. In most cases, no specific arrangements are made for the operation and maintenance and for the collection of fees to cover such costs. Although considered as sanitary because of the structure, most of the facilities have unsanitary conditions due to inadequate/lack of water supply and destroyed appurtenances because of vandalism.

Table 4.2.2 School Toilet Service Coverage by Municipality

Name of Municipality	Number of School	Total No. of Student	Number of Toilets		Service Coverage				
			Sanitary	Unsanitary	Served	%	Unserved	%	
Alegria	Public	10	3,189	26	1,040	33	2,149	67	
	Private	1	185				185	100	
	Total	11	3,374	26	1,040	31	2,334	69	
Bacup	Public	14	2,138	77					
	Private	1	421				421	100	
	Total	15	2,559	77	2,138	84	421	16	
Basilisa (Rizal)	Public	27	4,460	75	3,000	67	1,460	33	
	Private								
	Total	27	4,460	75	3,000	67	1,460	33	
Burgos	Public	9	1,506	6	240	16	1,266	84	
	Private								
	Total	9	1,506	6	240	16	1,266	84	
Cagdianno	Public	19	2,928	71	2,840	97	88	3	
	Private								
	Total	19	2,928	71	2,840	97	88	3	
Claver	Public	15	3,760	90	3,600	96	160	4	
	Private		294				294	100	
	Total	15	4,054	90	3,600	89	454	11	
Dapa	Public	23	5,631	12	480	9	5,151	91	
	Private	2							
	Total	25	5,631	12	480	9	5,151	91	
Del Carmen	Public	27	2,156	54	2,156	100			
	Private								
	Total	27	2,156	54	2,156	100			
Dinagat	Public	11	3,152	22	880	28	2,272	72	
	Private		421				421	100	
	Total	11	3,573	22	880	25	2,693	75	
General Luna	Public	16	3,156	43	1,920	61	1,236	39	
	Private								
	Total	16	3,156	43	1,920	61	1,236	39	
Gigaquit	Public	11	3,009	88	3,009	100			
	Private	1	224				224	100	
	Total	12	3,233	88	3,009	93	224	7	
Libjo (Albor)	Public	16	3,535	13	520	15	3,015	85	
	Private								
	Total	16	3,535	13	520	15	3,015	85	
Loreto	Public	10	1,458	40	1,458	100			
	Private	1	205				205	100	
	Total	11	1,663	40	1,458	88	205	12	
Mainit	Public	21	5,690	76	3,040	53	2,650	47	
	Private	1	650				650	100	
	Total	22	6,340	76	3,040	48	3,300	52	
Malimono	Public	19	3,932	42	1,680	43	2,252	57	
	Private								
	Total	19	3,932	42	1,680	43	2,252	57	
Pilar	Public	12	1,578	24	560	61	618	39	
	Private								
	Total	12	1,578	24	560	61	618	39	
Placer	Public	20	4,919	220	4,919	100			
	Private	1	231				231	100	
	Total	21	5,150	220	4,919	96	231	4	
San Benito	Public	14	2,301	40	1,600	70	701	30	
	Private								
	Total	14	2,301	40	1,600	70	701	30	
San Francisco (Ana-aon)	Public	14	2,524	75	2,524	100			
	Private	1	195				195	100	
	Total	15	2,719	75	2,524	93	195	7	
San Isidro	Public	12	1,578	91	1,578	100			
	Private								
	Total	12	1,578	91	1,578	100			
San Jose	Public	13		93					
	Private	1							
	Total	14		93					
Santa Monica (Sapa)	Public	8	1,365	16	640	47	725	53	
	Private								
	Total	8	1,365	16	640	47	725	53	
Sison	Public	13	2,320	46	1,840	79	480	21	
	Private								
	Total	13	2,320	46	1,840	79	480	21	
Secoro	Public	16	3,886	66	2,640	68	1,246	32	
	Private								
	Total	16	3,886	66	2,640	68	1,246	32	
Surigao City (Capital)	Public	71	32,028	518	20,320	65	11,708	35	
	Private	4	4,200	18	720	17	3,480	83	
	Total	75	36,228	536	21,040	59	14,788	41	
Tagana-An	Public	13	2,775	26	1,040	37	1,735	63	
	Private								
	Total	13	2,775	26	1,040	37	1,735	63	
Tubajan	Public	12	1,869	33	1,320	71	549	29	
	Private								
	Total	12	1,869	33	1,320	71	549	29	
Tubod	Public	8	2,400	24	960	40	1,440	60	
	Private	1							
	Total	9	2,400	24	960	40	1,440	60	
Provincial Total	Public	474	109,243	2,072	5	68,742	63	40,501	37
	Private	15	7,026	18	2	720	10	6,306	90
	Total	489	116,269	2,090	7	69,462	60	46,807	40

Table 4.2.3 Public Toilets Facilities and Service Coverage in 1997

Name of Municipality	Number of Sanitary Toilets			Number of Unsanitary Toilets			Total Number of PU Toilets	Served		Underserved	
	Public Markets	Bus/Jeepney Terminals	Parks/Playground	Public Markets	Bus/Jeepney Terminals	Parks/Playground		Number of Sanitary Toilets	%	Number of Unsanitary Toilets	%
Alegria	1						1	1	100		
Bacuag	2						2	2	100		
Basilisa (Rizal)	1						1	1	100		
Burgos	1		2				3	3	100		
Cagdianao	1						1	1	100		
Claver	1	1	1				3	3	100		
Dapa	2	2	1				5	5	100		
Del Carmen	1						1	1	100		
Dinagat	1		4				5	5	100		
General Luna											
Gigauit	1		3				4	4	100		
Libjo (Albor)			5				5	5	100		
Loreto	1		2				3	3	100		
Mainit	1	3					4	4	100		
Malimono	1	1	6				8	8	100		
Pilar	1		1				2	2	100		
Placer	1	2					3	3	100		
San Benito	1	1	1				3	3	100		
San Francisco (Anao-Aon)	1						1	1	100		
San Isidro	1						1	1	100		
San Jose	2		2				4	4	100		
Santa Monica (Sapao)	1						1	1	100		
Sison	1						1	1	100		
Socorro	2		1				3	3	100		
Surigao City (Capital)	6	2	2				10	10	100		
Tagana-An	1						1	1	100		
Tubajon	1						1	1	100		
Tubod	1						1	1	100		
<b>Provincial Total</b>	<b>35</b>	<b>12</b>	<b>31</b>				<b>78</b>	<b>78</b>	<b>100</b>		



#### 4.2.4 Sewerage Facilities

There are no existing sewerage facilities in the province. Most of the wastewater from the dwelling units with acceptable facilities finds its way to open drains and eventually to water-courses. These deficiencies are the major contributing factors to the poor condition of the water environment in some areas of the province.

