

### 2.2.2 Sea Bed Materials

Following parameters of seabed material were analyzed. The samples were collected at same station of the water quality survey. (See Fig. 2.2.1-1 - Fig. 2.2.1-4).

- |                             |  |
|-----------------------------|--|
| 1) pH                       | 2) Ignition loss                           |
| 3) Dissolved Oxygen,        | 4) BOD,                                    |
| 5) COD                      | 6) Surface Active Agent with Methylenblue, |
| 7) Oil and Grease (Content) | 8) Phenols,                                |
| 9) Fecal Coliform,          | 10) Copper,                                |
| 11) Arsenic                 | 12) Cadmiums,                              |
| 13) Hexavalent Chromium,    | 14) Cyanide,                               |
| 15) Lead                    | 16) Total Mercury,                         |
| 17) Organic Phosphorous     | 18) Total P                                |
| 19) Total N                 | 20) Sulphide                               |

The results of the seabed quality survey are shown in Tables 2.2.2-1 - Table 2.2.1-4.

**pH:** pH values of sediment leachates registered values higher than 8. The sediment is slightly alkaline in nature.

**BOD, COD:** Sediment leachates registered relatively low levels of BOD and COD.

**Coliform:** Generally, leachates of all sediment samples registered very high concentration of total and fecal coliform levels.

**Table 2.2.2-1 Results of the Sea Bed (Bottom Sediment) Quality Survey at the Existing Cebu Base Port Area**

Parameters	Sampling Station					
	1	2	3	4	5	
Coordinates	10°17'45N 123°54'5E	10°17'8N 123°54'8E	10°18'25N 123°54'2E	10°17'95N 123°54'1E	10°17'6N 123°54'1E	
Sampling Date & Time	02 June 2001 10:54 am	02 June 2001 11:14 am	02 June 2001 11:35 am	02 June 2001 10:24 am	02 June 2001 11:09 am	
Climate	Sunny, clear day	Sunny, clear day	Sunny, clear day	Sunny, clear day	Sunny, clear day	
Sediment Appearance (depth)	Muddy mixed with plastics (12 m)	Muddy (11 m)	Muddy (13 m)	Muddy (10 m)	Sandy with shell fragments (15 m)	
Color (visual)	Grayish black	Charcoal gray	Charcoal gray	Charcoal gray	Charcoal gray	
Odor	Marshy	Marshy	Marshy	Marshy	Marshy	
Sieve Analysis:	Particle Size, Mesh:					
	<10 (% w/w)	7.86	13.94	54.04	56.67	21.93
	10/20 (% w/w)	34.14	37.02	26.54	24.8	16.61
	20/45 (% w/w)	22.84	15.84	9.28	8.47	28.84
	45/100 (% w/w)	19.39	15.34	5.64	4.06	26.99
	100/200 (% w/w)	9.75	10.23	2.07	2.34	3.77
	>200 (% w/w)	6.02	7.63	2.43	3.66	1.86
PH @25.0 °C	8.56	8.75	8.62	8.59	8.86	
Ignition loss						
Biochemical Oxygen Demand (BOD), mg/L	17.1	16.2	13.5	12.6	8.6	
Chemical Oxygen Demand (COD), mg/L	41.3	32.2	32.2	27.2	18.1	
Surfactants or Surface Active Agent with Methylene Blue, mg/L						
Oil and Grease, mg/L						
Phenols, mg/L	0.01	0.08	0.01		0.04	
Total Coliform, MPN/g	24,000,000	8,000,000	24,000,000	1,400,000	8,000,000	
Fecal Coliform, MPN/g	22,000,000	3,400,000	2,300,000	1,400,000	3,500,000	
Copper, mg/L		49.5	42.7	44.47	24.4	
Arsenic, mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
Cadmium, mg/L	<0.1	<0.1		<0.1	<0.1	
Hexavalent Chromium, mg/L						
Cyanide, mg/L	0.03	0.02	0.04	0.02	0.04	
Lead, mg/L	32.8	21.3	17.8	19.6	12.7	
Total Mercury, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Organic Phosphorus, mg/L						
Total PO <sub>4</sub> , mg/L	0.30	0.48	0.15	0.10	0.07	
Total N, mg/L						
Sulfates, mg/L						

**Table 2.2.2-2 Results of the Sea Bed (Bottom Sediment) Quality Survey at the New Cebu Port Area**

Parameters	Sampling Station					
	1	2	3	4	5	
Coordinates	10°21'17N 124°00'02E	10°21'03N 124°59'47E	10°20'54N 123°59'05E	10°21'18N 123°59'33E	10°21'38N 123°59'46E	
Sampling Date & Time	03 June 2001 9:15 am	03 June 2001 9:23 am	03 June 2001 9:32 am	03 June 2001 9:40 am	03 June 2001 9:51 am	
Climate	Sunny, clear day, high tide	Sunny, clear day, high tide	Sunny, clear day, high tide	Sunny, clear day, high tide	Sunny, clear day, high tide	
Sediment Appearance (depth)	Muddy (10 m)	Silty clay (12 m)	Silty clay (7 m)	Sandy with shell fragments (1 m)	Sandy with shell fragments (1.5 m)	
Color (visual)	Charcoal gray	Charcoal black	Charcoal black	Gray	Gray	
Odor	Marshy	Marshy	Marshy	Marshy	Marshy	
Sieve Analysis:	Particle Size, Mesh:					
	<10 (% w/w)	50.1	47.41	43.51	12.77	10.32
	10/20 (% w/w)	24.28	26.99	29.53	25.02	21.38
	20/45 (% w/w)	10.84	11.46	12.67	31.74	30.23
	45/100 (% w/w)	6.37	7.11	7.53	22.6	24.65
	100/200 (% w/w)	2.72	3.11	3.41	5.82	5.05
	>200 (% w/w)	5.69	3.92	3.35	2.05	8.37
pH	8.59	8.62	8.50	8.38	8.54	
Ignition loss						
Biochemical Oxygen Demand (BOD), mg/L	18.9	18.2	21.0	13.5	9.8	
Chemical Oxygen Demand (COD), mg/L	33.2	41.3	40.3	30.2	21.2	
Surfactants or Surface Active Agent with Methylene Blue, mg/L						
Oil and Grease, mg/L						
Phenols, mg/L	<0.01					
Total Coliform, MPN/g	5,000,000	11,000,000	22,000,000	5,000,000	14,000,000	
Fecal Coliform, MPN/g	2,600,000	11,000,000	22,000,000	70,000	7,000,000	
Copper, mg/L	32.5	39.7	41.6	7.7	8.2	
Arsenic, mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
Cadmium, mg/L	<0.1	<0.01	<0.1	<0.1	<0.1	
Hexavalent Chromium, mg/L						
Cyanide, mg/L	0.02	0.04	0.04	0.04	0.01	
Lead, mg/L	7.4	12.0	14.4	17.4	19.1	
Total Mercury, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Organic Phosphorus, mg/L						
Total PO <sub>4</sub> , mg/L	0.06	0.04	0.17	0.15	0.09	
Total N, mg/L						
Sulfates, mg/L						

**Table 2.2.2-3 Results of the Sea Bed (Bottom Sediment) Quality Survey at the Toledo Port Area**

Parameters	Sampling Station				
	1	2	3	4	5
Coordinates	10°22'30N 123°37'36E	10°22'58N 123°37'54E	10°23'39N 123°38'21E	10°23'45N 123°37'33E	10°23'01N 123°38'08E
Sampling Date & Time	05 June 2001 8:51 am	05 June 2001 9:06 am	05 June 2001 9:15 am	05 June 2001 9:32 am	05 June 2001 9:24 am
Climate	Cloudy, rainy day	Cloudy, rainy day	Cloudy, rainy day	Cloudy, rainy day	Cloudy, rainy day
Sediment Appearance (depth)	Muddy clay (3 m)	Muddy clay (2 m)	Muddy clay (17 m)	Sandy, silty (2 m)	Muddy clay (24 m)
Color (visual)	Charcoal black	Charcoal black	Charcoal black	Dark gray	Brownish
Odor	Marshy	Marshy	Marshy	Marshy	Marshy
Sieve Analysis: Particle Size, Mesh:					
<10 (% w/w)	0.11	0.41	0.47	0.42	0.06
10/20 (% w/w)	0.43	0.09	0.01	0.15	0.02
20/45 (% w/w)	9.39	1.52	24.03	2.31	18.78
45/100 (% w/w)	58.05	28.96	33.15	22.34	32.42
100/200 (% w/w)	28.76	50.06	23.05	55.03	29.56
>200 (% w/w)	3.26	18.96	19.29	19.75	19.16
pH	8.20	8.23	8.26	8.23	8.21
Ignition loss					
Biochemical Oxygen Demand (BOD), mg/L	18.6	5.7	10.2	5.8	14.7
Chemical Oxygen Demand (COD), mg/L	40.7				
Surfactants or Surface Active Agent with Methylene Blue, mg/L					
Oil and Grease, mg/L					
Phenols, mg/L					
Total Coliform, MPN/g	170,000	9,000,000	17,000,000	1,400,000	1,700,000
Fecal Coliform, MPN/g	170,000	3,300,000	3,400,000	1,100,000	1,700,000
Copper, mg/L	112	137	530	266	599
Arsenic, mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium, mg/L	0.35	0.13	0.30	0.43	0.30
Hexavalent Chromium, mg/L					
Cyanide, mg/L	0.04	0.05	0.05	0.05	
Lead, mg/L	11.3	10.6	10.3	8.0	12.2
Total Mercury, mg/L					
Organic Phosphorus, mg/L					
Total PO <sub>4</sub> , mg/L	0.07	<0.01	<0.01	0.07	0.02
Total N, mg/L					
Sulfides, mg/L					

**Table 2.2.2-4 Results of the Sea Bed (Bottom Sediment) Quality Survey at San Remigio Area**

Parameters	Sampling Station				
	1	2	3	4	5
Coordinates	11°04'58N 123°55'38E	11°05'24N 123°55'33E	11°06'16N 123°55'20E	11°06'29N 123°56'48E	11°06'02N 123°56'16E
Sampling Date & Time	04 June 2001 8:48 am	04 June 2001 9:07 am	04 June 2001 9:25 am	04 June 2001 9:37 am	04 June 2001 9:48 am
Climate	Sunny, clear day	Sunny, clear day	Sunny, clear day	Sunny, clear day	Sunny, clear day
Sediment Appearance (depth)	Sandy (1.5 m)	Sandy (5 m)	Sandy (4 m)	Sandy (4 m)	Sandy, silty (5 m)
Color (visual)	Charcoal gray	Charcoal black	White gray	Charcoal gray	Charcoal gray
Odor	Marshy	Marshy	Marshy	Marshy	Marshy
Sieve Analysis: Particle Size, Mesh:					
<10 (% w/w)	31.86	8.05	15.27	10.34	13.54
10/20 (% w/w)	19.26	60.85	41.6	22.14	18.59
20/45 (% w/w)	15.39	27.53	32.12	39.72	27.16
45/100 (% w/w)	24.5	2.79	9.84	26.18	24.62
100/200 (% w/w)	8.29	0.33	0.98	1.08	11.79
>200 (% w/w)	0.7	0.45	0.19	0.54	4.3
pH	8.51	8.51	8.49	8.58	8.70
Ignition loss					
Biochemical Oxygen Demand (BOD), mg/L	12.0	19.8	4.8	2.6	10.0
Chemical Oxygen Demand (COD), mg/L	23.4	44.7	9.2	4.1	20.3
Surfactants or Surface Active Agent with Methylene Blue, mg/L					
Oil and Grease, mg/L					
Phenols, mg/L					
Total Coliform, MPN/g	2,400,000	1,400,000	24,000,000	1,700,000	11,000,000
Fecal Coliform, MPN/g	340,000	700,000	11,000,000	1,700,000	3,500,000
Copper, mg/L	2.8	2.0	2.1	1.4	1.4
Arsenic, mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium, mg/L	3.3	3.2	3.2	3.0	3.0
Hexavalent Chromium, mg/L					
Cyanide, mg/L	0.06	0.05	0.04		0.04
Lead, mg/L	24.4	27.3	31.0	27.8	27.8
Total Mercury, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Organic Phosphorus, mg/L					
Total PO <sub>4</sub> , mg/L	0.03	0.03	0.20	0.49	0.02
Total N, mg/L					
Sulfates, mg/L					

**Copper:** Seabed sediment from Cebu Base Port area registered high levels of copper concentration. However, all samples registered lower levels. Samples 4 and 5 from New Cebu Port area registered lower copper levels. For sediment samples taken from San Remigio area, all sediment samples registered very low copper levels. However, the sediment samples from Toledo Port area registered higher concentration values.

**Arsenic:** All sediment samples registered arsenic contents lower.

**Lead:** All sediment samples registered lower concentrations than PEL.

**Mercury:** With respect to mercury levels, all sediment samples registered low.

### 2.2.3 Terrestrial and Marine Flora and Fauna

#### (1) Terrestrial flora

A survey of terrestrial and marine flora and fauna along the coastline of the existing Cebu Base Port, New Cebu Port area, San Remigio and Toledo City Port were done on June 1 - 6, 2001 (Fig. 2.2.1-1 - Fig. 2.2.1-4 in above section shows the Fauna and Flora survey area.) This activity was conducted to determine the characteristic floristic composition of the study area. Based on actual identification of plant stands in the study area, common species of plants were identified. The terrestrial vegetation within the existing Cebu Port is presented in Table 2.2.3-1. Table 2.2.3-2 shows the vegetation identified in New Cebu Port while Table 2.2.3-3 presents the vegetation studied in San Remigio. Table 2.2.3-4 shows the vegetation identified in Toledo City Port.

**Table 2.2.3-1 Terrestrial Vegetation in the Existing Cebu Port Study Area**

Scientific Name	Common Name	Economic Utilization/Ecological Importance
Non-dipterocarps		
<i>Cocos nucifera</i>	Coconut	Fruit is edible; different parts of the tree has variety of uses; young leaves serve as food for insects
<i>Bougainvella spectabilis</i>	Boganvilla	Ornamental plant
<i>Leucaena leucoccephala</i>	Ipil-ipil	Wood is a good source of firewood and charcoal; bark produces brown dye; leaves can be used as animal feed; seeds used as substitute for coffee; leaves serve as insect food
<i>Acacia mangium</i>	Yellow acacia	Wood used for light construction; source of pulp
<i>Carica papaya</i>	Papaya	Fruit is edible; fruit skin is source of papain ; ripened fruit serve as food for insects and birds
Grasses		
<i>Imperata cylindrica</i>	Kogon	Dried leaves are used as roof thatches; due to height, used by birds as nesting grounds

**Table 2.2.3-2 Terrestrial Vegetation in the New Cebu Port Study Area.**

Scientific Name	Common Name	Economic Utilization/Ecological Importance
<b>A. Non-dipterocarps</b>		
<i>Leucaena leucocephala</i>	Ipil-ipil	Wood is a good source of firewood and charcoal; bark produces brown dye; leaves can be used as animal feed; seeds used as substitute for coffee; leaves serve as insect food
<i>Cocos nucifera</i>	Coconut	Fruit is edible; different parts of the tree has variety of uses; young leaves serve as food for insects
<i>Terminalia catappa</i>	Umbrella Tree	Wood is used for light construction; seeds are edible; bark produces brown dye; ornamental tree
<i>Bougainvella spectabilis</i>	Boganvilla	Ornamental plant
<i>Pithecellobium dulce</i>	Karnachile	Fruit is edible; wood used for light construction/firewood
<i>Tamarindus indica</i>	Tamarind	Young leaves, flowers and pods are used for seasoning food; fruit used in the manufacture of jams, sweets and drinks; bark is source of ink; seed is source of oil/ varnish; street ornamental plant; young leaves and ripened fruit serve as food for birds and insects
<i>Gmelina arborea</i>	Gmelina	Wood is used for light construction; reforestation tree species; temporary shelter for birds and insects; reforestation species; source of pulp/paper
<i>Acacia mangium</i>	Yellow acacia	Wood used for light construction; source of pulp
<i>Artocarpus heterophyllus</i>	Langka	Fruit is edible; wood used for light construction; edible fruit serves as food for insects
<b>B. Bamboo</b>		
<i>Bambusa arundinacea</i>	Bamboo	Young shoots are edible; wood used for light construction/fence
<b>C. Grasses</b>		
<i>Imperata cylindrica</i>	Kogon	Dried leaves are used as roof thatches; due to height, used by birds as nesting grounds
<i>Brachiaria reptans</i>	Marakauayan	Fodder stock for animals

**Table 2.2.3-3 Terrestrial Vegetation in the San Remigio Study Area**

Scientific Name	Common Name	Economic Utilization/Ecological Importance
<b>A. Non-dipterocarps</b>		
<i>Bougainvella spectabilis</i>	Boganvilla	Ornamental plant
<i>Cocos nucifera</i>	Coconut	Fruit is edible; different parts of the tree has variety of uses; young leaves serve as food for insects
<i>Leucaena leucocephala</i>	Ipil-ipil	Wood is a good source of firewood and charcoal; bark produces brown dye; leaves can be used as animal feed; seeds used as substitute for coffee; leaves serve as insect food
<i>Musa sapientum</i>	Banana	Fruit is used as food; the inner core, trunk and flowers are used as food/vegetable; edible fruit serves as food for birds and insects
<i>Tamarindus indica</i>	Tamarind	Young leaves, flowers and pods are used for seasoning food; fruit used in the manufacture of jams, sweets and drinks; bark is source of ink; seed is source of oil/ varnish; street ornamental plant; young leaves and ripened fruit serve as food for birds and insects
<i>Gmelina arborea</i>	Gmelina	Wood is used for light construction; reforestation tree species; temporary shelter for birds and insects
<i>Acacia mangium</i>	Yellow acacia	Wood used for light construction; source of pulp
<i>Terminalia catappa</i>	Talisay	Wood is used for light construction; seeds edible; bark produces brown dye; ornamental tree/under cultivation
<i>Carica papaya</i>	Papaya	Fruit is edible; fruit skin is source of papain ; ripened fruit serve as food for insects and birds
<b>B. Bamboo</b>		
<i>Bambusa arundinacea</i>	Bamboo	Young shoots are edible; wood used for light construction/fence
<b>C. Grasses</b>		
<i>Imperata cylindrica</i>	Kogon	Dried leaves are used as roof thatches; due to height, used by birds as nesting grounds
<i>Brachiaria reptans</i>	Marakauayan	Fodder stock for animals

**Table 2.2.3-4 Terrestrial Vegetation in the Toledo City Port Study Area**

Scientific Name	Common Name	Economic Utilization/Ecological Importance
<b>A. Non-dipterocarps</b>		
<i>Cocos nucifera</i>	Coconut	Fruit is edible; different parts of the tree has variety of uses; young leaves serve as food for insects
<i>Acacia mangium</i>	Yellow acacia	Wood used for light construction; source of pulp
<i>Artocarpus blancoi</i>	Antipolo	Wood used for light construction

## (2) Coastal Zone Vegetation

The marine ecosystem of the proposed project area is characterized by muddy/silty substrate at the shoreline and sandy at seaward portion. The mangal community along the shoreline provides the characteristic features of the substrate in the study area. This type of vegetation depends on many factors among which are water inundation, nutrients and soil type. The minimal water motion along the mangal community of the New Cebu Port area is attributed to the prop roots forming a dense root system that decreases water movement. This slow water motion allows the settlement and accumulation of fine sediments on the bottom, which leads to the accumulation of mud/silt with high bacterial count, low oxygen, high salt and high organic content. Moving along the shoreline by foot, through the mangal stands is rather difficult due to thick mud/silt about 1 foot deep.

Tides also determine the association and zonation of mangroves in the study area. The seaward section is dominated by *Avicennia* sp., while landward, the *Sonneratia* sp. are abundant. The extensive prop root system of *Sonneratia* sp. acts to reduce tidal currents causing the extensive deposition of mud and silt, and provide surfaces for attachment of marine organisms.

A survey of mangal stands along the shoreline of New Cebu Port Study area was conducted on 3 June 2001. Only two identified species of mangroves were noted. These are presented in Table 2.2.3-5.

**Table 2.2.3-5 Results of Mangal Survey in New Cebu Port Study Area**

Scientific Name	Common Name	Economic Utilization/Ecological Importance
A. Mangroves		
<i>Sonneratia alba</i>	Firefly mangrove, Pedada	Flowers serve as source of food for insects; leaves and branches serve as temporary shelter for marine birds and insects; fish nursery ground
<i>Avicennia marina</i>	Bungalon, Piapi	Flowers serve as food for insects; leaves and branches serve as temporary shelter for marine birds and insects; prop roots serve as protection for juvenile fishes against currents

The density of mangal species were also determined by placing a transect line parallel to the shore and 10 quadrates of size 10m<sup>2</sup> were set at right angles from the transect line. Trees inside the quadrates were identified to species level and diameter at breast height (in centimeter) were measured. Of the ten quadrates considered for the mangal survey, an average of 12 mangrove trees were noted in Table 2.2.3-6. However, of the total number studied in the ten quadrates, more can be found in the study area. Approximately 1200 mangrove trees are scattered at the littoral zone and along the coastlines of the New Cebu Port study area. Most of the trees studied were of mature stage with average diameter at breast height measuring from 15 cm to 29 cm. It was also noted that most of the branches of the

mangrove trees are cut partially indicating utilization as fuelwood. Mangrove trees are highly utilized as firewood because of high heating capacity.

**Table 2.2.3-6 Mangal Density at New Cebu Port Study Area**

Quadrat (10m <sup>2</sup> )	Species	Number	Average dbh <sup>+</sup>
1	<i>Avicennia marina</i>	4	20
	<i>Sonneratia alba</i>	5	16
2	<i>Avicennia marina</i>	3	18
	<i>Sonneratia alba</i>	7	27
3	<i>Avicennia marina</i>	5	24
	<i>Sonneratia alba</i>	9	17
4	<i>Avicennia marina</i>	9	18
	<i>Sonneratia alba</i>	8	22
5	<i>Avicennia marina</i>	8	22
	<i>Sonneratia alba</i>	10	17
6	<i>Avicennia marina</i>	7	22
	<i>Sonneratia alba</i>	8	15
7	<i>Avicennia marina</i>	9	15
	<i>Sonneratia alba</i>	7	29
8	<i>Avicennia marina</i>	9	26
	<i>Sonneratia alba</i>	3	21
9	<i>Avicennia marina</i>	11	15
	<i>Sonneratia alba</i>	9	24
10	<i>Avicennia marina</i>	5	23
	<i>Sonneratia alba</i>	10	22
	<i>Total</i>	146	

\*diameter at breast height (cm)

### (3) Seabed Soft Benthos and Macrofauna Survey

A survey of seabed characteristic at Consolacion area was conducted on June 3, 2001. The results are presented in Table 2.2.3-7.



**Table 2.2.3-7 Results of Soft Benthos and Macrobenthic Survey in New Cebu Port Area.**

Scientific Name	Common Name	Economic Utilization/Ecological Importance
<b>A. Seagrasses</b>		
<i>Halophila ovalis</i>	Lusay	No identified economic utilization for humans; leaves serve as sources of food and oxygen for juvenile fishes and other marine organisms
<i>Enhalus acroides</i>	Lusay	No identified economic utilization for humans; leaves serve as sources of food and oxygen for juvenile fishes and other marine organisms; due to large size, often serve as habitat for other macrobenthic organisms
<b>B. Algae</b>		
<i>Ulva lactuca</i>	Green algae	Provides food to juvenile and small fishes
<i>Ulva reticulata</i>	Green algae	Provides food to juvenile and small fishes
<i>Caulerpa serrulata</i>	Green algae	Provides food to juvenile and small fishes
<i>Acetabularia major</i>	Green algae	Provides food and protection to juvenile and small fishes
<i>Sargassum polycystum</i>	Brown algae	Provides protection to juvenile and small fishes, food and oxygen contributor in the sea
<i>Padina gymnospora</i>	Brown algae	Provides protection to juvenile and small fishes
<i>Halimena durvillaei</i>	Red algae	Provides protection and food to juvenile and small fishes
<i>Gracillaria arcuata</i>	Red algae	Provides food and protection to juvenile and small fishes
<b>C. Macrobenothos</b>		
<i>Diadema setossum</i>	Sea urchin	Marine scavenger
<i>Eucidaris tribuloides</i>	Pencil sea urchin	Marine scavenger
<i>Strongylocetrotidae sp.</i>	Purple sea urchin	Marine scavenger
<i>Asteroidea sp.</i>	Knobby starfish	Marine scavenger
<i>Linklia sp.</i>	Blue starfish	Marine scavenger
<i>Strombus gracilor</i>	Shellfish	As filter feeder, provides cleansing effect on water
<i>Mitra lugubris</i>	Shellfish	As filter feeder, provides cleansing effect on water
<i>Anadara antiquata</i>	Arc shell, Batotoy	As filter feeder, provides cleansing effect on water
<i>Paphia amabilis</i>	Venus clam	As filter feeder, provides cleansing effect on water
<i>Tellinia alternata</i>	Striped sunset shell	As filter feeder, provides cleansing effect on water
<i>Terebra monilis</i>	Divided auger	As filter feeder, provides cleansing effect on water
<i>Solen ensis</i>	Shellfish	As filter feeder, provides cleansing effect on water

To determine the seabed characteristics of San Remigio Study area, a survey was conducted on June 4, 2001. The results of this survey are presented in Table 2.2.3-8.

**Table 2.2.3-8 Results of Seabed Macrobenthic and Soft Benthos Survey in San Remigio Area**

Scientific Name	Common Name	Economic Utilization/Ecological Importance
<b>A. Sea grasses</b>		
<i>Syringodium isoetifolium</i>	Lusay	No identified economic utilization for humans; leaves serve as sources of food and oxygen for juvenile fishes and other marine organisms
<i>Halophila ovalis</i>	Lusay	No identified economic utilization for humans; leaves serve as sources of food and oxygen for juvenile fishes and other marine organisms
<i>Thalassia hemprichii</i>	Lusay	No identified economic utilization for humans; leaves serve as sources of food and oxygen for juvenile fishes and other marine organisms
<i>Enhalus acroides</i>	Lusay	No identified economic utilization for humans; leaves serve as sources of food and oxygen for juvenile fishes and other marine organisms; due to large size, often serve as habitat for other macrobenthic organisms
<b>B. Algae</b>		
<b><i>Ulva lactuca</i></b>	Green algae	Provides food to juvenile and small fishes
<i>Halimeda opuncia</i>	Green algae	Major contributors in reef building and production of beach sediments
<i>Halimeda macroloba</i>	Green algae	Major contributors in reef building and production of beach sediments
<i>Sargassum polycystum</i>	Brown algae	Provides protection to juvenile and small fishes, food and oxygen contributor in the sea
<i>Padina gymnospora</i>	Brown algae	Provides protection to juvenile and small fishes
<i>Halimena durvilaei</i>	Red algae	Provides protection and food to juvenile and small fishes
<i>Gracillaria arcuata</i>	Red algae	Provides food and protection to juvenile and small fishes
<b>Macrobenthos</b>		
<i>Asteroidea sp.</i>	Knobby starfish	Marine scavenger
<i>Linklia sp.</i>	Blue starfish	Marine scavenger
<i>Terebra monilis</i>	Divided auger	As filter feeder, provides cleansing effect on water

To assess the presence of corals and determine the percentage of coral cover, a transect survey was conducted in New Cebu Port Study area. The results of the transect survey are presented in Table 2.2.3-9.

**Table 2.2.3-9 Results of Coral Survey**

Station (m)	Description	Station (m)	Description
0.00	Silt and sand	25.88	Silt/sand
3.15	Coral massive - Galaxia spp	27.37	Rock
3.30	Coral massive - Goniophora spp	27.55	Coral massive
3.33	Sand	27.80	Siltsand
4.88	Coral massive - Goniophora	28.15	Coral folius
4.91	Dead coral with red algae	28.40	Silt/sand
4.93	Holothuria - Synapta spp	28.70	Dead coral
5.01	Turf algae/soft algae	28.91	Rock
5.21	Coral massive - Goniophora	29.32	Sand
5.41	Dead coral with algae - Sargassum spp.	30.05	Coral massive
5.46	Mushroom coral - Fungia spp.	30.20	Sand
5.60	Dead coral with algae - Sargassum spp.	30.40	Coral massive
5.65	Dead coral massive - Euphilia spp.	31.21	Coral massive
5.68	Dead coral with algae (red)	31.42	Rock
5.71	Sponge - Soft coral	32.00	Sand
6.93	Silt/Sand	32.30	Coral massive - Goniophora
7.06	Dead coral with algae	32.40	Dead coral
11.75	Silt	32.70	Silt
11.88	Boulder (half meter)	33.40	Rock
12.65	Silt	33.70	Coral encrusting
12.72	Coral encrusting (Pyctenia sp)	33.80	Dead coral with algae
12.80	Coral colius (Montiphora sp.)	34.11	Coral folius
14.25	Silt	34.53	Rock
13.80	Dead coral with algae (red)	34.55	Sponge
14.92	Silt	34.60	Silt
15.05	Coral encrusting	35.90	Sponge
15.21	Dead coral with algae	36.05	Coral massive
15.24	Other animal (Gorgonian )	36.30	Silt
16.66	Silt	37.00	Rock
16.74	Macroalgae (Caulerpa, Serulata)	35.15	Silt
21.65	Silt	37.60	Coral massive - Goniophora
21.80	Halimena sp	37.65	Sponge
22.00	Dead coral with algae	37.77	Rock
22.15	Macroalgae Halimena sp.	37.80	Silt
22.28	Coral massive Goniophora sp.	38.20	Rock
22.47	Dead coral with algae	38.30	Silt
22.49	Other organism - Gorgonian	39.25	Coral massive - Goniophora
22.63	Dead coral with algae	39.40	Silt
22.79	Encrusting coral - Porites	40.35	Coral encrusting
22.82	Encrusting coral - Montiphora	40.85	Silt
22.95	Dead coral with algae	45.90	Coral encrusting
22.99	Encrusting coral - Pectynia	46.20	Rock
23.25	Dead coral with algae	46.40	Other organims - Diadema s.
23.31	Coral massive - Goniophora	46.65	Rock
23.50	Organ pipe coral - Tubophora	46.95	Coral encrusting
23.75	Dead coral with algae	47.20	Silt with Diadema s.
24.04	Coral mass - Goniophora	48.85	Rock
24.08	Other organism - Goniophora	49.20	Silt
24.17	Organ pipe coral - Tubiphora	50.00	Silt
24.55	Dead coral with algae		
24.60	Coral Tubiphora		
24.95	Dead coral with algae		
25.00	Coral Tubiphora		
25.38	Dead coral with algae		
25.65	Encrusting coral		
25.80	Dead coral with algae		

Based on the above surveys, no threatened is anticipated. Extinct or rare species of mangroves, seaweeds, algae, macrobenthic organisms or coral were found in the four study areas.

#### 2.2.4 Air Quality and Noise

##### (1) Air Quality Survey

The Air quality and Noise survey was carried out at two sites 1) Cebu Baseport and 2) Consolacion site.

The results of the air quality and noise surveys are presented in Tables 2.2.4-1 and Table 2.2.4-2.

**Gaseous Pollutants:** The observed 1-hr average Ground Level Concentrations (GLCs) are presented in Tables 2.2.4-1 and 2.2.4-2. The 1-hr measured average GLC for SO<sub>2</sub> ranged from nil to 0.004 ppm for New Cebu Port area and 0.001 to 0.004 ppm for Cebu port area. These values are well within the DENR 1-hr standard of 0.13 ppm.

For NO<sub>2</sub>, the observed 1-hr average GLC ranged from 0.0003 to 0.0064 ppm for New Cebu Port area and 0.0033 to 0.0190 ppm for Cebu port area. As in the SO<sub>2</sub> case, the measured GLCs also satisfy the DENR 1-hr standard of 0.14 ppm.

For total nitrogen oxides (NO<sub>x</sub>), the observed concentrations ranged from not detectable to 0.7 ppm for New Cebu Port area and nil to 4 ppm for Cebu port area. There is no 1-hr averaging DENR standard for oxides of nitrogen.

For carbon monoxide (CO), the observed concentrations for both New Cebu Port and Cebu port areas were not detectable to trace of CO but below the minimum detectable limit. The 1-hr averaging DENR standard for CO is 30 ppm.

**Particulates:** The observed 1-hr average TSP concentrations vary from 7 to 134 microgram/Ncm. The DENR standard for TSP of 300 microgram/Ncm was satisfied at the New Cebu Port area for the sampling stations. At Cebu port area, the TSP level ranged from 103 to 2702 microgram /Ncm which exceeded the DENR standard. Stations P1 and P2 exceeded the TSP limit for 1-hr averaging, resuspension of dust particulates in these stations were noted during passage of trucks and cars. At stations P4 and P5, TSP levels were within the DENR limit and it was further observed at these stations that the vehicles and trucks were prohibited to pass except for those official passes. Forklift and cargo lifting machine were the most visible at the area.

**Table 2.2.4-1 Observed Air Quality and Noise Level at the Vicinity of the Cebu New Port Area**

Station	Time & Date	Concentrations					Noise Level dB(A)
		SO <sub>2</sub> (ppm)	NO <sub>2</sub> (ppm)	NO <sub>x</sub> (ppm)	CO (ppm)	TSP (µg/Ncm)	
C1	0815-0915 16Jun2001	0.001	0.0005	NIL	ND	134	48
	1430-1530 13Jun2001	0.002	0.0003	0.7	ND	11	46
	1900-2000 13Jun2001	0.002	0.0004	ND	ND	32	43
C2	1024-1124 13Jun2001	0.001	0.0014	ND	ND	25	49
	1600-1700 13Jun2001	0.002	0.0003	NIL	ND	24	48
	2240-2340 12Jun2001	NIL	0.0011	ND	ND	22	<40
C3	0845-0945 13Jun2001	0.001	0.0047	ND	ND	7	42
	1650-1750 12Jun2001	0.003	0.0029	ND	ND	12	<40
	2120-2220 12Jun2001	0.004	0.0027	ND	ND	25	<40
C4	0935-1035 16Jun2001	0.001	0.0054	ND	ND	45	42
	1535-1635 15Jun2001	0.001	0.0057	NIL	ND	106	42
	1910-2010 15Jun2001	NIL	0.0051	ND	ND	43	<40
C5	1055-1155 16Jun2001	0.002	0.0059	NIL	ND	37	42
	1650-1750 15Jun2001	0.002	0.0054	NIL	ND	40	42
	2030-2130 15Jun2001	0.004	0.0064	ND	ND	80	<40
DENR Standard	1-hr averaging	0.13	0.14	-	30.0	300	-

ND = Not Detectable; NIL = Trace but below detectable limit

**Table 2.2.4-2 Observed Air Quality and Noise Level at the vicinity of Cebu Base Port Area**

Station	Time & Date	Concentrations					Noise Level dB(A)
		SO <sub>2</sub> (ppm)	NO <sub>2</sub> (ppm)	NO <sub>x</sub> (ppm)	CO (ppm)	TSP (µg/Ncm)	
P1	1000-1100 14Jun2001	0.002	0.0170	2	NIL	2702	66
	1640-1740 14Jun2001	0.001	0.0097	1.2	ND	530	58
	2205-2305 14Jun2001	0.003	0.0085	NIL	ND	257	42
P2	0750-0850 15Jun2001	0.001	0.0190	NIL	ND	1203	46
	1300-1400 15Jun2001	0.003	0.0110	1.5	NIL	2416	54
	2215-2315 15Jun2001	0.002	0.0110	NIL	ND	106	52
P3	1030-1130 15Jun2001	0.004	0.0098	.75	NIL	105	62
	1405-1505 14Jun2001	0.001	0.0085	1.5	NIL	103	56
	1920-2020 14Jun2001	0.002	0.0071	4	NIL	252	58
P4	0910-1010 15Jun2001	0.003	0.0073	NIL	ND	215	62
	1250-1350 14Jun2001	0.003	0.0100	NIL	NIL	125	56
	2035-2135 14Jun2001	0.002	0.0081	0.8	NIL	266	42
P5	0800-0900 14Jun2001	0.001	0.0045	NIL	ND	191	56
	1520-1620 14Jun2001	0.001	0.0042	NIL	ND	185	56
	2155-2255 13Jun2001	0.002	0.0033	NIL	ND	119	52
DENR Standard	1-hr averaging	0.13	0.14	-	30.0	300	-

ND = Not Detectable; NIL = Trace but below detectable limit

**(2) Noise**

Noise observations were made at air quality stations. The observed noise levels at New Cebu Port area ranged from less than 40 to 49 dB(A) while at Cebu port area the noise level ranged from 42 to 66 dB(A). For Cebu port area, the noise sources were trucks, cars and ships docked at the pier. The maximum observed noise level could reach up to 85 to 90 dB(A) within a short period occurring during passage of trucks. The maximum average noise level at Cebu port area was 66 dB(A). At New Cebu Port area, noise sources were household noises like stereos, TV sets and other domestic sources.

## 2.3 Social Environment Conditions

### 2.3.1 Cebu Baseport

#### (1) History of Cebu City

The place now called Cebu City first came to be known and seen by the people from the west after the arrival of the Spaniards in Cebu on April 7, 1521. Their leader, Ferdinand Magellan, a Portuguese in the service of the King of Spain, befriended Rajah Humabon, the local chieftain.

The Spaniards, however, found Cebu City lacking of food and other basic supplies. They decided to transfer their command post to Iloilo and then to Manila after finding the place more populated and amply supplied with food and other basic items from its much wider hinterland in Luzon. Since then Cebu only became a distant military and mission outpost. It was considered important only because of its strategic location in the center of Visayas and nearness to Mindanao, from where the Spaniards were able to control or administer them.

It was not until the 19<sup>th</sup> century that Cebu City finally surfaced as an important trading center and central place in southern Philippines. This came after the closing of the galleon trade, which benefited on the city of Manila, and the eventual opening of the country to free trade, which encourage the countryside to produce for the export market. Because of its location, Cebu City turned out to be strategic place for consolidating the surplus products from the Visayas and Mindanao.

It was also the intellectual and political capital of the south such as that by the time the first Philippine Assembly was established under the tutelage of the American colonial rulers in 1907, a Cebuano in the person of Don Sergio Osmena, found himself at the helm of the Philippine archipelago's 7.8 million people. Unfortunately, any other Cebuano has not repeated this fate up to now.

#### (2) Profile

The City of Cebu is located along the coastal and eastern belt of the Island Province of Cebu at 10 degrees 17N latitude and 123 degrees 54E longitude. The Municipality of Consolacion and the City of Mandaue, on the South by the Bohol Strait and on the west by the Municipality of Talisay and the City of Toledo bound it on the north. From outside the province, Cebu City is accessible from all places by air and sea transport.

Cebu City has a total land area of 32, 800 hectares. Its terrain is relatively flat on the coastal plain and becomes rolling and hilly at elevations of 40 to 200 meters and then generally rugged at elevation 200 to almost 800 meters above sea level. Cebu City has a very

unfavorable topography, since 80% of its total land area is mountainous. Thus, the City government opted to reclaim foreshore lands for added space.

As of 1995, the population growth rate of Cebu City is at 2.2% and in year 2000 population projection is pegged at 758,814.

In 1995 the population density of the Cebu city	2,370 /sq.km
Metro Cebu	Average density 1,990
	Mandaue City 6,743
	Cordova City 3,146
	Talisay City 3,062
	Urban area of Cebu City 7,753
Whole province	603

### (3) Demographic Characteristics

The population of the city has increased by 51,882 over the census population in 1990. This represents an annual growth rate of 1.54 % from 1990 to 1995.

**Table 2. 3.1-1 Total Population, Annual Growth Rate and Density**

	Total Population	Density Per Sq.Km	Annual Growth Rate,
Cebu City	662,299	2,031	1.54
Urban	589,841	7,553	1.26
Rural	72,458	292	3.99
North District	306,157	1,959	0.69
Urban	271,280	5,069	0.38
Rural	34,877	339	3.31
South District	356,142	2,097	2.31
Urban	318,561	12,965	2.06
Rural	37,581	259	4.64

The number of households in the city rose to 134,986 in 1995, registering an increase of 20,278 households over the 1990 figure.



**Table 2. 3.1-2 Household Population and Household Size**

	Household Population	Number of Households	Household Size
Cebu City	654,839	135,089	4.8
Urban	582,432	120,510	4.8
Rural	72,407	14,576	5.0
North District	300,468	63,511	4.7
Urban	265,591	56,348	4.7
Rural	34,877	7,163	4.9
South District	354,371	71,578	5.0
Urban	316,341	54,162	4.9
Rural	37,530	7,416	5.1

**- Age-Sex Composition**

Cebu City has more females than males in 1995. The sex ratio of males for every 100 females was 98.0. In 1995, the age-sex structure of the population of the city deviated from the usual pyramid shape. It shows the protrusions at the ages 15 to 24 years.

The proportion of the population aged 0 to 14 was 33.4 %, slightly lower than the 1990 proportion (34.9%). The productive population aged of 15 to 64 years old above comprises 63 % of the household population. Only 3.1% of the population is in the 65 years old and above. The median age of the population in 1995 is 22.2 years.

The dependency ratio of the number of persons aged 0 to 14 and 65 years and above for every 100 persons aged 15 to 64 was 57.3 %. Specifically, in 1995 for every 1000 persons in the working ages (15 -64 years), there were 57 dependents consisting of 52 persons aged 0 to 14 years (young dependents) five persons aged 65 years old and over (old dependents).

**Table 2.3.1-3 Percent Distribution of Population by Age Group and Sex, 1995**

Age Group	Total Population	Percent Total	Percent Male	Percent Female
All ages	662,299	100.00	49.07	50.93
Under 1	17,140	2.58	1.34	1.24
1 - 4	61,200	9.33	4.84	4.50
5 - 9	73,590	11.08	5.70	5.38
10 - 14	66,666	10.07	5.05	5.02
15 - 19	81,251	12.27	5.68	6.59
20 - 24	75,260	11.36	5.39	5.97
25 - 29	63,527	9.59	4.68	4.91
30 - 34	51,011	7.70	3.77	3.94
35 - 39	43,347	6.54	3.26	3.28
40 - 44	34,943	5.28	2.62	2.66
45 - 49	26,303	3.97	1.95	2.02
50 - 54	19,889	3.00	1.47	1.54
55 - 59	15,638	2.36	1.12	1.24
60 - 64	11,947	1.80	0.86	0.95
65 - 69	8,454	1.28	0.58	0.70
70 - 74	5,527	0.83	0.37	0.46
75 - 79	3,214	0.49	0.21	0.28
80 - 84	1,956	0.30	0.12	0.17
85 - over	1,073	0.16	0.07	0.09

**(4) Economy**

The dominance of trade and service activities in the city is due to its strategic location being in the central part of the Visayas and having a good seaport. Products from the island and those coming from the provinces of Central Visayas and Mindanao are brought to the city for processing and redistribution to other parts of the country.

These trading activities have encouraged financial institutions and other trading activities to locate themselves in the city. Allied with the growing trading and financial services in the city is also the growing tourism industry. Likewise, the city is known for its rich cultural heritage and history, being the first Spanish settlement in the country.

**1) Labor Force and Employment****a. Employment Structure**

Most of the employed workers in Cebu City are engaged in service activities. Census data in 1995 showed that 73.2 % of the cities employed labor force are found in trade and other related service activities such as banking, real estate, and insurance, community and personal services and others. Some 18.8 % are employed in industry while 7.85% are engaged in

agriculture and related activities.

**b. Unemployment Rate**

Cebu City has a very high unemployment rate of 16.0% as of 1999. This indicated the slowing down of business after the Asian crisis.

In April 2000 the rate of unemployment in the city declined to 11.5% despite the country's unemployment rate of 13.7%. This was due to the reduction in the labor force participation rate bringing down the labor force from 340.4 thousand in 1999 to 329.8 thousand in April 2000.

**Table 2.3.1-4 Population 15 years and Over by Employment Status 1999-2000**

	April 1999	April 2000	Increase/ (Decrease)
Working Age Pop. (1000)	497.0	509.0	12.0
Labor Force Part. Rate, %	68.5	64.8	
Labor Force (1000)	340.4	329.8	(10.6)
Not in Labor Force (1000)	156.6	179.2	22.6
Employed (1000)	286.0	291.9	5.9
Unemployed (1000)	544.5	37.9	(16.6)
Employment Rate, %	84.0	88.5	
Unemployment Rate, %	16.0	11.5	

Source: Quarterly Labor Force and Employment Survey, NSO

**2) Family Income, Expenditures and Savings**

**a. Average Family Income**

In 1997 the family income in Cebu City is Ph 163,196 per family. This is 60% higher than the province and almost twice that of the average for the region.

**b. Average Family Expenditures**

The average family expenditure in the city in 1997 was Ph 114,326. Deducting expenditures equals Ph 48,870 savings per family. This was equivalent to a savings rate of 29.9%, which was higher than the average savings for the whole region.

**c. Type of Expenditures**

Most of the families in the city spend their income for food. This accounted for 44.8% of the total expenditures in 1997. Housing rent followed this and rental value of occupied dwelling units with 18.1 percent. Expenses for transportation and communication came next, followed by fuel, light and water, personal care and effects, medical care and furniture. The smallest items of expenditures were for recreation and non-durable furnishings. Only 2.6 percent were spent for education.

#### d. Source of Income

As of 1997, 58.8 percent of the total number of families in the city received their income in salaries and wages, all coming from non-agricultural activities. Only 27.7 percent of the total number of families received their income from entrepreneurial activities, mostly from non-agricultural business. The rest of the families received their income from shares of crops, receipts from abroad, interest on deposits, dividends, gifts, and others.

Around 20 to 30 percent of residents in the city engage in underground economy such as sidewalk vending, dispatching and other forms of unorganized business and services.

#### 3) Investments

Cebu is widely known as the most progressive investment center in the country in Asia. Many foreign investors are attracted to Cebu because of the availability of skilled and educated labor force, strategic location, availability of infrastructure, presence of related and supporting industries, good peace and order situation, and supportive and progressive local government officials.

Over the past ten years, investments in the province have increased considerably. In 1990 up to the Asian crises in 1997 total accumulated investments in BOI approved projects reached 85.2 billion pesos. This was equivalent to 79.4 percent of the entire investments in Central Visayas or about 4.1 percent of the entire BOI approved projects in the country. Investments in BOI in Cebu declined after the Asian crisis in 1997, as many foreign investors were afraid to increase their investments in Asia. Local investments, however, already started to recover in 1999.

#### 4) Foreign Trade

Traditionally the bulk of Cebu's foreign trade passes through the port of Cebu. Because of the presence of the economic zone in Mactan, about one third of Cebu's exports and imports now passes through the airport in Lapu-lapu City and small volume through Danao City.

From over 600 million US dollars in 1990, total exports from Cebu went up to 1.887 billion in 1997. Despite the Asian crisis Cebu's exports crossed the two-billion dollar mark in 1998 and grew further to 2.4 billion 1999 leaving a trade balance of more than US 1.4 B dollar.

#### Top Ten Markets 1998

USA

Japan

Hong Kong

Taiwan

Singapore

Germany

Canada

France

#### Top Ten Products

Semi-conductor devices

Electronic components

Wire harness

Floppy disk drives

Photographic equipment

Garments

Computer Magnetic disks

Camera paraphernalia

Belgium  
United Kingdom

Communications equipment  
Computer disks

#### 5) Economic Zones

There are seven (7) economic zones in Cebu. MEPZ 1 and 2 are government owned while the rest are owned by the private sector. As of 1999, MEPZ 1 and 2 had 129 firms with a total employment of more than 43,000 workers. Although the economic zones are not really located in Cebu City, it provides most of the services and amenities required by the industries in the zone. One of the biggest foreign export firm in Cebu employing more than five thousand workers is located in Danao City.

The former Lahug airport is now being developed into an information and technology center for the city. The 300-hectare south reclamation project is also envisioned by the city to be developed into a new economic zone. When fully developed, the reclamation can easily generate up to 100,000 jobs. MEPZ 1 and 2 has only 120 hectares, housing more than 100 firms with over 40,000 workers.

#### (5) Social Services

##### 1) Education

The city has seven (7) universities and sixteen (16) colleges. Various courses from engineering to medicine, arts and sciences, including computer science. Vocational courses at the high school and post high school levels are also available for almost all crafts or trades provided by both private and public schools and training centers in the city. The city has a very high literacy rate of 98% as of 1995.

For the 1999 - 2000 the city has 307 public and private pre-school, elementary, and high schools with the total enrolment of 196,293. 69% were enrolled in the public schools and the rest in private schools.

##### 2) Health

The city maintains one (1) tertiary hospital, five (5) urban health units and fifty-two (52) barangay health stations. The city employs one hundred eighty-six (186) government health personnel including twenty-three (23) doctors, thirty-one (31) nurses and sixty-seven (67) midwives assigned in the different barangays of the city, excluding the health personnel that run the city hospital.

In the 1998 crude birth in the city was 22.3 per thousand population while crude death was 4.9 per thousand. In the same year infant death was recorded at 25 per thousand live births. Presently, the city has eighteen (18) private and government general hospitals with a total capacity of 2,162 beds. Eight (8) of these hospitals are at the tertiary level. Many people from the Visayas and Mindanao come to the city to seek medical assistance or hospitalization

making the city the medical capital of southern Philippines. Under construction is the new Chong Hua Hospital, which will become the biggest and best-equipped hospital in the country outside of Manila.

**Table 2.3.1-5 Ten Leading Causes of Mortality, Morbidity and Infant Mortality 1998**

Mortality		Morbidity		Infant Mortality	
Causes	Rate	Causes	Rate	Causes	Rate
Pneumonia	10.46	Upper res Inf	709.8	Pneumonia	4.05
Cerebro Vas A	7.51	Bronchitis	109.1	Septicemia	3.77
Cancer	6.51	Diarrhea	108.8	Co Anomaly	2.05
Cardio Vas Dis	5.38	Skin disorder	91.9	Asphyxia	1.83
Accident	4.79	Pneumonia	74.7	Inf diarrhea	1.60
Septicemia	3.47	Intestinal Par	51.6	Res dis sy	1.31
Medico legal	2.38	Wounds	41.8	Prematurity	0.86
Intra ute fet	1.57	EENT	32.0	Hypoxia	0.29
Renal failure	1.45	Hypertension	23.6	Bronchitis	0.23
Infec diarrhea	1.07	Furunculosis	22.2	Meningitis	0.23

Source: City Health Office, Cebu City

### 3) Housing

The city has 105 developed subdivisions with a total land area of 609.6 hectares divided into 11,830 residential units. Nineteen of the subdivisions are low cost covering 4,198 units in 63.59 hectares land. Condominium housing is fast developing in the city with 26 projects now completed and under construction for 2,344 units.

About two-thirds of the total number of households are living in blighted areas with substandard houses. Many are squatters in both public and private owned lands as a result of the high cost of land, displaced victims of fire and land development.

To meet the need of socialized housing; the city government's DWUP identified a total of 494 hectares of land for housing development in the different parts of the city. The program is expected to benefit 524 homeowners associations with more than 40,000 beneficiary families.

### 4) Social Welfare

The city government has a social welfare program directed at the community, family, women, youth and the disabled, including emergency assistance in certain areas. Almost all barangays have a Day Care Program except for eleven.

The assistance for the poor or economically disadvantage and disabled is focused on livelihood assistance, skills training, job placements and other activities designed to assist them find secure jobs or livelihood.

The most critical problem in the city is the rise of the number of street children, many of whom are victims of sexual abuse and the use of prohibited drugs. Joblessness and poverty of parents have consequentially caused the rise of street children in the city.

#### 5) Protective Services

At present the city has 11 police stations and 8 fire stations with a force of 452 police and 137 fire personnel, respectively. The ratio is 1: 1,564 for police and 1: 4,719 for fire personnel. Recorded were 1,907 index and non-index crimes in 1998. Petty crimes including violent ones abound in the city due to poverty. The use of drugs and the commission of drug are also common related crimes.

#### (6) Infrastructure and Utilities

##### 1) Transportation

##### a. Land Transportation

Cebu City is an old city. Narrow, circuitous, and poorly connected roads characterize the inner city. Because of urbanization it now becomes expensive to construct new roads or widen the existing roads of the city. It is for this reason that the city is now suffering from traffic problems.

The traffic problem is aggravated by the increasing number of vehicles plying the city's streets and the continuing increase in population that has lead to higher demand for travel and the concentration of business and many economic and social activities at the center of the city.

The situation has further increased the number of trips of people within the city and those coming from the provinces. The most problematic traffic area is the north-south direction because of the limited number of roads going to those areas.

**Table 2.3.1-6 Cebu City Vehicle Registration**

	1995	1996	1997	1998
Private	64,380	73,407	78,328	81,174
Government	1,700	2,020	2,287	2,386
For Hire	8,913	10,058	11,789	12,164
Total	74,993	85,485	92,404	95,724

Source: LTO, Cebu City

##### b. Sea Transport

The Cebu Baseport has about four (4) kilometers of berthing length with modern facilities to handle general and container cargoes. The city's port serves both domestic and international vessels.

In year 2000 the main port of Cebu handled a total of 7,451,967 tons of cargoes and 10,611,922 passengers. It also handled a total 437,869 TEUS of container cargoes. Foreign vessels carrying a total of 1,144,000 tons of cargoes for the city's foreign.

The historical trends of shipping and cargo statistics of the Cebu Baseort is detailed in 2.4 " traffic demands forecast "of the Chapter 2.

c. Cebu Baseport Residents/Vendors Population

The baseport area is a site where economic activities are diverse and thus able to pull new migrants. Settlement patterns in the baseport area are largely influenced by the capacity of port activities to attract job seekers. Most residents, as per interviews, settled in the port and risked building houses on private or government property because of its proximity to the workplace.

The most populous areas are along normal passing routes of ship passengers and near warehouses. Some areas along 5<sup>th</sup> street are littered with shanties, and at times, these houses also serve as mini convenience stores. As per CPA listing, 733 resident families are residing and/or doing business in the port area as follows

Location	Vendor/Resident Family Population
Along berths 23-27	86
Along berths 21-22	94
Berth 20	65
5 <sup>th</sup> Street	118
Pier 3 transit shed (north side)	40
<b>TOTAL</b>	<b>733</b>

d. Land and Property Ownership in the Cebu Baseport are listed in Table 2.3.1-7.



**Table 2.3.1-7 Land and Property Ownership**

Block No.	Lot No.	Area (sq.m.)	Name of Owner	Block No.	Lot No.	Area (sq.m.)	Name of Owner
Block 1	1	1,718	Carlos A. Gothong	Block 28-A	1	30,382	Cebu Ports Authority
	2	934	Lourdes R. Osmeña	Block 28	1	72,130	Cebu Ports Authority
	3	1,467	Four Seas Trading Corp.	Block 29	1	25,000	National Food Authority
	4	1,467	Escaño Lines Inc.	Block 30	1B (R)	11,955	Philippine Trident Land Inc.
	5	1,467	Escaño Lines Inc.		1A (R)	11,955	Sulpicio Lines Inc.
	6	1,512	Escaño Lines Inc.		2	36,879	Ludo and Luym Corp.
	7	1,603	Escaño Lines Inc.		3	25,000	Ludo and Luym Corp.
	8	1,694	Four Seas Trading	Block 31	1	2,052	Frederick K.D. Ong, Jr.
Block 2	2	2,248	Engson realty Co., Inc		2	2,067	Sea Commercial Co.
Block 3-A	1	1,180	Pablo Cantillas		3	1,908	Aboitiz Shipping
	2	770	Mingson Mining Industries		4	1,909	Aboitiz Shipping
	3	470	Mingson Agro-Urban Development Corp.		5	1,909	Aboitiz Shipping
Block 4	1 (R)	2,801	Sulpicio Lines Inc.		6	1,908	Aboitiz Shipping
	1(R)	3,034	Carlos A. Gothong		7	1,710	Anfil Agricultural Dev. Corp.
	1 (R)	2808	Lorenzo Shipping Corp.		8	2,000	White Gold Inc.
	1(R)	2,808	Sulpicio Lines Inc.		9	2,000	White Gold Inc.
	1	1,987	Vicsal Development Corporation		10	2,000	Maritime Co. of the Philippines
	2	1,976	Sulpicio Lines Inc.		11	1,989	Enrique and Elena Benedicto
	6	1,702	William Lines Inc.		12	2,080	Cebu Kingson Holding Corp.
	7	1,610	William Lines Inc.		13	1,820	Cebu Kingson Holding Corp.
	8	1,610	William Lines Inc.		14	1,820	Ma. Victoria Osmeña
	9	1,619	William Lines Inc.		15	1,820	Corazon Lua
	10	1,619	Virginia Dev. Corp.		16	1,976	Lauchanco Development Corporation
	11	1,619	Virginia Dev. Corp.		17	1,924	Aboitiz Shipping
	12	1,820	Carmencita Chan (deceased) Nelia Delgado		18	1,924	Aboitiz Shipping
	13	2,146	Virginia Dev. Corp.		19	1,521	Central Visayan Warehouse
	14	1,872	Virginia Dev. Corp.		20	1,506	Central Visayan Warehouse
15	1,872	Vicsal Dev. Corp.	Block 32	1	3,511	Aboitiz Shipping	
Block 5-A	1	1,986	Petrophil Corp.		2A	2,251	Jose Sotto Tantiangu
	2	2,070	J.F. Causing Inc.		2B	2,911	Sky Top Corp.
	3	2,109	Cebu Cartage Corp.		3	2,251	Benson Industries
Block 5-B	A (R)	1,575	Carlos A. Gothong		4	2,251	Filomeno Lim
	B (R)	1,591	Carlos A. Gothong		5	2,251	Alberto Gothong Ent., Inc.
	C (R)	2,751	Cebu Cartage		6	2,776	Mindanao Golden Valley Dev. Corp.
	D (R)	1,556	Eversure Trading		7	2,776	Frederick K.D. Ong, Jr.
	3	1,361	Square Deal Realty Corp.		8	2,853	Frederick K.D. Ong, Jr.
	4	1,364	Go Quiaco Castro Development		9	2,851	Dolores Du Diez, et al
	5	1,407	Manuel Lim		10	4,169	Dolores Du Diez, et al
	6	1,681	Frederick K.D. Ong, Jr.	TOTAL	—	355,762	—
	7	1,550	Equitable Banking Corp.				
8	1,645	Horacio Franco					
9	1,688	Limketkai Sons Milling Inc.					

#### e. Air Transport

The city used to have a domestic airport in *Lahug*. With the need to expand foreign investment, trade and tourism in Cebu, a new airport was opened in Mactan Island. It is about 15 kilometers from the city and can be reached in about half an hour using the two bridges connecting the Mactan Island with mainland Cebu.

The airport is of all weather type with modern terminal facilities and concrete runway that can accommodate all kinds of existing aircrafts in commercial use today. It is connected by regular flights to Manila and almost all the airports in the Visayas, Mindanao and other cities of Asia.

In 1999 the airport handled a total of 36,065 flights with 2,087,404 domestic and international passengers and 4,398,843 tons of domestic and foreign cargoes. The presence of the international airport is responsible for the entry of many foreign tourists in Cebu. The airport has also paved the way for the establishment of export processing zones in Mactan Island.

Most of the output of the foreign export firms that locate in the processing zones in Mactan use the airport for their export and import activities.

#### f. Communication

Cebu is now served with modern telecommunication systems. There are two land-based telephone companies such as PLDT and ISLACOM, and cellular companies lead by SMART and GLOBE.

#### g. Power

Electrical power is provided by the Visayas Electrical Company (VECO) serving Metro Cebu and neighboring areas. It gets its power from the NPC's Visayas Grid. This power comes from the geothermal power plants in Leyte and Negros and also the thermal plants here in Cebu. The Cebu-Negros-Panay-Leyte-Samar Grid has a total capacity of 977 MW.

Seventy-five of the 80 barangays in the city have already been served by VECO as of the end of 1998, covering 73.6% of the city's households. In 1999 VECO sold a total of 1,073,088-megawatt hours of electricity to 224,171 customers in Metro Cebu.

#### h. Water

The water need of Cebu is supplied by Metro Cebu Water District (MCWD) covering also Mandaue City, Lapu-lapu City and the municipalities of Liloan, Compostela, Consolacion, Cordova and Talisay. It draws most of its water supply from the underground aquifer through a network of pumping stations including those installed at the Mananga weir. The rest comes from Buhisan Dam, the first of water of Cebu City built during the American Occupation.

At present MCWD has a rated capacity of over 120 thousand cubic meters per day. Based on record, however, total consumption of water by all types of MCWD customers in Metro Cebu reached 29.9 million cubic meters in 1999. This is equivalent only to the daily consumption of 81.9 cubic meters per day. The difference between water production and consumption is the water loss, representing more than 30% of total rated capacity of MCWD.

The total demand for water in Metro Cebu is about three times the size of MCWD's present supply if those not presently served by MCWD are considered. To meet the demand, plans are now being made to augment MCWD production capacity through the construction of dams in Mananga and Lusaran or piping them from outside sources. When realized the two dams will add some 200,000 cubic meters of water per day for Metro Cebu.

#### i. Drainage and Sewerage

Cebu City has combined drainage and sewerage system. Both rainwater and domestic sewage are conveyed through a single pipeline, culverts or open canal and directly discharged to the creeks, rivers and into the sea. Most of the domestic sewage are untreated and cause pollution in the river and the sea. Most of these systems are clogged with debris or silt that render them useless during heavy rains and cause flooding in many low-lying areas of the city. Many of the city's waterways are also constricted due to the presence of housing settlements along the riverbanks and creeks obstructing the flow of rivers causing them to overflow and flood.

#### j. Solid Waste

The city generates a total of 350 tons of solid waste per day, mostly coming from the densely populated areas of the city. These are collected day and night by the city government's fleet of garbage trucks and brought into the *Inayawan* landfill. The landfill has a capacity of close to 1 million cubic meters but it has remaining life of only 6 to 8 years. A new landfill is needed soon to meet the city's growing volume of solid waste. Unfortunately no alternative site is available in the city. This should be solved in cooperation with the local government units in Metro Cebu as the other cities and municipalities in the city are also experiencing the same problems of the increasing volume of solid waste.

### 2.3.2 New Port - Barangay Tayud, Municipality of Consolacion

#### (1) History

Consolacion used to be a barrio of Mandaue. In 1871 Consolacion became an autonomous town.

During the years 1902 and 1903, the town of Consolacion could not continue to maintain itself as a municipality. Consolacion was again made part of the municipality of Mandaue.

In 1920, Consolacion again became a municipality.

## (2) General Profile

Consolacion lies at the eastern side of the Island of Cebu. Consolacion is bordered by Mandaue City at [the southwestern side and is flanked by the Municipality of Liloan at the northwest. At its western side is the City of Cebu while its northern tip the Municipality of Compostela bound Consolacion. Its shoreline faces Bohol Strait.

Consolacion has an estimated land area of 42.05 square kilometers. Its largest barangay in terms of land area is Brgy. Tayud with 6.56 square kilometers; this is followed by Brgy. Lanipga with 4.91 square kilometers.

## (3) Population

### 1) Historical Growth of Population

The 1995 population of Consolacion comprised 3.43% of Metro Cebu's population, and 1.68% of the whole Cebu province. It has a relatively higher population growth rate (3.580%) compared to Metro Cebu (2.536%) and the Province (2.060%).

In 1990, Consolacion's total population was 41,270 persons and by 1995, it increased to 49,205. Barangay Tayud has the largest share of population with 13.68% of the total population.

### 2) Projected Population by Barangay

Consolacion	49,205	100.00%
Tayud	6,732	13.68
Pulpogan	6,102	12.40
Nangka	5,260	10.69
Poblacion Occidental	3,843	7.81
Poblacion Oriental	2,785	5.66
Tilhaong	482	0.98
Lanipga	661	1.34
Other Balangays	23,342	47.44

The current population of 59,779 is projected to increase with growth rate of 3.97% by as much as 48% by the year 2010 to be 88,233.

### 3) Household Population and Number of Household by Barangay

The 1995 total of 9,996 households was projected to increase to 12,144 in the year 2000 and 17,924 by the year 2010. The average household size is 4.92.

(4) Household Population by Age Group and Sex

Sex Distribution / Composition	Males	29,953
	Females	29,826
Age Distribution	15 to 64	57.23 %
	0 to 14	39.82%
	Over 64	2.95 %
Projected Population Density	Tayud	11 /ha
	Poblacion Occidental	139 /ha
	Lanipga	2.54
Education grade completed	Elementary school	44.14%
	High school	28.08%
	College	6.18%

(5) Health Situation

There are a total of 163 RHU personnel and auxiliary workers that deliver health services to the municipality. The facilities are a Municipal Health Center and eight (8) Barangay Health Stations (BHS) serving the entire municipality.

The medical personnel ratio to the municipal population as of the year 2000 is: One doctor per the whole population of 59,779; one nurse per the whole population of 59,779; one sanitary inspector for every 29,890; one medical technologist for the whole 59,779; one dentist for the whole 59,779; one rural health midwife for every 6,642 population, and; one barangay health worker for every 424 population.

1) Live Births

Based on the 1999 RHU records crude birth rate is placed at 26.7%, crude death rate at 4 %, infant mortality below 1 year old at 8.9%. Maternal mortality was zero. Livebirths totaled 1,427 while the number of death was 171.

2) Mortality and Morbidity

Most of the illnesses in the area is caused by air-borne and water borne diseases.

Hypertensive disease is the number one killer in the municipality followed by Malignancies (Cancer).

All barangays have cases of malnutrition among children ages 0 -6 years old. The number of children malnourished totaled 3,779 with 81.58 % 1<sup>st</sup> degree, 18.28% 2<sup>nd</sup> degree, and 0.24% as 3<sup>rd</sup> degree malnourished.

3) Sanitary Toilet Facilities

Watersealed toilet facilities with depository	30.00 %
Water-sealed with sewer/septic tanks	23.60%
Without toilet facilities	25.60%.
Others	20.80 %

## (6) Social Welfare

Among the program and service the Municipal Social Welfare Department (MSWD) extended to the different clientele are Self-employment assistance (SEA); Family and Community Program; Women's Welfare program; Child and Youth Welfare programs; Emergency Assistance Program; and, Program for persons with disability and senior citizens.

In 1999, the MSWD's programs and projects were able to reach out and provide welfare assistance to 1,954 beneficiaries. Inspire of the various programs and the number of target clientele, MSWD have only two personnel- the Supervising Social Welfare Officer and a Social Welfare Aide. It operates fifteen (15) Day-Care Centers in thirteen (13) barangays; the other eight- (8) barangays do not have Day-Care Centers.

The MSWD is the primary government agency that provides social services in the Municipality. Other government agencies that provide services are the Municipal Health Department (RHU), Provincial Population Office, and the Bureau of Agricultural Extension (BAEX).

The Health Department provides mother's classes such as family planning and nutrition, which also includes child weighing and feeding, programs for the malnourished.

The BAEX employs a home management technical specialist who coordinates with other agencies in providing programs and projects in home economics, applied nutrition, and income generating projects and home management.. The PPO gives training in family planning and provides contraceptive devices.

The private sector (civic, religious & NGOs) is also involved in providing social welfare assistance.

## (7) Education

The Department of Education, Culture and Sports (DECS) provide public schooling through its (16) elementary schools and nine (9) secondary schools.

Consolacion Central School is the largest in terms of population and has the most number of school buildings and other facilities. However, Tayud Elementary School occupies the largest school site with 1.58 hectares of land area, followed by Jugan Elementary School with 1.48 hectares. Of the 16 elementary schools only four (4) have shops and laboratory, namely: Consolacion Central, Bagong Lipunan, Lamac and Tayud.

For the current SY 2000 - 2001, the elementary (including the primary schools) level has a total enrolment population of 10,848 being handled by 233 teachers in 216 classrooms.

Generally, the number of teachers in the primary, elementary and secondary levels are adequate to serve the current (SY 2000 -2001) number of students, given the standard

student-teacher ratio of 1:50 against the existing general average of 1:47 in the elementary and 1:38 in the secondary level.

The number of classrooms is also adequate for the elementary schools, with 1 classroom per 50 students. However, in the secondary level the classroom-student ratio of 1:69 is slightly above the standard.

The total annual enrolment population in the elementary level has been increasing in the past five years, with an average growth rate of 4.5%. However, there are schools with decreasing enrolment such as ANGLAG, Lanipga and Polog.

#### (8) Peace and Order

The peace and order situation in the municipality is relatively peaceful despite the suspected resurgence of insurgency in nearby municipalities and mountain barangays.

The local PNP has a manpower complement of 28 police officers; a police-population ratio of one (1) policeman per 2,135 population. This existing police-population ratio (1:2,135) is substandard compared to the ideal standard of 1:500 of the minimum standard of 1:1,000.

Homicide recorded a total of 19 incidences in the past five years. In the same period, frustrated murder and homicide recorded 15 and 43 cases, respectively.

The past five years records showed an increasing trend in the number of crime volume, increasing by 95.45 % from 1995's 110 cases to 215 cases in 1999.

The Bureau of Jail Management and Penology (BJMP) has twenty-one jailguards and three (3) detention cells located in the Municipal Building.

The Bureau of Fire Prevention (BFP) maintains a fire station with six (6) firemen and two (2) fire trucks. There is only one (1) recorded fire incidence in the municipality in the past five years, this happened in 1995 with the identified cause as arson.

#### (9) Housing/ Shelter

The proximity of the municipality of Consolacion has become convenient for the residential land requirements of the Metro Cebu city, Mandaue and Lapu-lapu cities.

Squatters (800 to 850 households) from Cebu City were relocated to sites located in Brgys. Pulpogan, Casili, and Cansaga.

There are an increasing number of commercial and industrial establishments, which have contributed to the increasing number of population and households requiring residential space.

Based on NSO census, Consolacion's 1999 household population was 49,205 with 9,996 households; a household size of 4,925 person per household. With a growth rate of 3.97 %

the 2000 and 2010 projected population will be 59,779 and 91,736 respectively.

The 1990 NSO showed 1,115 dwelling units occupied by 7,912; a ratio of 1.018 households per occupied housing units. Except for the Number of Population and Household, the 1995 NSO census did not include data in Housing.

The housing units were predominantly single detached as it comprised 97% of the total number of occupied housing units. The remaining 3 percent were duplex and multi-unit residential buildings.

## (10) Agriculture

### 1) Existing Situation

The land area of Consolacion is approximately 3,900 hectares. Agricultural land is generally classified as marginal, with very shallow to soil and low organic matter content and natural soil fertility. Around 60% of its land area has a slope of more than 35%, which makes it less suitable to cultivation because of its high erosion potential. Around 10% is classified as marginal while more than 60% is not suitable to agricultural production because of the presence of considerable amount of surface rocks, which also reduces the effective farming area.

Despite these conditions, Consolacion is still considered as basically agricultural land. More 95 % of the barangays are croplands

### 2) Crop Production

Crop production areas increased by 37.5% for 1995's 640 hectares to 880 hectares in 1999. Corn lands increased by as much as 60%, which made possible increased in production by 95 %. However, its yield still remain 0.90 MT/hectares. This increase in production yield was attributed to intensified vegetable technology.

Like the rest of the province, Consolacion's cropping system is corn-based. There are 16 barangays that still raise corn as basic commodity. Its production yield of 1.0 metric ton per hectare is similar to the provincial average. The number of cropping in a year has increased to 3 as compared to the last two cropping which was two.

Aside from corn, annual crops like vegetable and root crops are produced. Among the root crops are cassava and camote which remarkably exceeds the annual provincial average production per hectare. Except for the root crops, which are favored in these marginal lands, all other crops had to be provided intensive cultural management practices to increase production.

Among the perennial crops, mango remains as the highest income earner at limited labor



input.

### 3) Livestock and Poultry

Livestock and poultry production in Consolacion is considered an important component of Consolacion's agriculture. Livestock raising, particularly cattle, is considered as a backyard undertaking. Cattle are grazed in open grasslands and under the coconut groves. Lamac and Cabangahan produce the most number of cattle per unit area at a ratio of at least 9 cattle per hectare.

Swine production is traditionally raised at backyard level. However, the proximity of the town to the consumer centers of Cebu makes commercial raising so enticing to entrepreneurs. There are at least 4 commercial swine raisers in Consolacion with an aggregate population of around 300 thousand heads.

In 1999, livestock and poultry were able to generate/produce an equivalent meat production of 5,273.67 metric tons.

### 4) Fishery

The annual fish production from marginal fishermen generated 540 metric tons of fish.

## (II) Commerce

### 1) Profile of the Business Establishments in Consolacion

There are 131 registered business establishments in Consolacion, 43% of which are in the service sector while 20% are retailers, dealers and traders. Only about 17% are manufacturers while 14.5% are into food processing and food production. These establishments registered approximately total sales of Ph 60,309,096.59 in 1996 and have contributed about Ph 390,372 in taxes.

About 57% of the service establishments are located in the Poblacion Oriental and Occidental, Casili, Pulpogan, and Danglag. These areas are classified as residential and commercial zones. Other service establishments are located in areas designated as industrial zones complemented with agriculture and fishery.

The retailers, dealers and traders are located in Poblacion Oriental and Occidental, Casili, and Pulpogan. About 61% of the establishments are in these areas, which are identified for residential and commercial use, complemented with agriculture.

The establishments in the manufacturing sector are predominantly located in the industrial zone Barangays Pitogo, Tugbongan, Cansaga, and Tayud. About 68% are found in these barangays.

Seventy-four percent of the establishments in the food processing/production sector are

located in Poblacion Occidental and oriental, and Danglag: areas, which are reserved for residential and commercial purposes.

## (12) Industry

### 1) Existing Situation

The strategic location of Consolacion makes it a convenient place for industries. Its proximity to Cebu City makes it an easy alternative for business investors.

It shares with Cebu City, Mactan, and Mandaue City major infrastructure facilities such as seaports, airport, and telecommunication system.

An abundant water supply is also a major factor why firms are attracted to the area. No major power problems are imminent and almost all the barangays are already energized.

Peace and order situation in the area is also an important advantage, along with the well-implemented education program.

### 2) Constraints

Although support infrastructure facilities are already in place, there is still an inadequate garbage disposal system, and fully efficient drainage system had yet to be installed. The high cost of lands may deter investors from finding suitable locations within the municipality.

### 3) Environmental Concerns

- Solid waste disposal system
- Rise in the number of vehicles
- Water pollution problems
- Watershed degradation

## (13) Impact Barangay Tayud

### 1) Profile

The land area of the barangay is 344.2 hectares with 1,373 households and a total population of 6,629 as of the 1995 NSO increasing to 8,503 in the present and projected to reach 12,072 by the year 2010. The estimated annual income of the barangay is Ph 600,000.00 including IRA.

It is classified as Industrial Zone with six (6) shipyards, four (4) rattan & wrought iron companies, 1 stone craft, 7 poultry raising, 1 Meke factory, 7 fishponds and 2 piggeries.

It has a complete elementary school with a total enrollment of 354 and a secondary Barangay school with an enrollment of 626 as of SY 1999 -2000.

The barangay has one (1) Health Station with two (2) health workers. The MSWD has serviced the barangay with eighty-eight (88) Family Life Education & counseling, fifty (50) supplemental feeding and one (1) day care center.

The barangay has one (1) subdivision, "Marian Village" located in a 4.538 has in 26 lots.

Being the largest barangay in Consolacion, it is a sub-parish with a resident priest and a church. Located also in the barangay are the Missionary Society of the Philippines Seminary and the Contemplative Poor Clare Sisters.

**2) Tayud Barangay Officials 1997 -2002**

Barangay Captain	Hon. Benedicto R. Abucay, Sr.
Barangay Kagawad	Hon. Wilfredo L. Ibale
	Hon. Jimmylito J. Soco
	Hon. Victor G. Abucay
	Hon. Bonifacio C. Lauron
	Hon. Nestor E. Ruiz
	Hon. Renante A. Trangia
	Hon. Fredelino P. Soso
Sangguniang Kabataan	Hon. Nicole Alectis B. Villo
Barangay Secretary	Mr. Silvestre S. Jungoy
Treasurer	Mrs. Elizabeth P. Lauron
Information Officer	Mr. Cruz Malon

## 2.4 Traffic Demands Forecast

### 2.4.1 Premise and Methodology of Forecast

#### (1) Premise of Forecast

##### 1) Ports for Analysis

Traffic demand forecast was carried out according to the three-area bellow.

Cargo and passenger of Cebu Baseport

Cargo and passenger of the New San Remigio Port

Cargo and passenger of Toledo port

##### 2) Target year

Target year for forecast was set at year 2020. Data for the need for planning, however, the result of analysis was carried out for years of 2005, 2010, 2015 and 2020. The data used for the future demand estimate is the past data in 10 years between 1990-2000.

##### 3) Data Revision

After the past data was checked, for the purpose of traffic forecast, the following adjustment are made.

- a. The passenger and cargo data between Cebu Baseport and Bohol Island was excluded from past data in order to keep the same quality of data.
- b. The conversion unit of the container volume of containers (TEU) was changed.

Original	Revised
18.5 ton/ TEU in 1998	12.3 ton/TEU
18.9 ton/TEU in 1999	12.3 ton/TEU
17.7 ton/TEU in 2000	12.3 ton/TEU

- c. Cebu Baseport consists of the government port and non-government port. Data of the non-government was excluded from forecast.
- d. Inbound bulk of domestic cargo increased 3.5 times in 1998 from 452,340 tons to 1,477,660 tons in 1999. It was caused by Cebu South Reclamation Projects of 200 ha. In the extreme case like this, the figures were corrected for years between 1997 and 2000.

Table 2.4.1-1 shows the cargo volume of the Baseport before and after the revision. Details broken to incoming and outgoing and to break-bulk, bulk and container cargo is in Appendix Table 2.4.1-1 'Detailed Cargo Type Throughput Cebu Baseport, 1990-2000'.

**Table 2.4.1-1 Historical Cargo Data Before and After Revision, Cebu Baseport**

Unit: Metric Tons

Year	Original Data			Revised Data		
	Domestic	Foreign	Passenger	Domestic	Foreign	Passenger
1990	3,574,541	516,301	3,471,280	3,572,696	550,872	4,098,854
1991	4,210,956	343,498	3,890,632	4,214,747	262,921	3,890,632
1992	4,160,438	487,802	4,142,352	4,160,424	487,843	4,142,362
1993	4,078,625	351,704	4,276,358	4,073,895	351,669	4,276,358
1994	4,321,730	491,738	5,246,008	4,320,846	491,737	5,246,008
1995	4,751,771	646,419	5,484,621	3,998,244	801,336	6,334,552
1996	4,457,863	562,831	7,502,086	4,468,156	747,829	7,502,086
1997	4,555,357	930,430	9,517,438	4,755,554	683,188	9,517,438
1998	5,732,777	822,471	10,279,804	5,821,570	853,290	10,279,804
1999	6,567,406	884,561	10,611,922	5,690,476	863,023	10,432,761
2000				5,515,566	1,144,631	10,059,048

(2) Methodology

1) Cebu Baseport

a. Macro Analysis

Transport demand volume is forecasted through macro analysis and micro analysis. Future demand is closely related to socio-economic activities in the port hinterland. Therefore the following method was used for macro analysis

- Cargo transport demand is forecasted by correlative analysis between GRDP of the hinterland and cargo handling volume at Cebu Baseport.
- Cargo transport demand is forecasted by containerized cargo volume of commodities basis and number of containers thereof estimated by using containerization ratio considering the following impacts and generated components.
  - Bulk cargo volume has been small quantity, tentatively it is included as parts of the conventional cargo
  - Diversion of Manila Transit Cargo
  - Diversion of Traffic from Visayas Region
  - Influence of Development of the new San Remigio port and Toledo port
- Passenger traffic demand is forecast by correlative analysis between the growth of population of the hinterland as case 1 (covering direct hinterland) and case 2 (covering indirect hinterland) and embarking/disembarking totaled traffic volume of passengers at Cebu Baseport.

b. Micro Analysis

Micro analysis estimates the transport demand in the case of "with project". As for cargo demand estimation;

- Demand forecast of 18 specific commodities which have selected because of the closed relation with the growth of traffic volume with the economic indicators is estimated by the correlation with the socio-economic indicators based on the past trends and by the balance of supply and demand.
- Demand forecast of passenger traffic is estimated by types of service and by trip of movement of passengers using five different types of vessels calling to the Cebu Baseport.

#### c. Selection of Traffic Demands for the Study Based on Macro and Micro Analysis

Estimated figures between the macro analysis and the micro analysis are differed.

The detailed microanalysis based on the 18 commodities basis of domestic and 12 commodities of foreign cargo is considered more accurate and reflective cargo movements through the port. Thus the result thereof are used for the project analysis. Cargo forecast for the long-term plan was carried out in three cases as low, medium, and high, due to future uncertainty. Here the medium case is adopted.

Regarding the passenger traffic the forecast by the type of vessels is considered that micro projection above proposes to use for the plan of the project and its evaluation, since passenger traffic volume will be sensitive to characteristics of vessel types and to quality of service thereof.

### 2) Outports

#### a. Cargo Demand

Projection of cargo demand is estimated by considering normal traffic, diverted traffic and by development traffic. Then they are added together for the estimation.

- Normal traffic is estimated by GRDP correlation by economic sectors, and by main commodities.
- Diverted traffic is estimated for relative advantage of the use of land transport along with sea transport.
- Development traffic is estimated by considering additionally developing traffic by economic activities in the hinterland and by development of RORO route projects.

#### b. Passenger Traffic

Passenger demand is totaled by combining each estimates of the normal traffic, diverted traffic and development traffic. Projection of each traffic is based upon the same method as in the case of cargo, in which the population is replaced with the GRDP for cargo.

## 2.4.2 Socio-economic Frame Work

### (1) Population

National Statistical Coordination Board (NSCB) provided *1995 POPCEN-Based National and Regional Population Projections* as the official figures for planning and programming in *NSCB Resolution No. 05-97* issued on 21 March 1997, which contains the summary of projected Philippine population, annual geometric population growth rates and others.

Only total population of the Philippines by region as of May 1, 2000 is updated National Economic and Development Authority (NEDA) in 2001 while other figures remain as projection in the said resolution.

Projection of population by region may be assumed using the updated data of May 1, 2000 and growth rates by five-year provided in the resolution. Growth rate of newly established Caraga region (Region 13) is unfortunately not provided in the resolution therefore an average growth rate of surrounding regions is applied for projection.

Future trend of population by region are shown in Table 2.4.2-1.

**Table 2.4.2-1 Future Trend of Population by Region**

	2000 (May 1, 2001)	2005 growth rate	2010 growth rate	2015 growth rate	2020 growth rate
NCR	9,932,560	1.64%	11,470,282	1.26%	12,013,663
CAR	1,365,220	2.09%	1,658,481	1.84%	1,790,179
Region 1	4,200,478	1.60%	4,872,399	1.39%	5,161,631
Region 2	2,813,159	1.88%	3,342,778	1.60%	3,562,263
Region 3	8,030,945	1.85%	9,505,423	1.55%	10,119,547
Region 4	11,793,655	2.54%	15,074,775	2.43%	16,947,840
Region 5	4,674,855	1.67%	5,468,252	1.49%	5,821,543
Region 6	6,208,733	1.71%	7,283,924	1.51%	7,758,351
Region 7	5,701,064	1.84%	6,757,759	1.59%	7,222,826
Region 8	3,610,355	2.00%	4,362,307	1.82%	4,722,639
Region 9	3,091,208	2.25%	3,808,964	1.97%	4,135,780
Region 10	2,747,585	2.21%	3,380,595	1.98%	3,681,501
Region 11	5,189,335	2.35%	6,450,836	2.05%	7,028,477
Region 12	2,598,210	2.24%	3,190,527	1.91%	3,445,578
Region 13	2,095,367	2.26%	2,584,425	1.98%	2,806,863
ARMM	2,412,159	1.78%	2,852,244	1.60%	3,045,528
Others	2,851				
<b>Philippines</b>	<b>76,498,735</b>	<b>1.99%</b>	<b>92,069,186</b>	<b>1.75%</b>	<b>99,233,530</b>

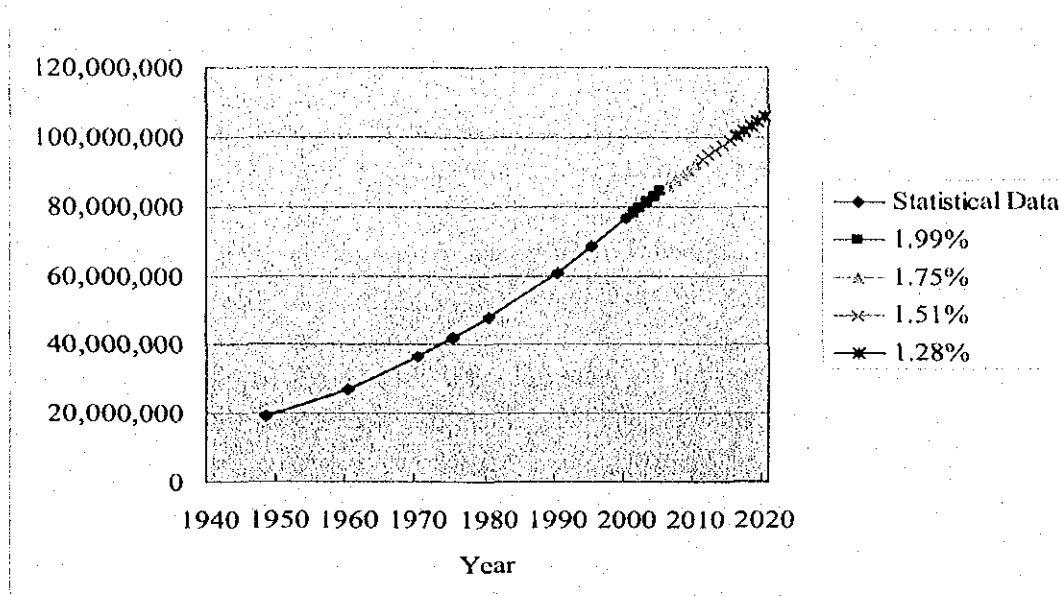
Source: 1995-Based National and Regional Population Projections + latest data of Census May 1, 2000

Notes: 1) Regional levels may not add up to National levels due to rounding.

2) Growth rates except Region 13 are provided in the source indicated in above.

3) Growth rate of Region 13 is estimated from an average of Region 9,10,11 and 12.

The future trend and population of the Philippines are shown in Fig. 2.4.2-1.



**Fig. 2.4.2-1 Future Trend and Population**

**(2) GDP**

“The World 2020, OECD” provided an average annual growth rate of 7% for 2001 - 2010, 6.4% for 2011 - 2020 and 6.9% for 1995 - 2020 for the high case for the East Asian Region which covers Chinese Taipei, Malaysia, Philippines and Thailand (see Table 2.4.2-2).

**Table 2.4.2-2 GDP Annual Growth Rate**

(unit: in percent)

	1996-2000		2001-2010		2011-2020		1995-2020	
	HG	LG	HG	LG	HG	LG	HG	LG
Chinese Taipei, Malaysia, Philippines, Thailand	7.7	6.1	7.0	4.8	6.4	4.2	6.9	4.8

Source: The World in 2020, OECD

These growth rates of 7.0% for 2000 - 2010 and 6.4% for 2010 - 2020 as the high projection may be applicable to the study as the most reliable and practicable alternative.

On the other hand, actual GDP and GRDP (Gross Regional Domestic Product) in real price at 1985 constant price for the period of 1985 - 2000 are shown in Table 2.4.2-3.

Data for the period of 1998 - 2000 are obtained from Economic and Social Statistics office, NSCB as of July, 2001 while others are from Philippine Statistical Yearbook 1998 and 2000.

The annual average growth rates of GDP and GRDP from 1985 to 2000 are obtained from the



Table 2.4.2-3. These growth rates may be applied for the case of low projection since these growth rates are the trend, which may be a minimum growth. The high projection growth rate of each GRDP may be assumed in pro-rata to GDP. Average growth rate of high and low projection may be applied for the case of medium projection.

Growth projections in the Medium-Term provided only for the period of 2001 - 2006 as shown in Table 2.4.2-4, Fig.2.4.2-2 and Fig. 2.4.2-3.

GDP and GRDP projection for the period of 2000-2010 and 2010-2020 is shown in Table 2.4.2-5, and future trend and GDP at 1985 constant prices are shown in Fig. 2.4.2-4

Table 2.4.2-3 GDP by Region (In million pesos: constant 1985 prices)

Region		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Share in 2000
	Philippines	571,884	591,423	616,926	658,583	699,449	720,691	716,523	718,942	734,156	766,368	802,224	849,121	893,151	888,001	918,161	954,962	100.0%
NCR	Metro Manila	164,246	169,358	180,609	197,266	214,663	221,753	220,972	215,465	216,149	227,348	242,167	256,000	272,991	272,316	280,862	296,859	31.1%
CAR	Cordillera Administrative			11,342	12,195	13,252	13,549	14,042	13,591	14,637	15,928	16,075	16,873	19,643	20,303	22,330	22,278	2.3%
Region 1	Ilocos Region	25,033	26,947	18,294	19,238	20,435	21,869	21,579	20,344	20,893	22,295	24,225	25,155	26,776	28,548	28,431	30,326	3.2%
Region 2	Cagayan Valley	15,309	15,668	13,087	13,994	14,725	15,548	14,714	13,974	14,460	15,428	16,142	16,712	18,450	17,506	21,512	21,600	2.3%
Region 3	Central Luzon	53,774	54,853	57,459	61,831	64,158	68,250	66,309	70,736	72,955	75,371	78,487	81,970	86,177	80,339	82,869	84,970	8.9%
Region 4	Southern Tagalog	82,165	86,473	90,978	98,333	104,972	109,509	109,844	113,545	114,787	120,155	125,248	134,814	140,913	139,144	141,083	144,996	15.2%
Region 5	Bicol Region	19,366	19,530	18,913	20,103	21,041	21,687	21,734	21,902	22,422	23,087	23,517	24,625	26,041	25,626	25,935	25,918	2.7%
Region 6	Western Visayas	42,418	43,554	44,858	46,699	50,113	50,747	50,451	53,331	55,487	57,050	57,597	61,098	61,627	61,962	65,380	67,001	7.0%
Region 7	Central Visayas	35,754	37,680	39,662	43,107	45,813	47,193	46,971	47,086	47,757	49,663	52,327	56,615	59,926	61,174	63,101	65,031	6.8%
Region 8	Eastern Visayas	16,218	16,057	16,175	17,297	17,373	17,322	17,396	17,088	17,851	18,387	18,969	20,000	20,973	21,001	21,798	22,956	2.4%
Region 9	Western Mindanao	18,561	19,163	19,191	19,569	20,214	21,132	20,773	21,186	20,862	21,125	21,813	24,702	24,909	25,493	25,662	27,001	2.8%
Region 10	Northern Mindanao	32,412	33,239	34,381	35,603	37,313	37,099	37,104	37,345	37,913	39,726	41,866	42,752	39,736	34,192	34,876	36,515	3.8%
Region 11	Southern Mindanao	43,727	45,317	48,383	48,691	49,970	50,074	50,155	48,953	50,671	52,570	53,501	55,929	48,541	55,141	56,832	60,275	6.3%
Region 12	Central Mindanao	22,452	23,582	23,592	24,657	25,407	24,959	24,477	24,396	20,405	20,815	22,174	23,491	24,135	23,656	24,686	25,721	2.7%
Region 13	Caraga	-	-	-	-	-	-	-	-	-	-	-	-	13,731	12,825	13,599	14,336	1.5%
ARMM	Autonomous Region of Muslim Mindanao	-	-	-	-	-	-	-	-	6,908	7,420	8,116	8,386	8,582	8,775	9,207	9,179	1.0%

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		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	1985-2000
Philippines	GDP	571,884	591,423	616,926	658,583	699,449	720,691	716,523	718,942	734,156	766,368	802,224	849,121	893,151	888,001	918,161	954,962	Average
	Growth Rate (%)		3.42%	4.31%	6.75%	6.21%	3.04%	-0.58%	0.34%	2.12%	4.39%	4.68%	5.85%	5.19%	-0.58%	3.40%	4.01%	3.5%

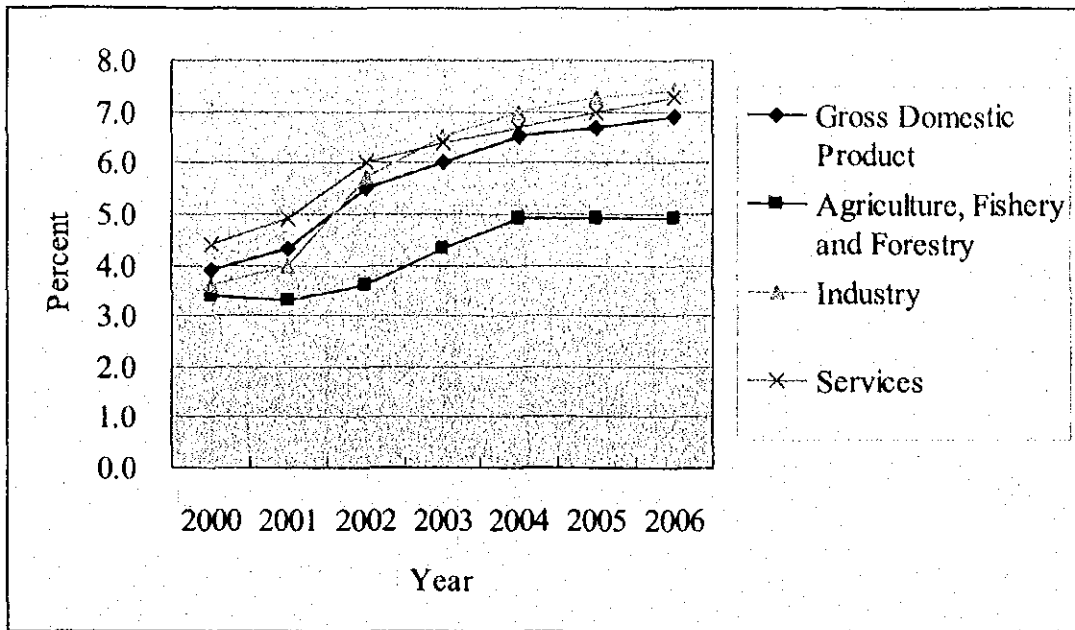
		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	1985-2000
Region 7	GDP	35,754	37,680	39,662	43,107	45,813	47,193	46,971	47,086	47,757	49,663	52,327	56,615	59,926	61,174	63,101	65,031	Average
	Growth Rate (%)		5.39%	5.26%	8.69%	6.28%	3.01%	-0.47%	0.24%	1.43%	3.99%	5.36%	8.19%	5.85%	2.08%	3.15%	3.06%	4.1%

Source : Philippines Statistical Yearbook 1998, 2000 and Economic and Social Statistics Office, National Statistical Coordination Board (As of July 2001)

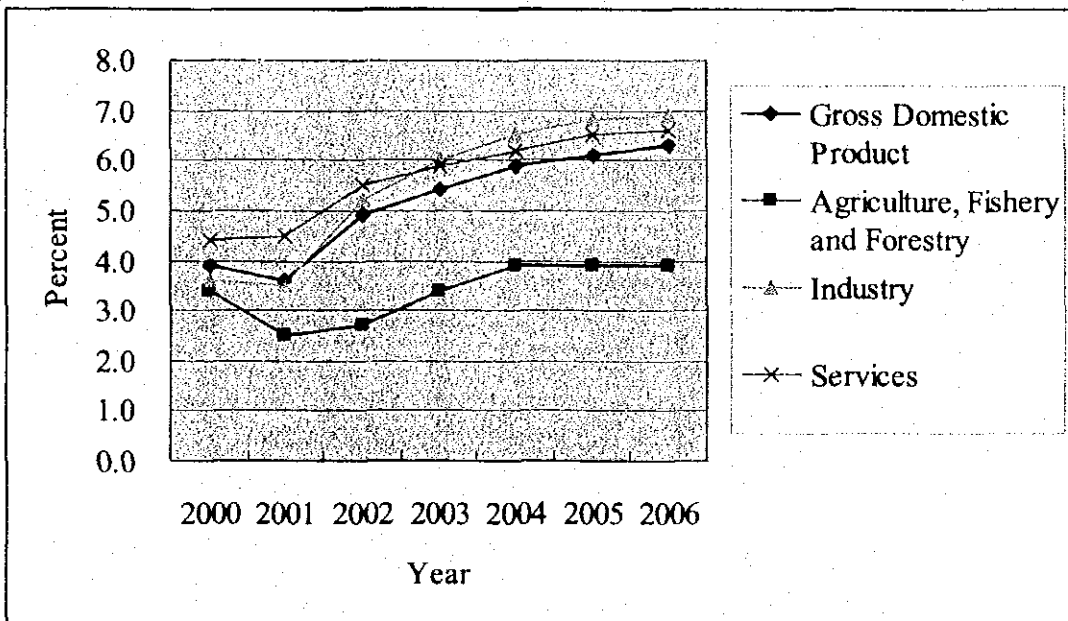
Table 2.4.2-4 Growth Projections in the Medium-Term, 2000 - 2006 (As of May 2, 2001)

	2000		2001		2002		2003		2004		2005		2006		2001-2006 Average	
	Actual	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	
<b>Gross National Product</b>	4.2	4.0	4.5	5.1	5.6	5.7	6.2	6.0	6.6	6.3	6.8	6.5	7.1	5.6	6.2	
<b>Gross Domestic Product</b>	3.9	3.6	4.3	4.9	5.5	5.4	6.0	5.9	6.5	6.1	6.7	6.3	6.9	5.4	6.0	
<b>Sectorial Breakdown (%)</b>																
Agriculture, Fishery and Forestry	3.4	2.5	3.3	2.7	3.6	3.4	4.3	3.9	4.9	3.9	4.9	3.9	4.9	3.4	4.3	
Industry	3.6	3.5	4.0	5.2	5.7	6.0	6.5	6.5	7.0	6.8	7.3	6.9	7.4	5.8	6.3	
Mining and Quarrying	8.7	5.0	5.5	6.0	6.5	7.0	7.5	7.0	7.5	7.0	7.5	7.0	7.5	6.5	7.0	
Manufacturing	5.6	4.5	5.0	5.4	5.9	6.0	6.5	6.2	6.7	6.3	6.8	6.4	6.9	5.8	6.3	
Construction	-6.0	-1.5	-1.0	4.0	4.5	6.0	6.5	6.0	6.5	10.0	10.5	10.0	10.5	6.1	6.6	
Utilities	3.7	3.5	4.0	5.6	6.1	6.0	6.5	6.0	6.5	6.0	6.5	6.5	7.0	5.6	6.1	
Services	4.4	4.5	4.9	5.5	6.0	5.9	6.4	6.2	6.7	6.5	7.0	6.6	7.3	5.9	6.4	
Transport, Communication and Storage	9.9	8.5	8.9	9.3	9.8	9.3	9.8	9.5	10.0	9.5	10.0	9.5	10.0	9.3	9.8	
Trade	5.6	5.5	5.8	5.6	6.1	5.8	6.3	6.0	6.5	6.0	6.5	6.0	6.5	5.8	6.3	
Finance	0.9	2.5	3.0	6.5	7.0	7.0	7.5	7.5	8.0	8.5	9.0	10.0	10.5	7.0	7.5	
O. Dwelling and Real Estate	0.3	1.5	2.0	3.1	3.6	4.0	4.5	5.0	5.5	6.0	6.5	6.0	6.5	4.3	4.8	
Private Services	4.7	4.4	4.9	5.5	6.0	5.6	6.1	5.8	6.3	5.8	6.3	6.0	6.5	5.5	6.0	
Government Services	0.9	0.5	1.0	1.0	1.5	1.6	2.1	1.8	2.3	2.0	2.5	2.8	3.3	1.6	2.1	
<b>Expenditure Breakdown (%)</b>																
Private Consumption	3.5	3.2	3.7	3.4	3.9	3.5	4.0	3.8	4.3	4.0	4.5	4.0	4.5	3.7	4.2	
Government Consumption	0.2	0.5	1.0	1.0	1.5	2.3	2.8	3.1	3.6	3.3	3.8	3.8	4.3	2.3	2.8	
Investments	0.8	2.6	3.6	6.9	7.4	9.7	10.9	11.8	12.0	12.9	13.1	14.2	14.5	9.7	10.2	
Exports	16.4	2.5	3.0	4.8	5.3	7.5	8.0	8.2	8.7	9.3	9.8	9.8	10.3	7.0	7.5	
Imports	2.4	5.3	5.8	5.9	6.4	6.9	7.4	8.3	8.8	8.6	9.1	9.4	9.9	7.4	7.9	
<b>Memo Items:</b>																
Nominal GNP, in billion pesos	3,505.2	3,665.6	3,920.8	4,263.6	4,390.0	4,708.6	4,920.7	5,216.8	5,534.4	5,793.1	6,238.4	6,445.9	7,045.7	5,048.9	5,341.7	
Net Factor income from Abroad real growth	9.0	8.7	9.0	8.0	8.5	9.3	9.8	8.5	9.0	8.6	9.0	8.9	9.4	8.7	9.1	
Inflation Rate(%)	4.4	6.0	7.0	5.0	6.0	4.5	5.5	4.5	5.5	4.5	5.5	4.5	5.5	4.8	5.8	
based on 1995 population census																

Source: National Economic and Development Authority



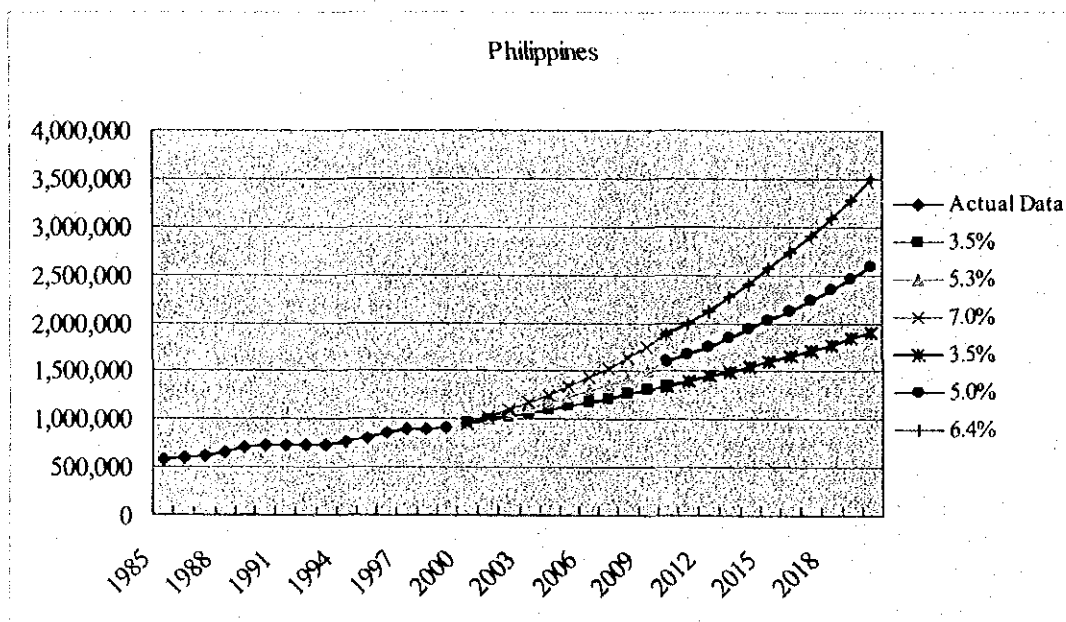
**Fig. 2.4.2-2 Medium-Term Targets as of May 2, 2001 - High Growth**



**Fig. 2.4.2-3 Medium-Term Targets as of May 2, 2001 - Low Growth**

**Table 2.4.2-5 GDP and GRDP Projection**

	1985-2000	1985-1990	1991-2000	2000-2010			2010-2020		
	Average	Average	Average	LG	MG	HG	LG	MG	HG
Philippines	3.5%	4.7%	2.9%	3.5%	5.3%	7.0%	3.5%	5.0%	6.4%
NCR	4.1%	6.2%	3.0%	4.1%	6.2%	8.2%	4.1%	5.8%	7.5%
CAR	5.4%	6.1%	5.2%	5.4%	8.1%	10.8%	5.4%	7.6%	9.9%
Region 1	1.9%	-1.2%	3.4%	1.9%	2.9%	3.8%	1.9%	2.7%	3.5%
Region 2	2.7%	0.7%	3.7%	2.7%	4.1%	5.4%	2.7%	3.8%	4.9%
Region 3	3.2%	4.9%	2.3%	3.2%	4.8%	6.4%	3.2%	4.5%	5.9%
Region 4	3.9%	5.9%	2.9%	3.9%	5.9%	7.8%	3.9%	5.5%	7.1%
Region 5	2.0%	2.3%	1.8%	2.0%	3.0%	4.0%	2.0%	2.8%	3.7%
Region 6	3.1%	3.7%	2.8%	3.1%	4.7%	6.2%	3.1%	4.4%	5.7%
Region 7	4.1%	5.7%	3.3%	4.1%	6.2%	8.2%	4.1%	5.8%	7.5%
Region 8	2.4%	1.4%	2.9%	2.4%	3.6%	4.8%	2.4%	3.4%	4.4%
Region 9	2.6%	2.6%	2.6%	2.6%	3.9%	5.2%	2.6%	3.7%	4.8%
Region 10	0.9%	2.8%	0.0%	0.9%	1.4%	1.8%	0.9%	1.3%	1.6%
Region 11	2.3%	2.8%	2.1%	2.3%	3.5%	4.6%	2.3%	3.3%	4.2%
Region 12	1.1%	2.2%	0.5%	1.1%	1.7%	2.2%	1.1%	1.6%	2.0%
ARMM	4.2%	-	4.2%	4.2%	6.3%	8.4%	4.2%	5.9%	7.7%
Region 13	1.6%	-	1.6%	1.6%	2.4%	3.2%	1.6%	2.3%	2.9%



**Fig. 2.4.2-4 Future Trend and GDP Forecast**