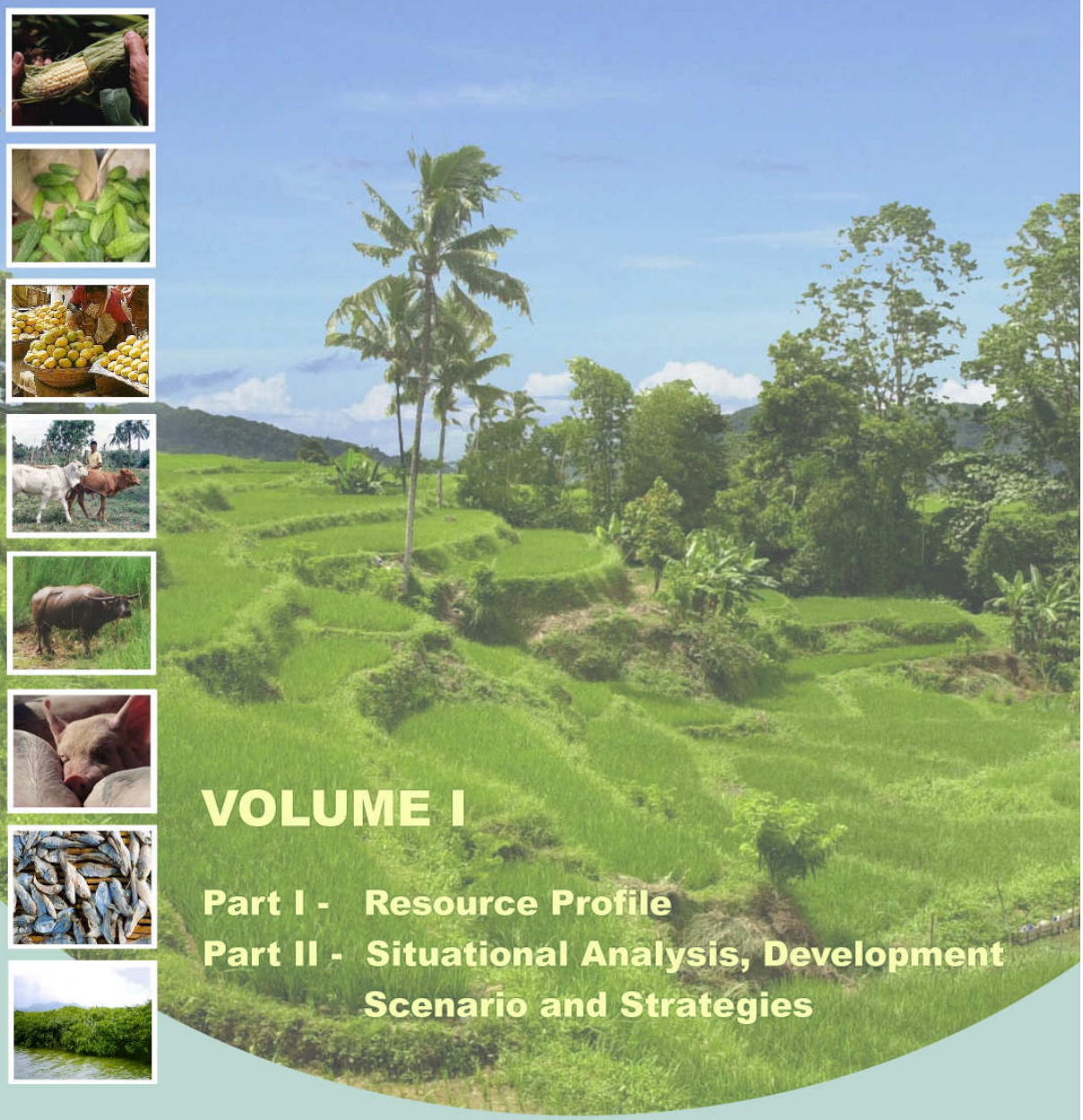

VOLUME I

Part I - Resource Profile
Part II - Situational Analysis, Development Scenario and Strategies

BOHOL AGRICULTURE MASTER PLAN CY 2006-2026

PAHRDF An Australian Government Initiative

Orient Integrated Development Consultants, Inc. (OIDCI)

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RESOURCE PROFILE

BOHOL AGRICULTURE MASTER PLAN: CY 2006-2026

BOHOL PROVINCIAL GOVERNMENT

PAHRDF An Australian Government Initiative

PART I
RESOURCE PROFILE

1.0 PHYSICAL AND NATURAL RESOURCE ATTRIBUTES

1.1 Location and Land Area

Created by virtue of Republic Act 2711 on March 10, 1917, the island province of Bohol is the tenth largest island in the country. Geographically, it lies between 123°40' and 124°40' East longitude and extends from 9°30' to 10°15' North latitude (refer *Figure 1-1*). This oval-shaped province is located in the central portion of the Visayas lying between Cebu to the northwest and Leyte to the northeast. To its south is the big island of Mindanao which is separated from Bohol by the wide Mindanao Sea. Aside from the mainland, Bohol has 61 smaller offshore islands and islets. Bohol is about 700 kilometers directly south of Manila and is about 70 kilometers southeast of Mactan Island.

1.2 Geomorphology

1.2.1 Geologic Features

Bohol may have been developed from the magnetic tectonic mechanism which resulted from the under thrusting of the southwest Philippine Plates east of Samar island and Surigao in Northern Mindanao. The Alicia Schist, the oldest known rock formation in the island, is inferred to be part of the Bohol crystal rocks before plate interactions. All the succeeding igneous extrusive and intrusive events in Bohol are the results of these resurging interactions. On-going erosion, transport and sedimentation continue to accumulate marine and terrestrial deposits in the Bohol basin.

Data provided by the Mines and Geosciences Bureau of DENR showed 11 major geologic formations in the Bohol mainland and offshore islands. The most extensive are Carmen formation, Maribojoc and Wahig limestones, Ubay volcanic and Kabulao conglomerates. These are shown in *Figure I-A* of the Annex report.

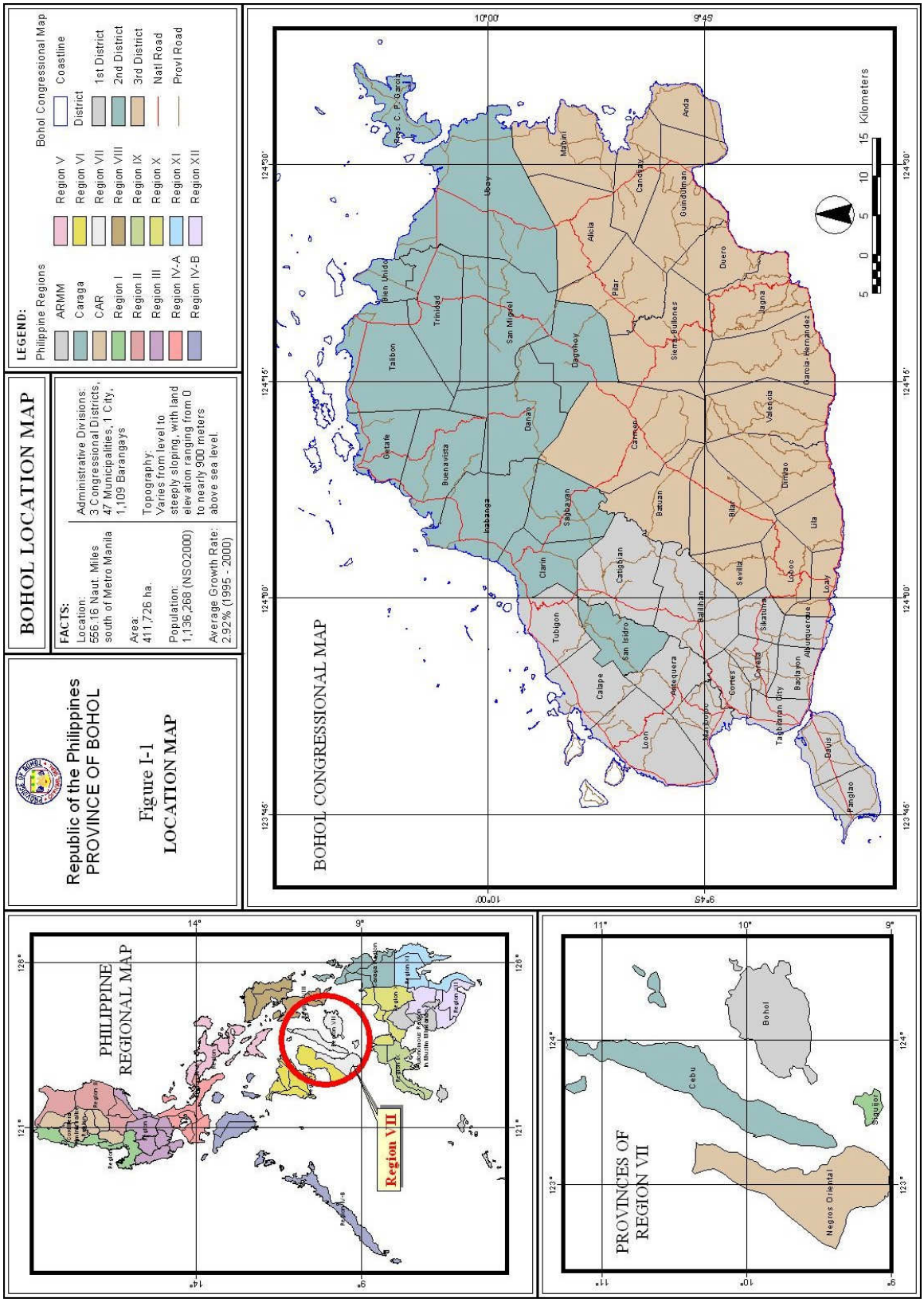
1.2.2 Physiography

Bohol's mainland exhibits the following salient physiographic units:

a) The east and west coast display northeast trending ranging up to 870 meters in elevation (Mt. Mayana) that drops steeply to the coast. These ranges reflect the major structural units of the island.

b) The central (Carmen area) and northern part of the island (Trinidad) are vast expanses of relatively rolling plains and flat lands.

c) The development of beautifully-arranged, symmetrically formed "haycock hills" in Carmen-Batuan and Bilar-Balilihan area in the east central part of the island is suggestive of well-defined system of shears and joints.


BOHOL LOCATION MAP
FACTS:
Location:
556.16 Naut. Miles
south of Metro Manila
Area:
411,726 ha.
Population:
1,136,268 (NSO2000)
Average Growth Rate:
2.92% (1995 - 2000)
Administrative Divisions:
3 Congressional Districts,
47 Municipalities, 1 City,
1,109 Barangays
Topography:
Varies from level to
steeply sloping, with land
elevation ranging from 0
to nearly 900 meters
above sea level.
LEGEND:
Philippine Regions
ARMM
Caraga
CAR
Region I
Region II
Region III
Region IV-A
Region IV-B
Region V
Region VI
Region VII
Region VIII
Region IX
Region X
Region XI
Region XII
Bohol Congressional Map
Coastline
District
1st District
2nd District
3rd District
Natl Road
Provl Road
Republic of the Philippines
PROVINCE OF BOHOL
Figure I-1
LOCATION MAP
BOHOL CONGRESSIONAL MAP
Kilometers
PHILIPPINE
REGIONAL MAP
Region VII
PROVINCES OF
REGION VII
Bohol
Cebu
Negros Oriental
Siquijor

d) An elongated cluster of hills of moderate height lies in the northeastern part of the island (Ubay area).

e) An east-west ridge connects Alicia with Carmen.

f) The Anda Peninsula and Loon Peninsula strongly suggest elevated plateaus.

g) At least five different Plio-pleistocene terrace levels ranging in height from 10 to 300 meters have been etched both in Carmen sandstone and shales and Maribojoc limestone.

h) The "Ilihan Plug" south of Tubigon, with an elevation of 240 meters above sea level, presents a unique geomorphologic element. At a distance, this plug is suggestive of a limestone hill with cliffy margins.

The detailed physiographic description by land system in each municipality of Bohol Province is provided in *Table I-A.1* of the Annex report.

1.2.3 Major Drainage Systems

There are several rivers in Bohol, the largest of which are the Loboc River in the southern part and the Inabanga River in the north. Major drainage systems in the province include the following:

River System		Estimated Drainage Area
a) Loboc River	. . . . .	160 sq. kms. of watershed
b) Abatan River	. . . . .	350 sq. kms. of watershed Empties south of Bohol
c) Inabanga River	. . . . .	570 sq. kms. of watershed
d) Ipil River	. . . . .	250 sq. kms. of watershed Empties northward

The drainage pattern is generally radial. The west is drained by the Abatan River and Wahig River; the north by Salog, Ipil and Soom Rivers; the east by the Mabini and Guindulman Rivers; and the south by the Loboc-Loay, Jagna and Garcia Hernandez Rivers (refer to *Figure I-B* of the Annex Report). These rivers, however, are not important for navigation purpose.

1.2.4 Mountain Ranges

There are two sets of mountain ranges located between the municipalities of Alicia and Ubay on the northeastern side of the mainland which generally trend to the north and south directions. The first range attains a maximum elevation of 404 meters above sea level (masl) while the second range of elongated clusters of hills has a maximum elevation of about 120 masl. The northern end of the mountain range is drained by the Lomangog River while the southern end by the east-flowing San Pascual River, which empties into Cogtong Bay (refer to *Figure I-B*).

About two kilometers south-southwestward from Tubigon is Mt. Ilihan which is 240 meters high with steep, almost bufflike sides. Farther east are two mountain ranges, Mt. Tanawan and Mt. Candungao, with 460 and 500 meters elevation, respectively. Both are prominent landmarks rising several meters above the surrounding countryside. From Mt. Tanawan going southwestward, the range presents a monotonous karst topography, declining gradually in height until finally it joins the foothills about 4.5 kilometers southwestward of Calape. The main range of hills extending from Calape joins the southwestward trending mountain range from the interior, runs south and out to Loon Peninsula terminating in Punta Cruz (Maribojoc).

The Sierra Bullones Range follows roughly the trend of the south coast. It commences from the vicinity of Loboc and Biabas, Candijay. The highest point of this range and in the entire province is Mt. Mayana. Other prominent peaks found in this range are Mts. Gorda, Amicay and Binalao.

1.3 Climatology

1.3.1 Climate and Rainfall Pattern

The climate of Bohol falls under the 4th Type of Corona's climatic classification, characterized by rainfall more or less evenly distributed throughout the year. Rainfall distribution is influenced by the prevailing air streams, the intertropical convergence zone (ITCZ) and the island's topography.

Using the rainfall normal values of the PAGASA-Tagbilaran Station (1971-2000), the data show a mean annual rainfall of 1, 360. 2 mm, or equivalent to 3.73 mm per day, and this is insufficient to sustain the moisture needs of corn at 7.0 mm/day. The lowest monthly average rainfall occurs in March at 62.8 mm with about 10 rainy days (although the least number of 8 rainy days occur in April), while highest rainfall occurs in November at 182 mm with 18 rainy days (*Table I-1*). This minimum and maximum average rainfall is equivalent to about 2.27 mm/day and 6.07 mm/day, respectively.

The southwest monsoon usually starts from the month of July until October, the wettest months which collectively account for 726.8 mm rainfall or 53 % of the total annual average precipitation. Based on the observation of local residents, rainfall distribution and intensity varies over the province with the interior mountainous landscapes receiving greater rainfall as compared to the coastal and offshore islands. There are no data, however, to quantify the variations in rainfall pattern and intensity.

1.3.2 Temperature and Relative Humidity

Table I-1 shows that the mean temperature regime in Bohol is 27.7 °C; the lowest temperature at 26.5 °C in January with 83 % relative humidity, and the highest temperature at 28.7 °C with 79 % relative humidity during May. The highest average relative humidity of 85 % is recorded in November, the wettest month of the year.

Table I-1. Climatological Normal Values for Bohol Province, 1971-2000

Month	Rainfall		Temperature			Relative Humidity (%)	Wind	
	Ave./Mo. (mm)	No. of Rainy Days	Maximum (°C)	Minimum (°C)	Mean (°C)		Speed (mps)	Direction
Jan	103.1	14	30.8	22.1	26.5	83	2	NE
Feb	78.7	11	31.3	22.0	26.6	81	2	NE
Mar	68.2	10	32.1	22.2	27.1	79	2	NE
Apr	69.6	8	33.0	23.1	28.0	78	1	NE
May	75.1	10	33.3	24.1	28.7	79	1	S
Jun	112.3	15	32.6	24.1	28.4	81	1	S
Jul	118.8	14	32.3	24.1	28.2	81	2	S
Aug	111.8	13	32.7	24.3	28.5	80	2	S
Sept	135.5	15	32.5	24.1	28.3	81	1	SW
Oct	178.7	18	32.1	23.8	27.9	84	1	S
Nov	182	18	31.7	23.3	27.5	85	1	NE
Dec	126.3	16	31.2	22.7	27.0	84	2	NE
ANNUAL	**1360.2**	**162**	**32.1**	**23.3**	**27.7**	**81**	**2**	**NE**

Source: DA-BSWM, May 2005 (based on the PAGASA Tagbilaran City Station date for 1971 – 2000).
(Latitude : 09° 38' 36" N, Longitude: 123° 18' 18" E, Elevation : 6.0 m)

As per observations, the coastal zones of the province are comparatively warmer than the interior and higher elevation areas, which are colder especially during night time and early morning.

1.3.3 Wind Speed and Direction

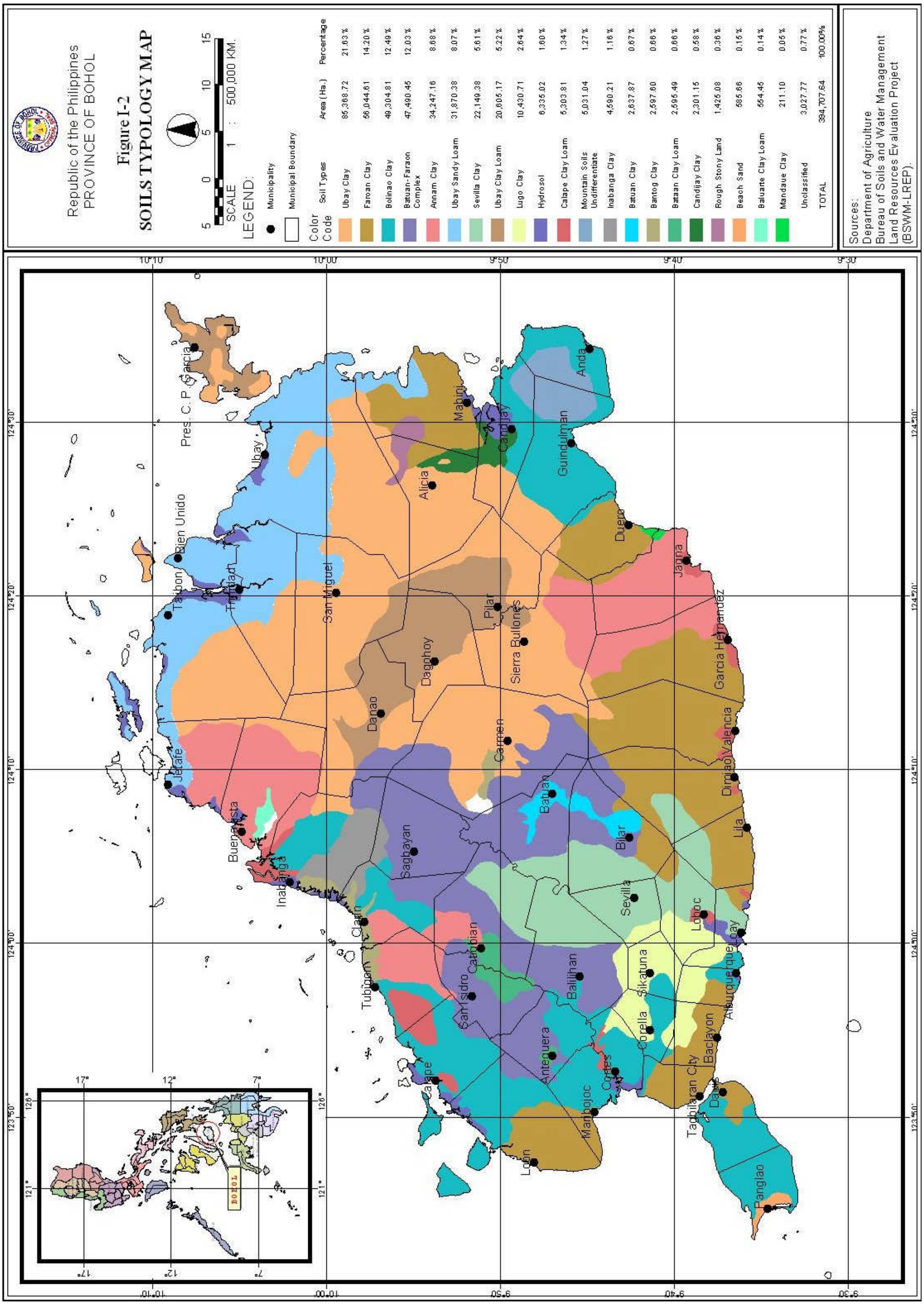
The prevailing wind direction from November to April is towards northeast with average speed of 2 miles per hour (*Table I-1*). The months of May to October experience gentler winds oriented southward.

Bohol is outside of the "typhoon belt" zone of the country, as typhoon rarely passes the province. However, typhoons passing below or above the island bring about greater volume of precipitation. The frequency of typhoon passage is 0-10 % from an average of 20 typhoons passing over the Philippines each year.

1.4 Land Resource Base

1.4.1 Soils

Figure I-2 shows the occurence, extent of distribution and area coverage of each of the 22 soil types within the province as based from the Bureau of Soils and Water Management - Land Resources Evaluation Project (BSWM-LREP) report. Of these soil typologies, the most extensive is Ubay clay occuring from the central (Carmen and Sierra Bullones) to the north and northeastern (San Miguel to Alicia) and northwestern areas. Faraon clay predominates at the southern municipalities of Lila, Dimiao, Valencia and Garcia Hernandez. The other soil types with relatively larger area coverages include the Batuan-Faraon complex, Ubay clay loam, Sevilla clay and Annam clay.


Republic of the Philippines
PROVINCE OF BOHOL
Figure I-2
SOILS TYPOLOGY MAP
SCALE 1 : 500,000 KM.
LEGEND:
Municipality
Municipal Boundary
Color Code | Soil Types | Area (Ha.) | Percentage
Ubay Clay 85,368.72 21.63%
Faraon Clay 56,044.61 14.20%
Bolinao Clay 49,304.81 12.49%
Batuan-Faraon Complex 47,490.45 12.03%
Annam Clay 34,247.16 8.68%
Ubay Sandy Loam 31,870.38 8.07%
Sevilla Clay 22,149.38 5.61%
Ubay Clay Loam 20,605.17 5.22%
Lugo Clay 10,430.71 2.64%
Hydrosol 6,335.02 1.60%
Calape Clay Loam 5,303.81 1.34%
Mountain Soils Undifferentiate 5,031.04 1.27%
Inabanga Clay 4,590.21 1.16%
Batuan Clay 2,637.87 0.67%
Bantog Clay 2,597.60 0.66%
Bataan Clay Loam 2,595.49 0.66%
Candijay Clay 2,301.15 0.58%
Rough Stony Land 1,425.08 0.36%
Beach Sand 585.66 0.15%
Baluarte Clay Loam 554.45 0.14%
Mandaue Clay 211.10 0.05%
Unclassified 3,027.77 0.77%
TOTAL 394,707.64 100.00%
Sources:
Department of Agriculture
Bureau of Soils and Water Management
Land Resources Evaluation Project
(BSWM-LREP).

There is relatively thin or shallow soil mantle over Bohol, with bedrocks randomly cropping out even at the valley and shore areas. Over most of the hillsides and ridges are meager to zero soil cover. This may be due to the fairly rapid surface drainage over most of the province's land area. The soils derived from the weathering of rock types are generally clay and silty with sandy soils limited to some coastal areas.

The distribution of each soil type in terms of land topography or relief is detailed in *Table I-A.2*, while *Table I-A.3* summarizes the other basic soil attributes such as soil depth, texture and fertility status. As indicated, the moderately deep (24-60 cm) soils occur in Candijay, Garcia Hernandez and Tubigon, and the rest of the city/ municipalities have very shallow to shallow soils. In terms of fertility status, adequate Nitrogen soil content is evident only in Baclayon and Cortes while low to medium level occur in all other municipalities. Soil content for Phosphorus and Potassium ranges from possibly deficient to adequate levels.

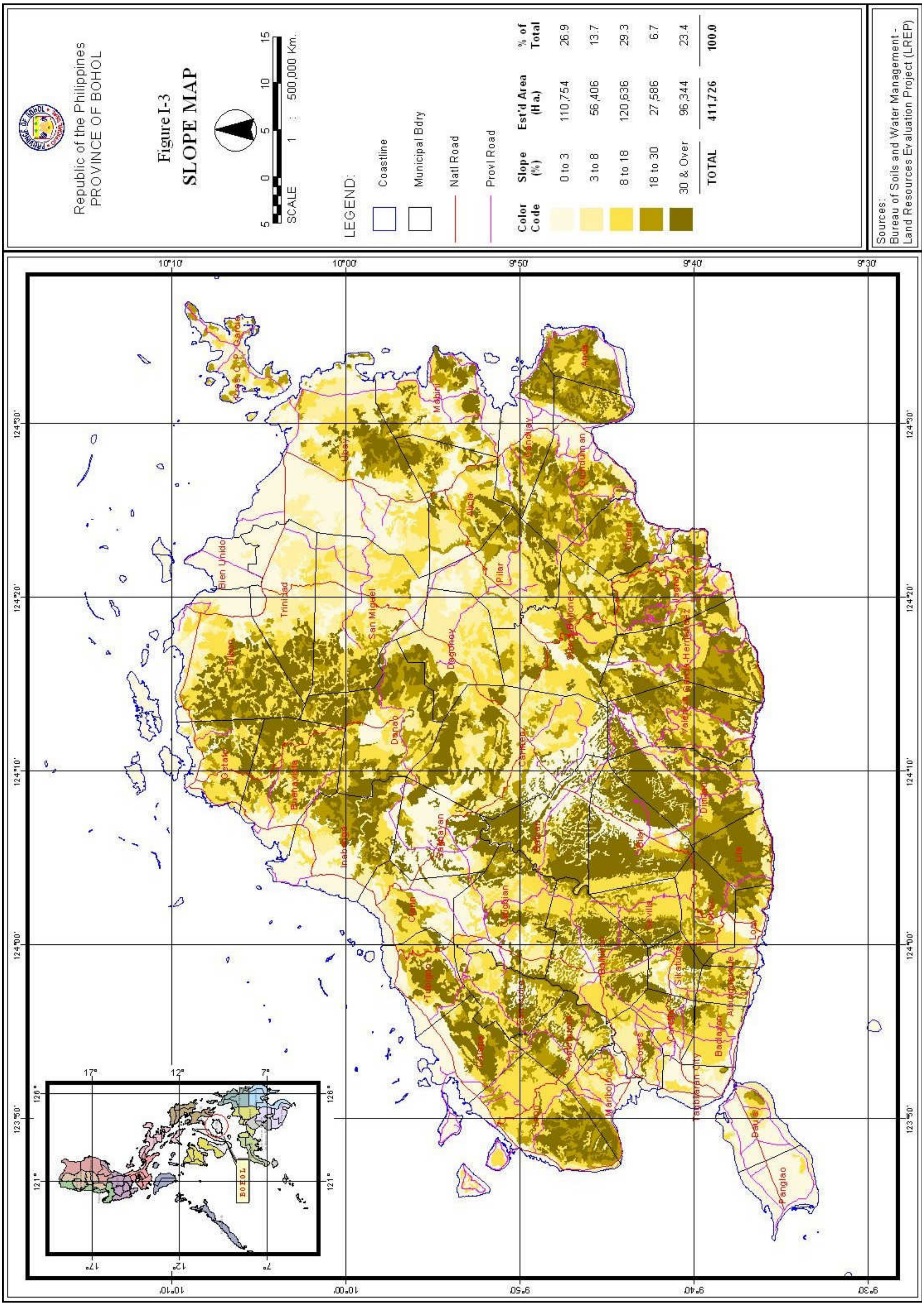
1.4.2 Slope

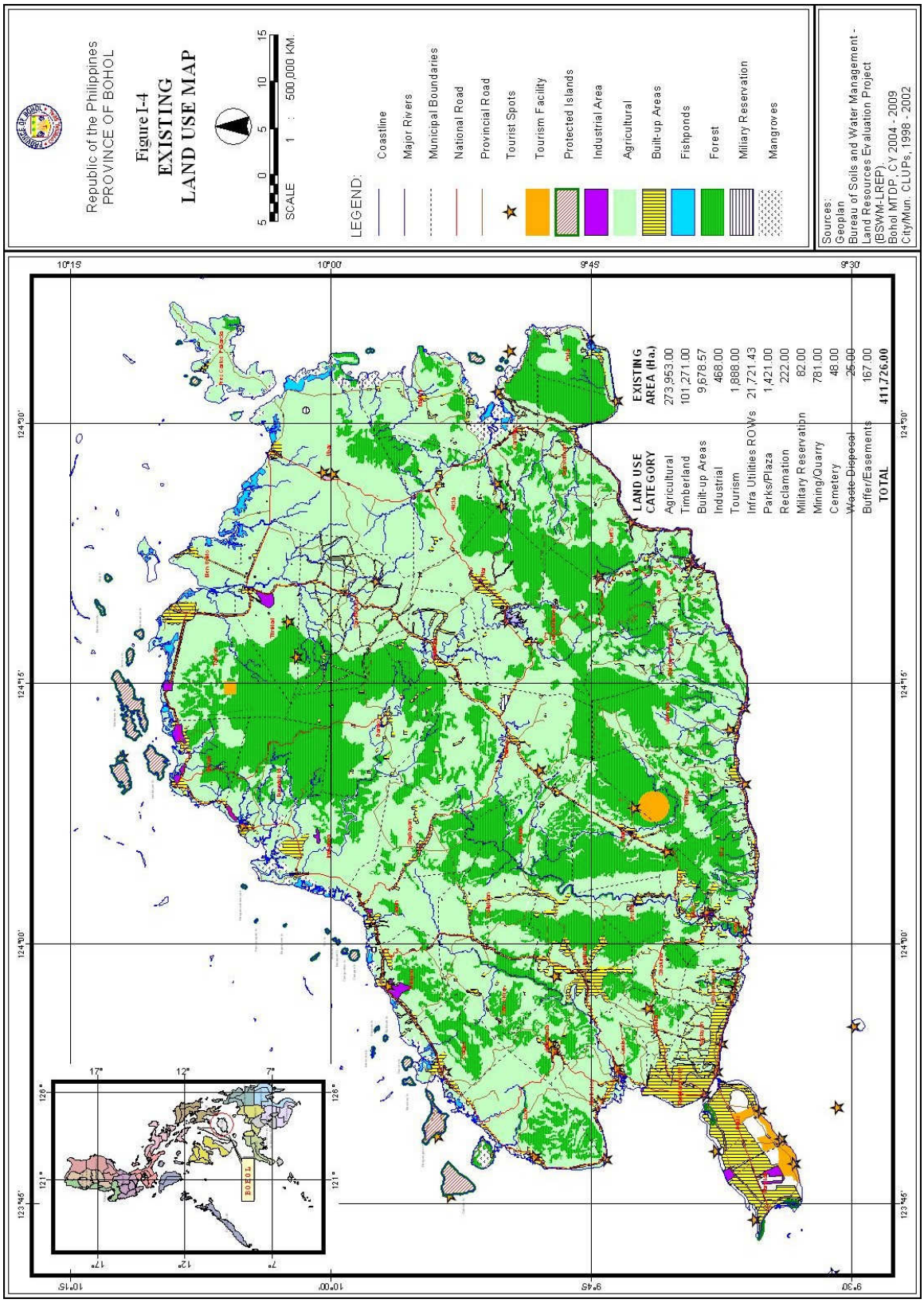
Approximately 167,160 hectares or 40.6% of the total provincial land area have slope gradients of 0-8%, largely covering the central to northern areas which comprise the prime agricultural zone utilized for irrigated and rainfed palay and corn production. The areas with 8-18% slopes accounted for 29% (about 120,636 hectares), mostly coconut, corn and subsistence crops and open/idle or Imperata-dominated and eroded land areas. The rolling to mountain areas with slopes of 18% and above cover 123,930 hectares or 30% of Bohol land area. As shown in *Figure I-3*, these areas generally cover the remaining timberlands and classified forests in the province. Due to increasing population and economic pressures, it is noted that areas with slopes of 18% and above have been disturbed and exploited particularly for subsistence agricultural purposes.

1.4.3 Land Classification and Existing Land Use

Based on the DENR-PENRO data and as presented in *Figure I-C* of the Annex report, approximately 101,271 hectares or 24.6% of Bohol's land area is classified as public domain lands which include the forests, mangroves, national parks and reservation lands (refer *Section 1.5 Forest Resources* for detailed discussion). The alienable and disposable lands therefore would account for 75.4% of the provincial land area including its offshore islands and islets.

Table I-2 and *Figure I-4* provides the existing general land use in the province as analyzed from the Bohol Medium Term Development Plan (MTDP) and available City/Municipal Comprehensive Land Use Plans (CLUP). Of the total land area, approximately 66% or 273,950 hectares are utilized for agricultural production, mainly palay, corn, coconut and oil palm, vegetables and rootcrops. As mentioned earlier, the existing forestland accounts for 24.6% of the total land area.


Republic of the Philippines
PROVINCE OF BOHOL
Figure I-3
SLOPE MAP
SCALE
1 : 500,000 Km.
LEGEND:
Coastline
Municipal Bdry
Nat'l Road
Prov'l Road
Color Code
Slope (%)
Est'd Area (Ha.)
% of Total
0 to 3 110,754 26.9
3 to 8 56,406 13.7
8 to 18 120,636 29.3
18 to 30 27,586 6.7
30 & Over 96,344 23.4
TOTAL 411,726 100.0
Sources:
Bureau of Soils and Water Management -
Land Resources Evaluation Project (LREP)


Republic of the Philippines
PROVINCE OF BOHOL
Figure I-4
EXISTING
LAND USE MAP
SCALE 1 : 500,000 KM.
LEGEND:
Coastline
Major Rivers
Municipal Boundaries
National Road
Provincial Road
Tourist Spots
Tourism Facility
Protected Islands
Industrial Area
Agricultural
Built-up Areas
Fishponds
Forest
Military Reservation
Mangroves
Sources:
Geoplan
Bureau of Soils and Water Management - Land Resources Evaluation Project (BSWM-LREP)
Bohol MTDP, CY 2004 - 2009
City/Mun. CLUPs, 1998 - 2002
LAND USE CATEGORY
EXISTING AREA (Ha.)
Agricultural 273,953.00
Timberland 101,271.00
Built-up Areas 9,678.57
Industrial 468.00
Tourism 1,888.00
Infra Utilities ROWs 21,721.43
Parks/Plaza 1,421.00
Reclamation 222.00
Military Reservation 82.00
Mining/Quarry 781.00
Cemetery 48.00
Waste Disposal 25.00
Buffer/Easements 167.00
TOTAL 411,726.00
10°15'
10°00'
9°45'
9°30'
124°30'
124°15'
124°00'
123°45'

Built-up areas cover 9,678.57 hectares, which include the residential, commercial and institutional areas. The tourism and industrial use zones cover 1,888 hectares and 468 hectares, respectively. The other major land uses include the infrastructure and utilities right-of-ways (21,721.43 hectares), open spaces and parks (1,421 hectares) and the mining and quarrying sites with about 781 hectares.

Table I-2. Existing General Land Use of Bohol Province, 2002

Land Use Category	Existing Area (Ha)	% of Total
Agricultural	273,953.00	66.54
Timberland/Forestland	101,271.00	24.60
Built-up Areas	9,678.57	2.35
▪ Residential/Socialized Housing	*9,049.84*	
▪ Commercial	*99.65*	
▪ Institutional	*529.17*	
Industrial	468.00	0.11
Tourism	1,888.00	0.46
Infra Utilities	21,721.43	5.28
▪ Roads/Bridges/Airports	*18,515.43*	
▪ Power Lines	*3,206.00*	
Open Space, Parks/Plaza	1,421.00	0.34
Reclamation Areas	222.00	0.05
Military Reservation	82.00	0.02
Mining/Quarrying	781.00	0.19
Cemetery	48.00	0.01
Waste Disposal	25.00	0.006
Buffer/Easements	167.00	0.04
TOTAL	**411,726.00**	**100.00**

Sources: Medium Term Development Plan (2004-2009), Province of Bohol.
City/Municipalities Comprehensive Land Use Plans, 2000-2008.

1.5 Forest Resources

1.5.1 The Protected Areas

The National Integrated Protected Area System (NIPAS) through Republic Act 7586 was created to protect and maintain the natural biological and physical diversities of the environment on areas with biological unique features to sustain human, plant and animal life.

Bohol has a total NIPAS area of 75,766 hectares or about 75% of the forest land areas (refer *Table I-3*) categorized as strict nature reserve, natural park, natural monument, wildlife sanctuary, protected landscapes and seascapes, resource reserve, natural biotic areas and other categories established by law, conventions or international agreements which the Philippine Government is a signatory. All development in these areas follows the relevant provision embodied in the NIPAS Law.

Table I-3. Summary of NIPAS Areas in Bohol (As of May 2005)

Area Classification	Total Area (ha)	% to Total
Watershed Forest Reserves	24,387	33
Protected Seascapes and Landscapes	21,519	28
Strict Nature Reserves	29,860	39
Total	**75,766**	**100**

Source: DENR-PENRO, Province of Bohol and Bohol Environment Management Office.
Refer Table I-A.4 in Annex report for detailed presentation.

1.5.2 Watershed Forest Reserves

The total area classified as timberland or forestland in Bohol is 101,271 hectares. Out of this area, 23,940 hectares or 24% is natural forest, classified as dipterocarp forest, second growth natural forest and mangrove. Established plantations cover 25,227 hectares or 25% of the total forestland which include reforestations, areas developed in the watersheds, areas developed by Forestry Sector Project and mangrove rehabilitation. Other areas are classified as open/denuded/reverted fishpond, civil reservation, kaingin area, grassland and rocky areas, and others account for 61,104 hectares or 60%.

Table I-4 and *Figure I-5* provide the area and municipalities covered per watershed, which, as expected, extends beyond the forest area boundaries.

Table I-4. Inventory of Bohol Watersheds (As of May 2005)

Name of Watershed	Covered Area	Estimated Area (ha)	% of Total
1. Abatan Watershed**	Sagbayan, Clarin, Catigbian, Sikatuna, San Isidro, Antequera, Tubigon, Loon, Calape, Balilihan, Corella, Cortes and Maribojoc	36,540	20
2. Caroud Watershed**	Ubay, Alicia, Mabini, Pilar, Guindulman and Candijay	20,472	11
3. Loboc Watershed*	Balilihan,Batuan, Bilar, Sagbayan, Carmen, Catigbian, Dimiao, Lila, Loay, Loboc, Sevilla, SBullones and Valencia	38,475	21
4. Wahig-Inabanga Watershed*	Inabanga, Buenvista, Trinidad, Talibon, Ubay, San Miguel, Alicia, Pilar, Jagna, SBullones, Carmen, Dagohoy, Danao, Sagbayan, GHernandez, Duero, Guidulman	57,675	31
5. Anibongan-Cansohay-Alijawan Watershed**	Duero and Jagna	3,000	2
6. Lumbay Watershed**	Guindulman	2,725	1

Name of Watershed	Covered Area	Estimated Area (ha)	% of Total
7. Panampan Watershed**	Valencia	1,650	1
8. Manaba Watershed**	G-Hernandez, Jagna, S-Bullones	5,525	3
9. Moalong Watershed**	Loon	1,237	1
10. Ipil Watershed**	Trinidad, Talibon, San Miguel and B-Unido	15,000	8
11. Banban (Dimiao) Watershed**	Dimiao	2,559	1
TOTAL		**184,858**	**100**

Source: PENRO-DENR, Province of Bohol and Bohol Environment Management Office (BEMO).
Note: ** - Non NIPAS Areas; * - NIPAS Areas

1.5.3 Production Forest

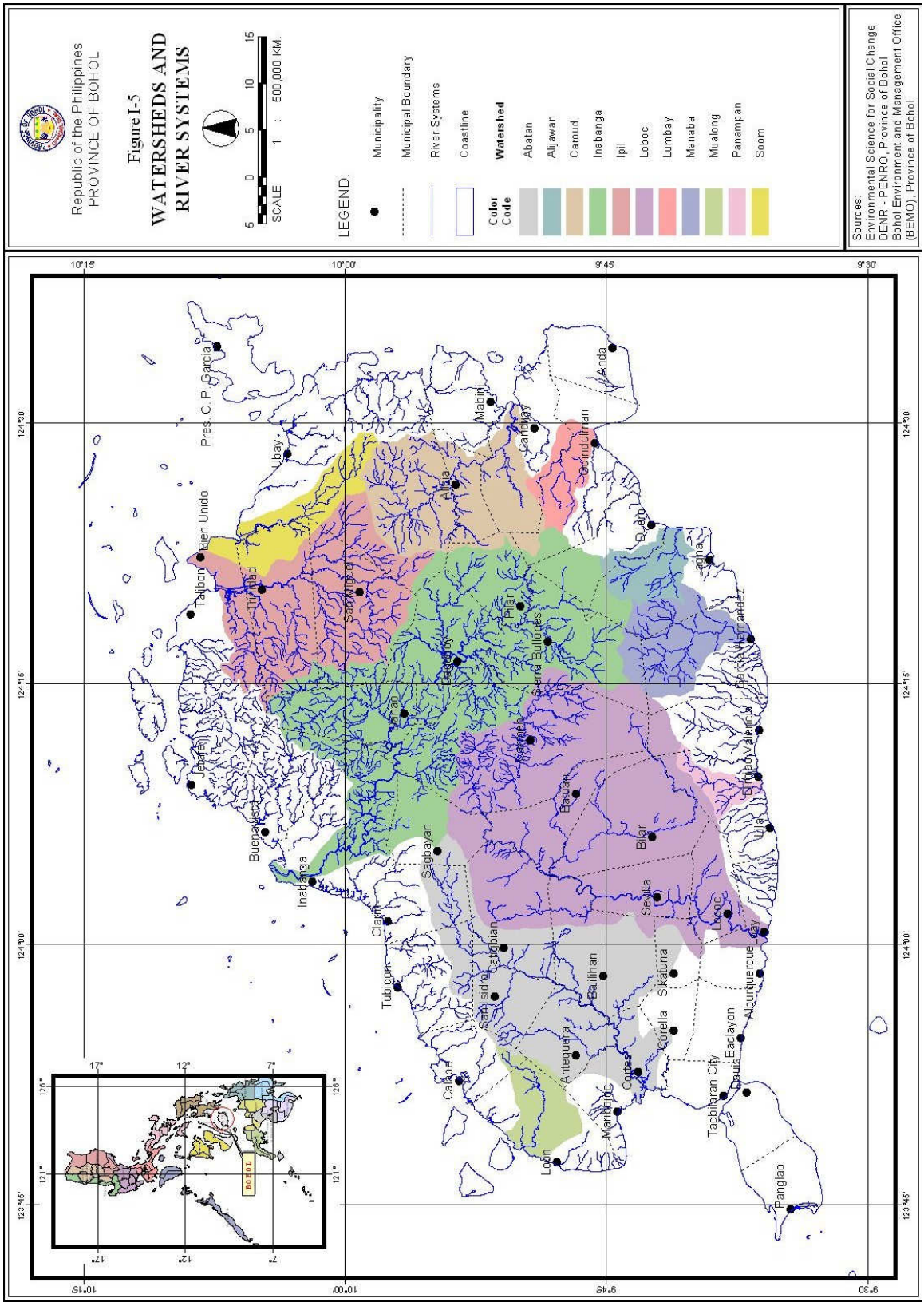
Big portion of Bohol's forestlands are set aside by the concerned national government agencies into multiple use zone to give opportunities for the community people living nearby forest and existing forest occupants to derive economic benefits thereat for their survival and, at the same time, share in managing and protecting the forest. About 2,979 hectares have been awarded to qualified beneficiaries under the Integrated Social Forestry (ISF) program, 20 hectares for Industrial Forest Management Agreement (IFMA) and 6,937 hectares under the Community-based Forest Management (CBFM) covering both mangroves and upland areas.

Agro-forestry is an appropriate land-use adapted in the uplands. Tree crops are planted to meet the fuelwood and lumber requirement for households use. As of April 2005, the DENR-PENRO of Bohol has recorded a total of 2,422 board feet of lumber produced and disposed in the province (*Table I-5*). Of this volume, about 86% were mahogany and the remainder consisted of gmelina, antipolo and ipil-ipil lumber. Micro-enterprises are also being supported as alternative source of income aside from the income and food products derived by settlers for improving agricultural productivity of their farm lots.

Table I-5. Lumber Production and Disposal of Bohol (As of April 2005)

Kind	Jan 2005	Feb 2005	Mar 2005	Apr 2005	Total (bd ft)	% to the Total
1. Mahogany	413.04	707.92	690.80	284.17	2,095.93	86.50
2. Gmelina	40.38	87.82	57.48	128.56	314.24	12.90
3. Antipolo	-	-	8.07	-	8.07	.03
4. Ipil-ipil	-	-	38.07	2.59	2.59	.01
5. Molave	-	-	1.24	-	1.24	.004
				TOTAL	**2,422.07**	**100**

Source: DENR-PENRO, Province of Bohol.


Republic of the Philippines
PROVINCE OF BOHOL
Figure I-5
WATERSHEDS AND
RIVER SYSTEMS
SCALE 1 : 500,000 KM.
LEGEND:
Municipality
Municipal Boundary
River Systems
Coastline
Watershed
Color Code
Abatan
Aljawan
Caroud
Inabanga
Ipil
Loboc
Lumbay
Manaba
Mualong
Panampan
Soom
Sources:
Environmental Science for Social Change
DENR - PENRO, Province of Bohol
Bohol Environment and Management Office
(BEMO), Province of Bohol
Pres. C. P. Garcia
Ubay
Talibon
Bien Unido
Trinidad
San Miguel
Getafe
Tagbilaran City
Panglao

1.5.4 Man-made Forest

As a strategy to rehabilitate the degraded zones and the remaining natural forest and maintain ecological balance, reforestation activities have been implemented by the government agencies in the past decades. These efforts were started in the 1950's by the DENR, which successfully revegetated the critical slopes along the Loboc–Bilar Highway. This was followed by Community-based Reforestation Project in the 1980's, covering denuded mountains and deforested mangroves. Due to increasing public awareness on the protection and preservation of the environment, other sectors have rallied to implement environmental protection programs to complement the objective of restoring the "lost forest" and increase vegetation cover. These initiatives have extended to areas outside the classified timberlands such as school forest parks, Barangay/Municipal/City Park, greenbelts and bird sanctuaries.

Table I-6 provides the latest inventory of man-made forests in the province. As shown, the aggregate area of 25,227 hectares was accomplished under the DENR Refo Programs.

Table I-6. Man-made Forest in Bohol (As of May 2005)

Name of Project	Location	Area Covered (has)	Implementing Agency
A. DENR Refo Programs			
1. Regular Reforestation	Timberland	12,163	DENR
2. Refo. By FSP -1	Timberland	5,961	DENR
3. ISFP – 2	Timberland	2,979	DENR
4. IFMA/SIFMA/TF Plantations	Timberland	20	DENR
5. Area developed within watersheds	Timberland	1,914	DENR
6. FSP – CSD	Timberland	1,444	DENR
7. Mangrove Rehabilitation by CEP, JBIC Loan II	Timberland	746	DENR
B. Pocket Forest	School site	225	DepEd
C. City Park	Cabawan, Tagb. City	4	Tagbilaran City
D. Barangay Forest	Loboc Watershed	29	BANGON
E. Rainforestation	Roxas, Bilar	4	CVSCAFT-Bilar
Total		**25,489**	

Source: DENR-PENRO, Province of Bohol; DepEd-Division of Bohol

1.5.5 Mangrove Forests

In the Central Visayas Region, Bohol ranks first in terms of the biggest mangrove area of 14,502 hectares, which accounts for 19% of the total forest resources. The biggest mangrove areas are located in Getafe, Talibon, Ubay, President Garcia, Mabini and Candijay. The province is known for its most diverse mangrove ecosystems in the Philippines with some 32 identified species. The largest and most diverse mangrove area is found in Cogtong Bay, which is bounded by Mabini and Candijay and covers an area of 2,200 hectares. The most popular man-made mangrove forest is located around Banacon Island, Getafe comprising an area of 1,750 hectares.

1.5.6 Biodiversity

Floral Characteristics. Bohol has a high diversity of flora in the different ecosystems of the island such as the forest, reefs, farmlands, riparian zones along creeks and rivers, caves and cave entrances and marine areas. Natural forests in the province are still evident. Majority is found in the classified timberlands excluding the flora of the family Dipterocarpceae, Leguminoseae and Verbanaceae which are becoming rare. In the Rajah Sikatuna Protected Landscape (RSPL), 384 tree species have been identified. For the non- tree species, field data include the identification of 3 shrubs, 1 fern, 4 herbs, 11 palms and 8 vines.[1] The Duero Watershed has 138 species of trees, 6 shrubs, 16 grasses, 27 palms, 9 vines and 16 ferns. In the Inabanga-Wahig Watershed, there are 197 tree species, 9 species of shrubs, 9 species of cycads and palms, 60 species of herbs, 20 species of vines, 31 species of ferns and 22 species of grasses.[1]

Other species of wildlife and endemic trees, shrubs, palms, vines and other flora species are provided in *Table I-A.5* of the annex report.

Fauna Characteristics[2]. Based on the recent bird studies at RSPL, there are 56 bird species identified and 18 species still unidentified in the province. There are 25 species of bats identified (refer *Table I-A.6* in Annex report), aside from the most well-known primate-Philippine Tarsier (Tarsius syrichta). In the Duero Watershed, 16 bats were identified along with 62 birds, 13 reptiles and 8 amphibians. In Inabanga – Wahig Pamacsalan Watershed, a total of 111 species of wildlife are recorded. These comprise mainly of 8 amphibians, 13 reptiles, 74 birds and 16 mammals.

The list of wildlife species per municipality as compiled by the Bohol Environment Management Office (BEMO) is provided in *Table I-A.5* of the Annex report.

1.6 Water Resources for Fisheries

1.6.1 Background Information

The province has 30 coastal municipalities including the Capital City of Tagbilaran that covers 304 barangays and 72 islands and islets. Approximately, 33% of the total population is directly dependent on fishing and fisheries as the primary livelihood.

Municipal waters cover an area of 6,245.06 km^2 and a total shoreline length, excluding offshore islands and islets, of 653.65 km. It has sandy white beaches for tourism development. It is known internationally as rich corals and coral reefs in the island of Balicasag, Panglao where 144 species have been confirmed out of the 480 species recorded nationwide. In Cabilao Island in Loon and Danajon Bank in Northern Bohol, a documented double barrier reefs in the world with a total area of 271.7 km^2 (over 1% of the total coral reef area of the Philippines which is estimated at 27,000 km^2). Based on the SOT satellite imagery collated by the National Biodiversity Strategy and Action Plan (*Ong, et al. 2002),* the area of coral reefs of Bohol is 69,614 hectares.

[1] DENR-PENRO, Province of Bohol
[2] Data from Bohol Medium Term Development Plan and Soil Water Conservation Foundation

The eastern part of the province particularly the island of Pamilacan is known for its marine mammals like whales and dolphins, which are famous for whale watching activities for tourist attraction. Eleven (11) out of more than 25 species recorded in the Philippines are confirmed to be present in these areas. Several marine turtles and elasmobranch like rays, whale sharks and sharks are also observed.

Bohol is also acclaimed to have the biggest mangrove areas of 14,502 hectares in Central Visayas. The biggest mangrove stands are located in Getafe, Talibon, Ubay, Pres. Garcia , Mabini and Candijay. The most diverse mangrove ecosystem in the Philippines with some 32 identified species and most diverse mangrove area are found in Cogtong Bay which covers 2,200 hectares. But the most popular man-made mangrove forest comprising of 1,750 hectares is found in Banacon Island, Getafe. Bohol is also known for its rich natural resources like springs, rivers, creeks and river basins/watersheds. The faunal and avi faunal resources are directly correlated with the resources of major watershed. Four (4) species of freshwater fishes are being extracted from the rivers and tributaries, i.e., tilapia, mudfish, catfish and common carp.

1.6.2 Inland Waters/Freshwater

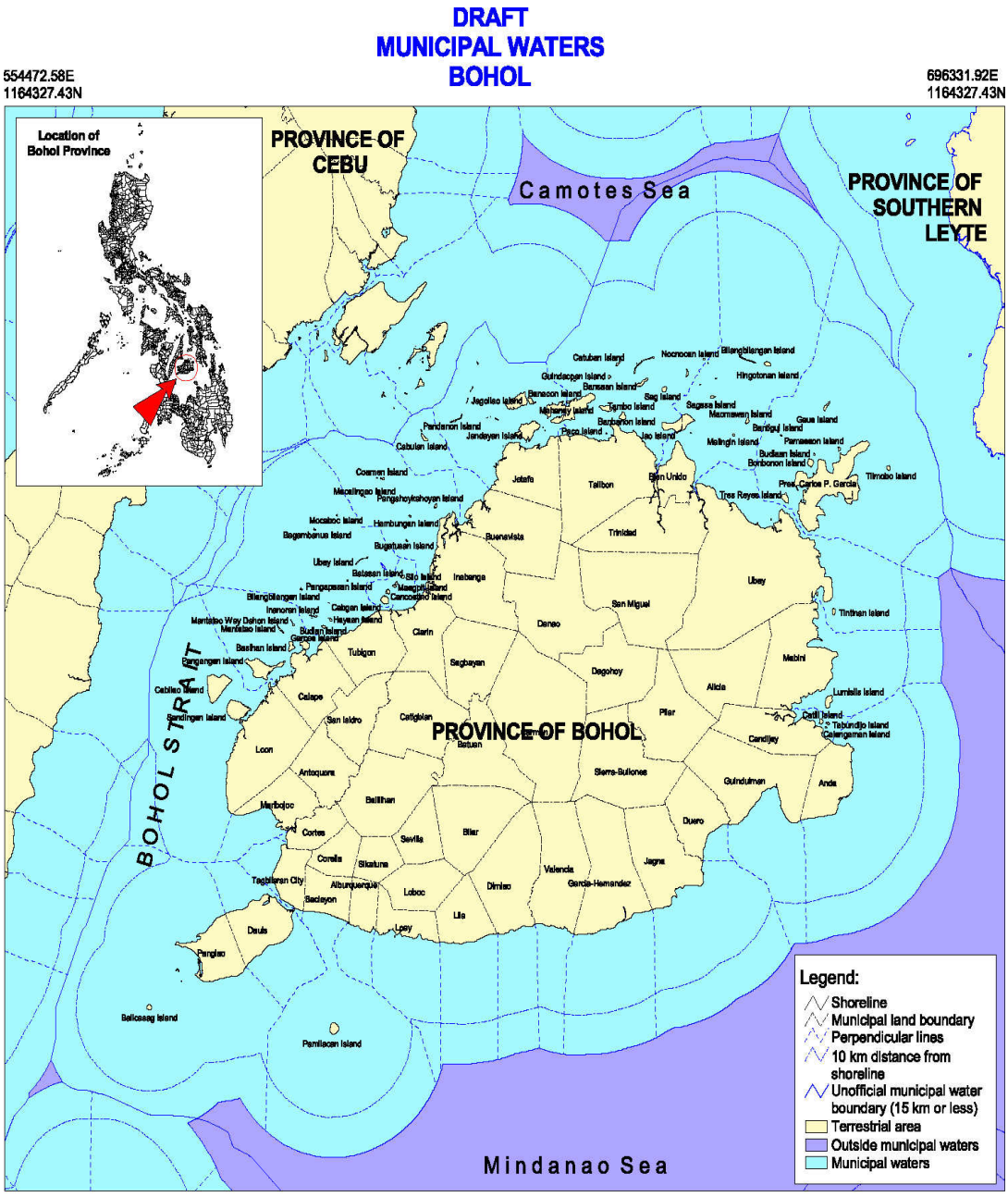
Bohol's inland water resources include 2,224 springs, 59 rivers, 200 creeks and river basins/watersheds which provide water for domestic and irrigation purposes. There are eleven (11) major rivers in Bohol fed by tributaries emanating from upland watersheds (refer *Figure I-5*). The river systems include the Wahig-Inabanga Rivers, Ipil River (Trinidad), Soom River (Ubay), Caruod River (Candijay), Lumbay River (Anda-Guindulman), Abatan River (Cortes, Maribojoc), Moalong River (Loon) and Alejawan River (Duero).

The Wahig-Inabanga is the largest watershed covering 16 municipalities and 98 barangays, with a total area of 52,516 hectares. It has a daily discharge rate of about 1.5 million m^3 during the rainy season, which gradually decreases to 600,000 m^3 at the onset of the dry months (NRDB 2000). During the rainy months, minor rivers and tributaries are vital to the coastal ecosystem because, through natural processes, discharge of large amount of organic matters and nutrients from the upland and lowland takes place. Rivers and estuaries in Bohol have many uses. They commonly serve as harbors for aquaculture, irrigation, recreation and tourism, fishing, sand quarrying area, and also for domestic and industrial uses (Loboc-hydro-power plant).

1.6.3 Coastal and Nearshore Waters

Municipal waters cover 6,245.06 km^2 (refer *Figure I-6*), and a total length along shoreline excluding offshore islands of 653.65 kilometers. There are three (3) major fishing grounds in Bohol, namely: Bohol Sea, Cebu Strait and Danajon Bank with a total area of 27,352.5 km^2 inside and outside Central Visayas. Bohol sea has 273.3 km. coastline, Cebu strait has 264.8 km and Danajon Bank has 301.0 km (see *Table I-7*). Each of these bodies of water can be considered a discrete ecosystem which has multitudes of habitats such as mangrove forest, seagrasses, mudflats, sandy beaches and others. These are the main feeding grounds, nursery areas and spawning grounds of coastal dwelling marine aquatic organisms.

Figure I-6. Municipal Waters of Bohol



Sources:

Shoreline digitized from 1:50 000 Topographic Map Series, NAMRIA.
Bohol administrative boundaries digitized from 1:50 000 Topographic Map Series (NTMS). NAMRIA, 1993.
Cebu administrative boundaries are derived from conversion of cadastral coordinates from LMS-DENR R7.
All administrative boundaries are not authoritative and may change without prior notice.
Preliminary municipal water boundary digitally generated by GEOPLAN Cebu Foundation, Inc.
Level of accuracy approximately 150m and is not based on actual geodetic survey.

Projection:
Universal Transverse Mercator (UTM)
Clarke 1866, Zone 51
Central Meridian.

Developed and Printed by:
GEOPLAN Cebu Foundation, Inc.
Banilad, Cebu City
TeleFax 032-231-6209
March 2000

N

Scale: 1 : 750 000

8 0 8 16 24 32

Kilometers

Table I-7. The Total Area of Different Fisheries Ecosystems Including Area Outside of Central Visayas, May 2005

Ecosystem	Coastline (km)	Total Ecosystem Area (km²) (Inside & Outside of CV)
Bohol Sea	273.3	20,943.6
Cebu Strait	264.8	3,933.0
Danajon Bank	301.0	2,475.6
Camotes Sea	248.2	7,448.0
Tanon Strait	452.7	3,995.2
Visayan Sea	242.1	11,696.3
Sulu Sea	205.5	285,612.9
Total	**1,987.6**	**336,104.6**

Source: CRMP-GIS, 2004; BFAR Reg. VII, Cebu City; May 2005.

Bohol Sea is also known as Mindanao Sea. This large body of water is bounded by the island of Mindanao (south and east), Bohol and Cebu (north) and Negros (west). It measures about 270 km on the east-west axis and the length of coastline fronting Central Visayas is about 273.3 km. About 7,968 km² of Bohol Sea is within Central Visayas jurisdiction (Ong et al. 2002). The sea is relatively deep and is famous for whalesharks population, which only recently returned in small numbers after many years of hunting, and manta ray (Manta spp.) inhabitants. The Bohol Sea is identified as one of the priority areas in the conservation of mangroves, crustaceans, corals, and whalesharks.

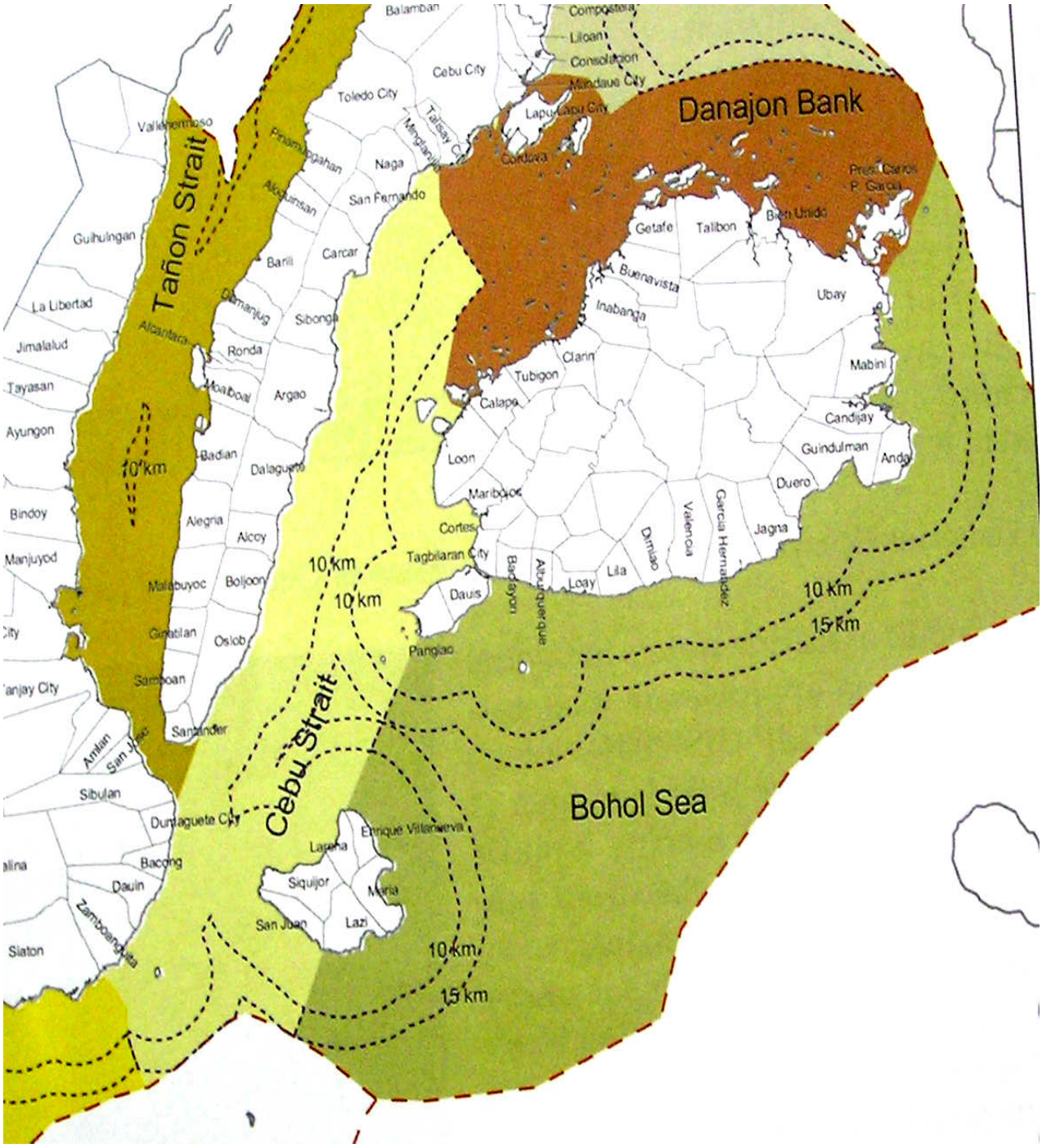
Cebu Strait, sometimes called as Bohol Strait, is the body of water separating the islands of Bohol and Cebu. The strait is relatively deep, with a maximum depth of about 306 m. It has a coastline of 342.4 km and a total area of 3,933 km². The strait has over 10.9 km² of mangrove cover dispersed along coastline and offshore islands and 3.8 km² fishponds in mangrove areas (Ong et al. 2002). Its coastline is fairly sloping and fringed with coral reefs, especially near Bohol's offshore islands, with 158.6 km² of coral reefs in the whole fisheries ecosystem.

Danajon Bank is located at the southern periphery of Camotes sea, which is about 72 km long on the eastwest axis and ranges from 9 to 25 km wide. It has a total coastline of 301 km and a total area of 2,476 km², entirely within the municipal waters. Danajon bank is a unique double barrier reef composed of numerous but diversed islets and reef patches joining together into an inner Calituban and outer Caubyan barrier reef.

Figure I-7 presents the major fishing grounds of Bohol as discussed above.

The area of municipal waters is even bigger than the total land area of the province. Productivity is directly associated by the diversity of the major ecosystem abutting these areas. Municipal fishers which constitute the bulk of resource users have competed with the commercial fishers in using the resources.

Figure I-7. Map of the Major Fishing Ground of Bohol



Municipal waters under R.A. 7160 and R.A. 8550 extend fifteen (15) kilometers going seaward measuring from each coastal shoreline, which is under the management jurisdiction of the local government units. The 10.1 transboundary is a conditional limit where LGU's can allow the entry of commercial fishing boats to fish, however, it must undergo consultation process with the peoples' organization and FARMC members.

Mangrove, on the other hand, is estimated to cover some 10,200 has. in the region (Ong, et. al. 2002). They are productive habitat for fisheries and shrimps, and provide ideal spawning ground for many fish and crustaceans. Many of the mangrove areas were leased to private individuals for fishpond development in line with the national government fisheries development program, "the blue revolution". At that time, only few valued the benefits of mangroves.

The coral reefs are another productive ecosystem considered as the "city under the sea". These are the nursery ground for demersal fin fishes and other vertebrates. Some 144 species have been confirmed in Bohol out of the 480 species recorded nationwide. The island of Balicasag in Panglao, which is known internationally, has rich corals and coral reefs. Based on the satellite imagery collated by the National Biodiversity Strategy and Action Plan (Ong, et.al., 2002), the area of coral reefs of Bohol is 69,614 hectares. Danajon Bank in Northern Bohol, a documented double barrier reefs in the world, has a total area of 271.7 km^2 or over 1% of the total coral reef area of the Philippines.

1.7 Mineral Resources

Bohol has a number of metallic and non-metallic mineral resources. Based on the Mines and Geo-sciences Bureau (MGB) field research and geological surveys, there are significant deposits of precious metals and other minerals widely scattered throughout the province (see *Table I-8*). Metallic mineral deposits include copper, manganese and chromite. The non-metals are guano and phosphatic limestone, clay, limestone, siliceous shale and lignitic coal.

Garcia Hernandez has the biggest quarry site where high quality limestone is mined. There are six copper mineral prospects located in Trinidad, Getafe and San Miguel. Alluvial gold prospects are found in Trinidad and manganese has been mined around the Anda Peninsula.

A more detailed inventory of the major mineral deposits, both metallic and non-metallic, their occurrence and estimated volume are provided in *Tables I-A.7, 8a and 8b* of the Annex report.

Table I-8. Mineral Deposits, their Location and Estimated Grade/Tonnage, Province of Bohol; May 2005

Mineral	Location	Grade/Tonnage
1. Chromite and Manganese	6 kms NW of Duero	Grade: 32.98% MgO,0.03% Cr 2o3
2. Copper	5 kms. SE of Pob. Jetafe Bonakan Prospect; 1.5 kms SE of Salog, Jetafe Baas Prospect; 200 m. of S Bagacay, Talibon Buli Prospect; 5 kms S of Salog, Jetafe Camaparot Prospect;2.5 kms SW of Baas Prospect Balisong Prospect: 2 kms SE of Bagacay, Talibon	Grade: trace -4.40% Cu Grade:.03%-2.73%Cu,.3-3.1 gm/MT Au Grade: .19-22% Cu Grade .09-.84% Cu Grade: .78% Cu Grade: .37%-.56% Cu
3. Copper Silver Gold	Salamanca Prospect; NW of Colonia Carmen	Grade:1.99%-2.55% Cu, trace 0.25 gm/MT Au 15.4-23.5 gm/MT Ag
4. Gold	Kauswagan Area	
5. Manganese	Buenavista Prospect, 4.5 km. NW, Buenavista, Carmen	Grade: 39-40.91%Mn
6. Nickel	Nagasnas Hill Prospect; 3 kms. NW of Alicia Boctol Prospect; 400 m. N of Boctol, Jagna	Grade 0.6 % Ni Grade: 0.57 % Ni; .32.88% Mg
7. Guano and Phosphate	Kauswagan, San Isidro, Po Cave, Babaud,Inabanga Balintawak & Baungon, Clarin Lat.9-52-20.17, Long 124-29-40.87 Cabadian Mabini Pob, Bongbong, Ambuan & Rizal Catigbian Tiwi & Tan-awan (Loon) Montehermoso, La Victoria Monte Suerte Carmen Sinibaon Cave, Nan-od (SBullones) Marcelo, Batuan & Tambo (Mabini) Bikanan & Tagustusan (Antequera) Kalubugan Cave, Bood Maribojoc Sta. Cruz & Upper Cabacnitan Batuan Magaiga, Baucan Sur, Buyog, Datag, Sal-ing & San Roque Balilihan La paz, Lourdes & Fatima Cortes Libjo, Cambuac N, Bahay-bahay Sikatuna Lico-lico, Lagtangan, Cambagui & Magsaysay Sevilla Villa Suerte & Cambigsi, Bilar Kanangkaan, Corella Ka Melchor, Cayawa & Tanday Bacalyon Jimilian and Buenavista Loboc Hophopan Cave, Omija Valencia	Tonnage: 3 MT guano, 15 MT phosphate Tonnage: 5 MT Tonnage:2 MT guano, 20 MT phosphate Tonnage:5MT guano, 42 MT phosphate Tonnage: 3MT guano, 15 MT phosphate Tonnage: 1 MT guano, 106 MT phosphate Tonnage:3 MT guano, 200 MT phosphate Tonnage:1,050 MT guano 12,015 MT phosphate Tonnage:12 MT guano,600MT phosphate Tonnage:1MT guano, 600MT phosphate Tonnage:12 MT guano, 700 MT phosphate Tonnage:1,079 MT guano, 681 MT phosphate Tonnage:362 MT guano, 15 MT phosphate Tonnage:5 MT guano, 1702 MT phosphate Tonnage:530 MT guano, 890 MT phosphate Tonnage: 7 MT guano, 457 MT phosphate Tonnage: Not estimated Tonnage:580 MT 270 MT phosphate Tonnage: 2 MT, 200 MT phosphate Tonnage: 2 MT guano, 200 MT phosphate
8. Phosphate	Dagnawan & San Roque (Sagbayan) Cabiawan Cave & Katiniong Cave, Basdio Guindulman	Tonnage:352 MT Tonnage: 70 MT
9. Silica Sand	Lat. 10-10-03, Long. 124-22-24-Jao Isl Lat. 10-07-37 Long 124-18-40.94 Balintawak Talibon Lat. 10-10-9.8 Long 124-21-2.73 Jao Island	
10. Siliceous Clay	Lat.10-01, Long 124-12, Catigbian, Buenavista	

Source: Bureau of Mines and Geo-Sciences, Cebu City.

1.8 Environmentally Constraint Areas

Geologic studies conducted by the Mines and Geo-sciences Bureau (MGB) revealed that the municipalities of Duero, Panglao, Guindulman, Anda, Loboc and Jagna are identified as environmentally hazard-prone areas. These areas are characterized by slope failure, collapsed caverns, highly fractured rock and rock fall, collapsed sinkholes, rotational slip and landslides. *Table I-A.9* of the Annex report provid-es historical incidences of landslides, subsidence and slope failures in several locations of Bohol.

Coastal municipalities that are situated in low-lying areas, usually estuarine area, are generally flood prone areas. Identified municipalities are Loboc, Guindulman, Candijay, Jagna, Valencia, Inabanga, Maribojoc, Garcia-Hernendez, Ubay and Trinidad. Communities close to major watershed river system outlets are heavily affected by flash floods especially when major run-off happens and, coupled with extreme high tide intruding inward. The major floods that happened in the 1960's in Inabanga and Loboc are factual evidences. The stability of the upland ecosystem is also a contributory factor that possibly enhances the severity of being environmentally declared hazard areas.

Based from the data of MGB-DENR Region VII, the flood prone municipalities and barangays of Bohol province are presented in *Table I-A.10* of the Annex report.

2.0 SOCIAL DEMOGRAPHIC ATTRIBUTES

2.1 Population and Demography

2.1.1 Population Growth Rate

Bohol's population of 1,137,268 persons in 2000 ranked 2nd in Central Visayas and 17th in the country, is projected to increase to about 1.262 million in 2005 and 1.744 million at the end of 2020. Given a rapid population growth rate of 2.92% (CY 1995-2000) annually, Bohol's population is projected to double in 24 years, by the year 2024. Among the 47 municipalities and one city with an annual growth rate of 2 percent or more include 23 municipalities and Tagbilaran City, which account for almost 50% of the total population. Most of Bohol's population resides in the rural area.

Based on the 2000 census-based population projection, the population in the year 2005 is projected at 1,262,339 with Tagbilaran City and the municipalities of Ubay, Talibon, Inabanga and Carmen having populations of more than 40 thousand. The city and these municipalities are estimated to continue to account for 25% of the province's total population during the planning period. The most rapid growth in population at 2.5% or more annually is shown in *Table I-9*. Annex *Table I-A.11* provides the total population and growth rate, number of households and average household size and population density based on the May 2000 census.

Table I-9. Fastest Population Growing Municipalities (with Yearly Population Growth Rate of 2.5% or more) in Bohol Province, 1995-2000 Census

Municipality	Annual Population Growth Rate (%)
1. Dagohoy	3.68
2. Panglao	3.32
3. Loon	3.30
4. Tagbilaran City	3.22
5. Baclayon	3.21
6. Pilar	3.14
7. Mabini	3.10
8. San Miguel	2.97
9. Danao	2.90
10. Duero	2.89
11. Sevilla	2.81
12. Talibon	2.81
13. Lila	2.74
14. Cortes	2.71
15. Dimiao	2.68
16. Antequera	2.65

Source: NSO, 2000 Census of Population & Housing, Manila.

Bohol's population increased fivefold since 1903 (*Table I-10*). In the next 45 years (1903-1948), the enlarged population was annually adding about 6 thousand persons.[3] From 1960 to 1995 period, the population nearly doubled, adding about 13 thousand people annually. Barely 4 years thereafter (1996-2000), the population was increasing by as much as 36 thousand people annually. Such rapid growth will have alarming impact on Bohol's resources and environment.

Table I-10. Trend of Population Increase, Bohol Province, 1903 – 2000

Censal Year	Interval Years	Population Difference Per Year	Increase Per Year
1903-1948	45	284,184	6,315
1960-1995	35	441,828	12,601
1996-2000	4	142,828	35,707

The number of households in Bohol as of 2000 Census is 209,588 with an average family size of 5. It is projected to be about 232 thousand in the year 2005 with an Occupancy Rate (OR) of 1 dwelling unit per household. Although the OR is ideal, most of these houses, however, are of sub-standard quality.

2.1.2 Population Density

Tagbilaran City, the capital and center of commerce and industry of the province, is the most densely populated with almost 3 thousand persons per km^2, followed by the municipalities of Dauis, Tubigon, Bien Unido and Baclayon (*Table I-11* and *Table 1-A.11*). The least populated municipality is Balilihan with only 119 persons per km^2.

[3] Sanger et al, United States Bureau of Census, 1905

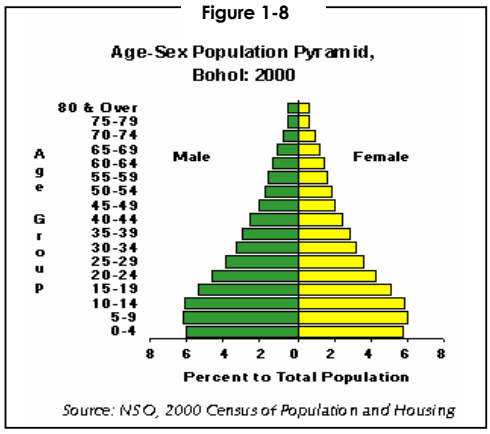
Table I-11. Top 10 Most Densely Populated Municipalities in Bohol Province, Year 2000

Municipality	Population Density (persons per square kilometer)
Bohol	**300**
Tagbilaran City	2,538
Dauis	616
Tubigon	534
Bien Unido	495
Baclayon	441
Mabini	422
Loay	415
Pilar	402
Panglao	385
Loon	378

Source: NSO, 2000 Census of Population & Housing, Manila.

2.1.3 Age-Sex Structure

Figure 1-8



Bohol's population is predominantly young with almost half of its population below 22 years old during the 2000 Census of Population. There were more males than females in the age group 0 to 44 years. On the other hand, females dominated the rest of the age groups. The sex ratio of 101.6 males for every 100 females in 2000 was almost the same as that of 1995 (*Figure 1-8*). There were 62 young dependents per 100 working persons.

The number of elderly population (ages 65 and older) in the province has significantly increased through the years constituting 7% of the population in Year 2000. They are concentrated in Loon (5.48%), Tagbilaran City (4.49%) and Ubay (3.7%). The municipality of Corella, however, had the most number of elderly person vis-à-vis their total population (*Table I-12*). About 26% of households head in Bohol is an elderly, mostly males.

Table I-12. Top 10 Municipalities with the Most Number of Elderly Population vis-à-vis Municipal Population, Bohol Province, CY 2000

Municipality	% to Municipal Population
1. Corella	9.72
2. Maribojoc	9.20
3. Antequera	9.03
4. Alburquerque	8.86
5. Loay	8.66
6. Sikatuna	8.59
7. Lila	8.42
8. Dimiao	8.28
9. Baclayon	7.89
10. Loboc	7.79

Source: NSO, 2000 Census of Population & Housing, Manila.

Of the total elderly population in 1995, about 18 thousand or 28% have some type of disability of which 68% are either blind, deaf or with some kind of paralysis (NSO, 1995). Vision impairment was the most common type of disability among the elderly, with about 4 out of 10 suffering from it. Majority of the elderly have no trade skill and are dependent on others for support.

Almost half of the female population during the 2000 Census are of childbearing ages (15-49 years old), concentrated mostly in the age group 15-19 years, while its estimated Total Fertility Rate (TFR) is 3.19 children per woman for the years 2005-2010.[3] The province's net migration rate, as forecasted, is expected to exhibit a negative percent change or a decreasing trend with (-) 0.0032 and (-) 0.0066 for male and female, respectively, for the 5-year period (NSO-NSCB). This simply implies that the steady increase of Bohol's population is attributed mostly to the number of its live births.

The Crude Birth Rate (CBR) and Crude Death Rate (CDR) in Bohol is estimated to decrease slowly in the ensuing years.[2] An estimated CBR of 23.9 live births per 1,000 population and a CDR of 6.8 deaths per 1,000 population is projected in 2005-2010, which is slightly lower than that of the country and region.[4] Per NSO projections, the average yearly growth rate of Bohol's population is expected to slow down in the coming years as a result of decreasing TFR/birth rates, declining migration and steady death rates.[5] The Crude Rate of Natural Increase (CRNI) or the population increase per 1,000 persons is estimated at 17.1 for 2005-2010.

2.2 Income and Poverty Incidence

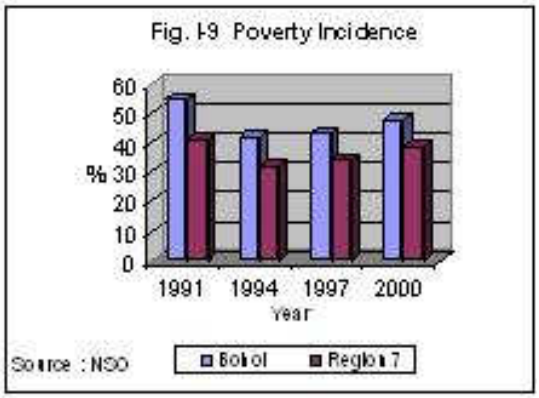
2.2.1 Income and Expenditure Pattern

Average income of a Boholano family is P77,291.00 based on NSO's Family Income and Expenditure Survey in 2000. This shows an increase of 36% from the 1997 level of P56,940.00 and 49% from the 1994 level of ₱38,187.00, or an annual average growth rate of 12%. Correspondingly, the average expenditure in 2000 for each family amounted to P66,907.00, denoting a 32% increase over the 1997 level of P50,754.00 and 76% over the 1994 level of ₱28,841.00. On the average, Boholanos do not spend more than they earn.

The major sources of income of Boholano families came from entrepreneurial activities, engaged by 50% of families, from wages and salaries (27%) and about 23% from other sources (NSO, FIES 1997)[6]. The bulk of family expenditures were for food (51%), rent (9.2%), education (3%), medical care (1.8%), recreation (0.2%), alcohol (1.2%) and tobacco (1.3%). A rise in rent of 1.4%, the second largest increase in family expenses, is noted while family spending for education has slightly lessened by 10% and medical care by a nominal change of 0.4%. Likewise in 1997, Boholano families decreased food spending by as much as 5.2%, the largest nominal change among family expenditures.

[4] NSO-NSCB, 1995 Census-based National, Regional & Provincial Population Projections
[5] Decreasing TFR/ birth rates to be attributed mostly to an aggressive campaign of the government on population reduction and on its program on enhancement of family welfare.
[6] NSO, Family Income & Expenditure Survey (FIES) 1997

2.2.2 Poverty Incidence



There has been an alarming increase in the percentage of families living below the poverty level from 1994 to 2000 (Figure 1-9). Based on the 1994 income, 42.3% of the total number of Boholano families lived below the poverty threshold of P5,978.00 per month, which is way above the regional poverty incidence of 32%. From 1994 to 1997, a 5% improvement was observed. However, from 1997 to 2000, the number of poor families had ballooned to 47.3%, an increase of around 10% from 1997. This places Bohol at number 16 among the top 20 poorest provinces in the country.

Some of the factors cited for the high poverty incidence are: seasonal employment, particularly in agriculture; minimal opportunities for off-farm employment compared to the tremendous growth in labor force; decrease in the purchasing power of the peso vis-a-vis the increase in prices of basic commodities; and rapid population growth.

Despite the alarming increase in poverty incidence, however, the province has achieved improvement in the Human Development Index (HDI), a composite measure of education, income and life expectancy. This positive trend shows that despite limited cash income, Boholano families have managed their resources well to minimize the impact of low income on their quality of life.

2.3 Employment/Underemployment

2.3.1 Labor Force[7] Situation

Bohol as of 2004 population count, has an estimated 785,540 people who are 15 years old and over. This working age population constitutes about 64 percent of the total population. Between 2000 and 2004, the working age population expanded at an average of 1.6 % annually.

The labor force situation in the province reflected an upward trend for the last five years from 2000 to 2004. The total working population estimated at 686,000 in 2000 had gone up to 730,000 in 2003 or about 6 % increase.

[7] Labor force consists of population 15 years old and over who contribute to the production of goods and services and are either employed (persons who reported either at work or with a job or business) or unemployed (persons without work or job/business but were reported available and actively looking for work). Visible underemployment refers to employed persons who worked less than 40 hours a week and wanting more hours of work.

2.3.2 Employment Status

From 2001 to 2003, the employment rate averaged 92.3%, while the unemployment rate averaged at 8.76%. The unemployment rate of the province had been decreasing from 9.9% in 2001 to 8.9% in 2002 and a further improvement to 7.4% in 2003 (*Table I-13*).

Table I-13. Total Population 15 Years Old and Over and Employment Status, Bohol Province; 2001 - 2003

ITEM	2001	2002	2003
Total Pop. 15 years and over	690,000	714,000	730,000
Labor Force Participation Rate (%)	63.9	64.7	64.5
Employment Rate (%)	90.1	91.1	92.6
Unemployment Rate (%)	9.9	8.9	7.4
Visible Underemployment Rate (%)	2.9	6.1	5.2

Source: Labor Force Survey 2003, 2002, 2001, NSO

The number of employed persons in recent statistics is 470,850 based on a 92.6% employment rate posted in year 2003. The unemployment rate at 7.4% translates to an estimated 54,020 unemployed persons, and the underemployment rate at 5.2% corresponds to an estimated 37,960 underemployed persons.

This relatively high figure of unemployment implies that additional job opportunities are necessary to accommodate labor force increase in Bohol. The number of jobless persons has increased primarily due to the rise in the number of working-age population rather than due to closure of business establishments.

Projections for the next 15 years of the labor force of the province shows an increasing trend (see *Tables I-14* and *I-A.12*) based on a 2.9 percent annual growth rate.

Table I-14. Projected Labor Force, Bohol Province; 2003 – 2020

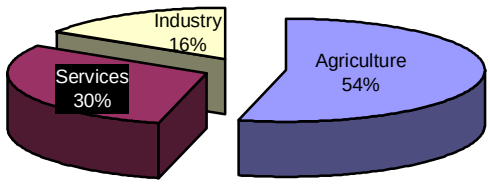
ITEM	CENSUS 2000		YEAR					
			2003	2004	2005	2010	2015	2020
Total Household Population 2000	1,134,733		1,210,481	1,236,094	1,262,339	1,403,639	1,563,472	1,744,492
Household population 15Years & Over 2002	716,000		771,364	785,540	800,053	877,990	965,773	1,064,766
			Projected Labor Force					
	2002	PR*	2003	2004	2005	2010	2015	2020
In the labor force	489,744	0.6840	527,613	537.309	547,236	600,545	660,589	728,300
Employed	414,323	0.8460	446,361	454,564	462,962	508,061	558,858	616,142
Umemployed	75,421	0.1540	81,252	82,746	84,274	92,484	101,731	112,158
Visibly Underemployment	30,854	0.0630	33,240	33,850	34,476	37,834	41,617	45,883
Not in the labor force	226,256	0.3160	243,751	248,231	252,817	277,445	305,184	336,466

Source: Labor Force Survey, National Statistics Office **PR = Participation Rate*

2.3.3 Employment by Sector

The agriculture sector continues to account for a greater portion of employment. On the average, the agriculture sector provides employment to 54% of the total employed persons in the province, followed by the services sector at 30% and the industry sector at 16% (*Figure I-10*).

Fig. I-10 Employment by Major Industry Group, Bohol Province; CY -2003



Source : NSO

2.4 Mortality and Morbidity

2.4.1 Mortality Status and Causes

Over 50% of deaths in Bohol were accounted for by the elderly of over 65 years old, which means that people are dying mostly due to old age. About 1/5th of deaths were accounted by people in the 50–64 years old bracket, while 5% of deaths occurred among the infant population (*Table I-15*). Compared to the previous years, deaths among the school-age children accounted for less than 1/5th of the entire population, hence children have now greater chances of reaching adulthood. This indicates a positive socio-economic development of the province.

Table I-15. Distribution of Deaths By Age Group and Sex, Bohol Province; Year 2000

Age Group	Both Sexes		Male		Female	
	No.	%	No.	%	No.	%
Less I year old	218	4.65	117	2.50	101	2.15
1 – 4	66	1.41	34	0.73	32	0.68
5 – 14	98	2.09	55	1.17	43	1.09
15 – 49	622	13.27	365	7.79	257	5.48
50 – 64	822	17.53	457	9.75	365	7.79
65 – over	2,862	61.05	1,453	30.99	1,409	30.06
Total	**4688**	**100.00**	**2,481**	**52.92**	**2,207**	**47.08**

Source: Provincial Health Office (PHO).

Out of the 4,688 deaths in year 2004, only 2,324 or 57% were medically attended. The top 10 leading causes of death for the general population in year 2004 were practically the same as in the past five years. Seven (7) were due to degenerative causes, i.e., non-infectious in nature, while only three (3) were caused by infectious or biological agents.

Deaths due to pneumonia, a respiratory ailment, is still much prevalent in Bohol, being the 2nd leading cause of death; tuberculosis or TB as the 7th leading cause of death had gone down from being the 3rdh cause of death from year 1999 – 2003. The 9th cause of death is Septicemia and Diabetes ranked as the 10h leading cause of death as shown in *Table I-16*.

Table I-16. Ten (10) Leading Causes of Death in 2004 Compared to Past 5 Years, Number and Rate per 100,000 Population, Bohol Province

Causes	2004		5 Year Average 1999 - 2003	
	Number	Rate	Number	Rate
1. Heart Disease All type	940	76.75	1,103	102.13
2. Pneumonia	687	56.10	796	73.71
3. Cancer All Type	454	37.07	383	35.46
4. Cardiovascular Disease	332	27.11	247	22.87
5. Kidney Diseases	243	19.84	138	12.78
6. Hypertension	198	16.17	384	35.56
7. TB Pulmonary	190	15.51	156	14.45
8. Accidents all Type	153	12.49	186	17.22
9. Septicemia	125	10.21	144	13.33
10. Diabetes All Kind	118	9.64	83	7.69

Source: Provincial Health Office (PHO).

2.4.2 Morbidity Status and Causes

Although deaths predominantly occur among the old age group, illnesses or morbidity mostly affected the younger age group of 1–4 years old (*Table I-17*).

Table I-17. Distribution of Morbidity By Age Group and Sex, Bohol Province; Year 2004

Age Group	Both Sexes		Male		Female	
	Number	%	Number	%	Number	%
Less 1	23,404	19.63	11,726	9.83	11,678	9.79
1 to 4	36,418	30.54	18,345	15.38	18,073	15.15
5 to 14	16,651	13.96	8,385	7.03	8,266	6.93
15 – 49	19,242	16.13	7,738	6.49	11,504	9.65
50 – 64	13,563	11.37	6,318	5.30	7,245	6.07
65 – over	9,986	8.37	4,924	4.13	5,062	4.24
Total	**119,264**	**100.00**	**57,436**	**48.16**	**61,828**	**51.84**

Source: Provincial Health Office (PHO).

The top 10 leading causes of morbidity among the general population in year 2004 were practically the same as in the past five years. Almost all (8 of the top 10 leading causes of illness) were infectious in nature, i.e. caused by germs and these are infections of either the lungs or gastrointestinal tract (refer *Table I-A.13* of Annex report). Hypertension, a non-infectious illness ranked sixth and Skin Disease, as the 7th cause of illness. Gastroenteritis, the 1st leading cause of illness, is an indicator of the poor environmental sanitation of the Boholano community where about 15% of the households have no sanitary toilets of their own. This is compounded by another reality where, except for Tagbilaran City, the potable water supply systems in the municipalities and barangays are untreated and generally prone to contamination.

2.4.3 Malnutrition

Malnutrition, an indicator of poverty, still exists in Bohol. Operation Timbang (OPT 2004) results show that 17% of pre-school children weighed (under 6) were found malnourished. About 16% of the total public elementary school population was found to be underweight at the start of the school year. Three percent (3%) of babies born in Bohol in 2004 weighed less than 2,500 grams, which indicate poor diet and/or low nutritional intake among mothers.

2.5 Potable Water Supply

About 732,220 or 59% of the present population (1,240,000 comprising 34% in urban area and 66% in rural area) are adequately served with potable water.[8] By area classification, 60% of urban population and 59% of rural population have access to safe water sources/facilities. Of the served population, 59% are served by Level III systems. About 35% depend on Level I facilities, while the rest rely on Level II systems.

The province has 90 service providers for Level III systems operating under different types of ownership. There are two (2) LWUA Water Districts covering two (2) municipalities while eleven (11) municipalities are managed by LGUs. The Bohol Water Utilities is the largest system covering 14 urban barangays in the City of Tagbilaran and serves approximately 49,000 persons.

There are 96 Level II systems in 26 municipalities in the province. The majority of the waterworks are utilizing spring sources (69 systems) while the remaining systems are using deep wells. Most of the latter practice scheduled water supply due to insufficient water source or insufficient capacity of the facilities. Such problems are mainly caused by indiscriminate expansion or tapping of individual connections resulting to insufficient water flow/reduction of water pressure. Most of the springs are free flowing and operate on a 24-hour basis.

Level I facilities are common in rural barangays. Of the 14,429 Level I facilities, 50% are covered/improved and open dug wells, 24% are shallow wells and 10% are deep wells. Only 10% of the shallow wells and covered/improved and open dug wells are observed to be safe. All deep wells and developed springs are regarded as safe water sources.

2.6 Household Sanitation

The PHO 2003 data showed that majority of households in Bohol have sanitary toilets while about 18% of households still have no sanitary toilets. The municipality of Talibon had the most number of households without sanitary toilets but as to the percent of households vis-à-vis its total number of municipal households, the municipality of Pres. Garcia have more than half of its households with no sanitary toilets (*Table I-18*). About 72% of households in Bohol have sanitary garbage disposal.

[8] Provincial Water Supply, Sewerage and Sanitation Sector Plan (PW4SP) Dec. 2003.

Table I-18. Top 10 Municipalities With Households Without Sanitary Toilets, Bohol Province; CY 2003

Municipalities	Households Without Sanitary Toilets	Municipalities	% HH Without Sanitary Toilets to Total No. of HH
Bohol	**39,704**		
1. Talibon	3,847	Pres. Garcia	56
2. Tagbilaran City	3.031	Batuan	40
3. Inabanga	2,400	Sierra Bullones	38
4. Pres. Garcia	2,334	Talibon	37
5. Loon	2,192	Buenavista	33
6. Sierra Bullones	1,782	Inabanga	30
7. Tubigon	1,765	Loboc	29
8. Carmen	1,529	Anda	29
9. Buenavista	1,524	Bilar	27
10. Calape	1,398	Loon	26

Source: Provincial Health Office.

The service coverage of sanitary toilets in the province is 79% or 188,024 of the total households which is below the current national average of 88%. These toilets consist of 7% flush type, 64% pour-flush and 8% VIP/sanitary pit latrine. Service coverage in urban area is 83% and about 77% in rural area. Although high percentage of sanitary toilets is disclosed in urban areas, problems arise from the unsatisfactory disposal of the effluent from the septic tanks or the direct discharge of wastewater to the local drains. There are no sewerage systems in most urban settlements.

The province has a total of 6,086 toilets installed in 1,207 schools. Only 80% of the students are adequately served by sanitary toilets (82% for public school students). The present average ratio of 44 students per sanitary toilet is over the service level standard of 40 students per sanitary facility. Some of these facilities are not used due to lack of water supply, destroyed plumbing fixtures and water tank seepage. Proper operation and maintenance are seldom done.

There are 338 public toilet bowls found in the public markets, bus/jeepney terminals, ports and parks or plazas. Almost all public utilities (98%) are served with sanitary toilets. However, improper usage and maintenance rendered the facilities unsanitary. At present, no specific arrangements are made for their operation and maintenance, as well as, the collection of fees to cover such costs.

3.0 AGRICULTURE AND FISHERIES

3.1 Crops Production

3.1.1 Rice Production

Rice is a staple food mainly produced by small farmers with landholdings ranging from 0.6 to 2.0 hectares. It is a major agricultural crop with a total area of 46,587 hectares, both irrigated and rainfed, which is 25 percent of the agricultural land area of the province at 185,276 hectares. Total palay production in 2004 was about 150,526 metric tons, which translates to 2.36 metric tons average yield per hectare given the effective harvested area of 63,771 and 1.40 cropping intensity as shown in *Table I-19*. It served as the primary source of subsistence and income for about 57,780 farming household of the province which represents 28 percent of the total household in year 2000.

Table I-19. Palay Production Trends: Area Harvested, Average Yield and Total Production for Irrigated and Rainfed; Province of Bohol, CY 1998-2004

Particulars	Crop Years							
	1998	1999	2000	2001	2002	2003	2004	(%) Change
A. Palay (Irrigated)								
Area Harvested (ha)	14,428	22,168	21,935	24,260	21,021	25,515	26,584	84.25
Average Yield (mt/ha)	2.68	2.82	3.02	3.02	3.16	2.91	3.18	18.65
Production (mt)	37,124	59,326	61,934	73,281	66,398	74,310	84,596	127.87
B. Rainfed								
Area Harvested (ha)	17,372	49,170	51,948	46,655	49,396	28,673	36,521	110.23
Average Yield (mt/ha)	1.35	1.63	1.58	1.62	1.59	1.48	1.81	34.07
Production (mt)	23,509	80,036	80,937	75,664	78,383	41,976	65,930	180.44
Total								
Area Harvested (ha)	**31,800**	**71,338**	**73,883**	**70,915**	**70,417**	**54,188**	**63,105**	**98.44**
Production (mt)	**60,633**	**139,362**	**142,871**	**148,945**	**144,781**	**116,286**	**150,526**	**148.25**

Source: Bureau of Agricultural Statistics.

The irrigated riceland is approximately 15,732 hectares in 2004. These rice areas are mostly within the municipalities of District III and provided with reliable irrigation facilities consisting of 215 communal irrigation systems (CIS) with a service area of 8,949 hectares, Bohol Irrigation Project Stages I & II with service areas of 4,960 and 5,300 hectares located at Pilar and San Miguel, respectively. The Capayas Irrigation System in Ubay service an area of 600 hectares. Several DA-assisted irrigation facilities such as the small water impounding projects (SWIP), small farm reservoir (SFR), concrete diversion dams and shallow tubewells enable farmers to practice year round rice farming.

The rainfed rice area is approximately 30,855 hectares. Rainfed areas are usually planted to rice once a year and followed by corn, vegetables/legumes as practiced in the municipalities of Calape and Tubigon. Most farmers leave their farm lot idle or under fallow period after the regular rice crop.

The Provincial Agriculture Office (PAO) data generated from the rice producing municipalities showed about 57,780 farmers engaged in rice production in year 2004. The farmers used the early maturing and high yielding varieties such as PSB-

RC 18, and IR varieties. Farmers acquired seeds through different sources. Most of them acquired seeds from their neighbor, government agencies that are producing seeds such as the Municipal Agriculture Office (MAO), Bohol Agricultural Promotion Center in Tagbilaran City and Bohol Experiment Station in Ubay. Others acquired seeds from their relatives and friends, and the rest got seeds from their own harvest. Seeds were acquired by most of the farmers through exchange or barter system, through purchases, seed subsidy from share/payment as hired labor, or simply given for demonstration purposes.

Rice seedlings are transplanted at the average of 20 days after sowing. Most farmers adopted the wetbed type of seedbed while a few preferred the dry type of seedbed.

More farmers practice the combination method of land preparation using both farm machines and draft method. According to the farmers, it is best to use draft method during plowing while the use of farm machines is best for harrowing and field leveling. Some preferred the draft method alone considering that they have their own carabao and utilizing family labor to perform the job.

Mechanized farming in the province is confined to a few. Farmers who own farm machines do the land preparation. Others resort to renting farm machines available in their area. Rentals of farm machines ranged from P160-180 per hour with operator.

There are three (3) different methods of transplanting palay seedlings practiced by farmers. Most farmers practice the random method which requires lesser labor cost compared to other methods, i.e. the two-way and one way straight row method. The most popular planting distance is 20 cm x 20 cm and the least preferred is the dry seeding method.

Most farmers apply the inorganic fertilizers at an average fertilization rate of 48-26-24 kg. NPK/has. Some farmers apply fertilizer through topdressing method. Next highly adopted method of fertilizer application is basal + topdressing, and the twice topdressing method. Other methods practiced by farmers are basal, side dressing, injection, dipping and topdressing, basal + twice topdressing and thrice topdressing.

Weeding is a common activity among rice farmers. Hand weeding is the most popular method conducted within 7-30 days after transplanting. Some farmers utilized the push type weeders to control weeds. Other farmers control weeds by chemical application.

From among the reported pests, golden snail or kuhol is ranked as number one, followed by ricebug, rats, stemborer and leaf folder. Chemical control is the common practice adopted by farmers.

During harvest, farmers practice three types of labor arrangements, namely: the "bid-bid" type, hired and family labor. The "bid-bid" type of labor is adopted by most farmers with several sharing arrangements. The most widely used is 6:1 sharing ratio (one part to harvester per 6 parts to the rice farmer) of fresh and cleaned palay.

The production cost and return per hectare for irrigated and rainfed palay production during May-Sept. 2004 cropping cycle is presented in *Table I-A.14* of the Annex report. As shown, the average net return from irrigated rice is higher by about P10,965 compared to rainfed rice crop per hectare. The latter showed a net return of only P 1,865.00 per hectare.

There are several government programs in support to rice production. These include subsidy for hybrid rice seeds; A x R (hybrid) and inbred rice seed production; varietal screening and selection; crop production practices improvement; farming systems improvement technology demonstration; farmer field schools for system of rice intensification; integrated pest management; plant genetic resource conservation development and natural farming technology. These are implemented in coordination with the DA-Agricultural Promotion Center and the Agricultural Training Institute.

3.1.2 Corn Production

Corn is the second staple crop to rice. In terms of land usage, approximately 15,293 hectares are cornlands in 2004, or a dramatic decrease of 59% over 14 years (*Table I-20*). Area devoted to open pollinated varieties or white corn types posted highest decrease at 61.3%, from 36,080 hectares in 1990 to only 13,974 hectares in 2004.

Table I-20. Corn Production Data: Area Harvested, Total Production and Average Yield per Hectare, Hybrid and OPV; Province of Bohol, CY 1990-2004

Type/ Particular	YEAR					
	1990	1995	2000	2002	2004	14 years Change (%)
1. Hybrid						
Area Harvested (has)	1,120	1,060	500	1,108	1,319	17.76
Total Production (mt)	1,013	1,063	460	2,055	2,743	170.77
Average Yield (mt/ha)	0.90	1.00	0.92	1.85	2.19	143.33
2. OPV						
Area Harvested (has)	36,080	33,100	17,683	18,437	13,974	(61.26)
Total Production (mt)	27,192	22,940	12,783	13,493	11,088	(59.22)
Average Yield (mt/ha)	0.75	0.69	0.70	0.73	0.92	(22.66)
PROVL. TOTAL						
Total Area Harvested (has)	**37,200**	**34,160**	**18,183**	**19,545**	**15,293**	**(58.88)**
Total Production (mt)	**28,205**	**24,003**	**13,243**	**15,548**	**13,831**	**(50.96)**

Source: Bureau of Agricultural Statistics.

On the average, a corn farmer tills an uneconomic cornfield ranging from 0.5 to 1.5 hectares per farmer. There are about 23,163 farmers involved in corn production as of CY 2004. Corn yields are quite low, about 2.19 metric tons and 0.92 metric tons per hectare per cropping for the hybrid and OPV, respectively.

Corn is usually planted in two croppings per year. The first cropping season is April – September and second is October-January. Some farmers defer their 2nd corn crop and practice diversification through crop rotation, most often with sweet potato, peanut, mongo and vegetables. But usually, corn monocrop farming is mostly preferred by farmers. Corn is also intercropped to coconut particularly in sparsely spaced coconut areas with road access, less sloping and with suitable soils.

Corn production in Bohol involves the Hybrid and Open Pollinated Varieties (OPV), the hybrid yellow corn is produced for animal feeds. The OPV is also utilized for feed, but in most cases, these are milled and consumed as supplement to rice. The percentage of the corn-eating population is only 18%. A number of farmers sell their corn produce to buy rice, being their preferred staple food for the family.

Per interview with several corn farmers (in San Vicente, Sagbayan), the corn crops in the 1980's were unfertilized yet produced good yields. Nowadays, corn crops need to be applied with commercial fertilizers. Weeding, pest and disease control and fertilizer application are the activities normally done by the farmer and family members. Hilling-up through plowing of the inter-row spaces with the aid of carabao is undertaken by hired labor at the prevailing rate of Php 150 per man-animal day. Harvesting, husking and hauling activities are undertaken through hired labor at Php 100 per day. Shelling and drying are similarly done by the farming household members.

Corn monocrop farming is estimated to generate 46 man-days of farm labor employment and 18 family labor over 4-months cropping cycle per hectare, as shown in *Table I-A.15* of the Annex report.

The trend of production showed a difference of P15,000 in favor of hybrid corn. A continuing increase in demand for yellow corn for the production of animal feeds also emerged after the operation of a private feedmill, requiring 10 metric tons of yellow corn per hour. This demand for corn validly assures the corn farmers of a bigger market. To address the gap and to make use of the demand opportunity, suitable areas of the potential agricultural land need to be tapped for corn production.

The Provincial Government through the PAO implemented corn program to augment its production. Cluster areas (municipalities) were identified to focus on corn production supported with the non-cluster areas involving 20 municipalities in the program. A Seed Exchange Project of Ginintuang Masaganang Ani (GMA) Corn Program was implemented in different LGUs in the province. The purchase of hybrid corn seeds were facilitated to make it available to corn farmers, Five (5) Upland Tractors were deployed to major corn municipalities (Carmen, Danao, Dagohoy, Sierra Bullones and Trinidad) for use in land preparation.

To ensure better quality of produce, the Corn Seed Producers of the province produced Certified OPV corn seeds. The Association obtained a 100% passing rate in the Seed Quality Testing at the National Seed Quality Control Laboratory at Bohol Experiment Station in Gabi, Ubay during the year 2004.

To be consistent with the province' environmental preservation effort, a Trichogramma Laboratory has been constructed to produce locally the trichogramma wasp, a biological organism which is being used to address corn pest problems.

3.1.3 Vegetable Production

The BAS data (1990-2004) listed 10 vegetable types, two of which are leafy and the rest are fruit vegetables, grown in the province. The leafy vegetables include cabbage and green onions while the fruit vegetables are ampalaya, chayote, eggplant, okra, bell pepper, squash and tomato including watermelon.

In the highland areas of Duero, Jagna, Sierra Bullones, Candijay and Guindulman, cabbage and chayote are commonly grown. The area covered is estimated at 100 hectares involving 400 farmers.

The rest of the vegetables are grown in the different lowland areas of the province. Semi-commercial productions are located in Bilar, Pilar, Danao, Carmen, Trinidad, Tubigon and Calape. As reported by the Municipal Agricultural Officers (March 2004), an estimated 13,126 farmers are involved in vegetable production dominated by backyard level producers.

As reflected in *Table I-21*, ampalaya has the most extensive area of 705 hectares in 2004. The area increased more than double from 338 hectares in 1990. It is followed by eggplant, tomato, chayote, okra, green onion, bell pepper, and squash. Watermelon covers the smallest with 14 hectares. For a period of 14 years, chayote showed the highest percentage increase of 289.74%, from 39 hectares in 1990, to 152 hectares in 2004. On the other hand, tomato showed a decreasing trend from 360 hectares in 1990 to 350 hectares in 2004.

Table I-21. Vegetable Production Trends: Area Harvested, Average Yield and Total Production of Selected Vegetables, Province of Bohol; 1990-2004

Particulars	Crop Years					Change (%)
	1990	1995	2000	2002	2004	
A. Leafy Vegetables						
1. Cabbage						
– Area harvested (has.)	16	20	27	22	20	25
– ave. yield (mt./ha.)	1.58	1.71	1.2	1.24	1.25	-20.88
– Production (m. t.)	25	34	33	27	25	0
2. Green Onion						
– Area harvested (has.)	25	28	60	79	78	212
– ave. yield (mt./ha.)	1.34	1.4	2.89	6.01	6.64	395.52
– Production (m. t.)	34	39	69	475	518	1423.52
B. Fruit Vegetables						
1. Ampalaya						
– Area harvested (has.)	338	338	350	397	705	108.57
– ave. yield (mt./ha.)	0.63	0.95	1.33	1.37	1.84	192.06
– Production mt./ha.)	214	320	464	544	1296	505.60
2. Chayote						
– Area harvested (has.)	39	146	194	207	152	289.74
– Ave. yield (mt./ha.)	3.93	3.97	3.96	4.02	7.47	90.07
– Production mt./ha.)	153	579	769	832	1,136	642.48
3. Eggplant						
– Area harvested (has.)	163	381	429	490	488	199.38
– Ave. yield (mt./ha.)	1.9	1.33	1.37	1.42	1.4	-26.31
– Production mt./ha.)	310	505	589	696	684	120.64

Particulars	Crop Years					Change (%)
	1990	1995	2000	2002	2004	
4. Okra						
– Area harvested (has.)	27	43	74	79	86	218.51
– Ave. yield (mt./ha.)	9	8.66	8.5	8.62	8.89	-1.22
– Production mt./ha.)	243	372	629	681	765	214.81
5. Bell Pepper						
– Area harvested (has.)	39	39	46	52	53	35.89
– ave. yield (mt./ha.)	0.51	0.73	0.76	0.78	0.79	54.90
– Production mt./ha.)	20	28	35	41	42	110
6. Squash (gourd)						
– Area harvested (has.)	25	22	24	16	49	96
– Ave. yield (mt./ha.)	29.92	29.9	26.9	27.39	22.32	-25.40
– Production mt./ha.)	748	658	646	438	1,094	46.25
7. Tomato						
– Area harvested (has.)	360	415	311	319	350	-2.77
– Ave. yield (mt./ha.)	1.42	1.21	1.81	1.81	1.79	26.05
– Production mt./ha.)	513	501	561	577	627	22.22
8. Watermelon						
– Area harvested (has.)	7	6	5	10	14	100
– Ave. yield (mt./ha.)	13.29	15.5	14.12	19.25	21.38	60.87
– Production mt./ha.)	93	93	71	193	299	221.50

Source: Bureau of Agricultural Statistics, Tagbilaran City.

Consistent to the area planted, ampalaya showed the highest volume of production of 1,296 metric tons in 2004. In contrast, cabbage showed the lowest volume of production with 25 metric tons in the same year with a stagnant growth rate from 1990 to 2004.

In terms of average yield per hectare, green onion showed the highest increase of 395.52%, followed by amplaya (192.06%), chayote (90.08%), bell pepper (54.90%) and tomato with 26.06%. Eggplant showed decreasing trend together with cabbage, squash and okra.

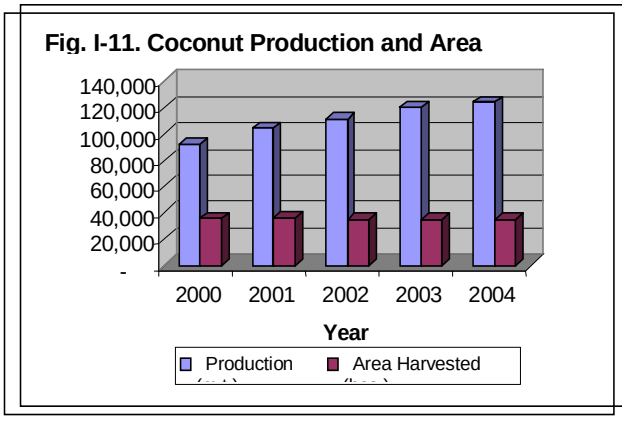
In *Table I-A.16* of the Annex report, a hectare of eggplant entails ₱17,220.00, the total cost of production in a period of six months. Obtaining an average yield of 1.5 metric tons per hectare, the net income is only ₱5,280.00. The activity generates labor of 71 man-days of which 53 man-days are provided by the family and the remaining 18 man-days are hired labor.

Production of cabbage, a semi-temperate vegetable crop, costs ₱15,320.00 per hectare per cropping as reflected in *Table I-A.17* of the Annex report. At an average yield of 1.5 metric tons per hectare, a net profit of only ₱7,180.00 is obtained. Seventy-one (71) man days are provided by family labor while only 15 man days are hired labor.

3.1.4 Coconut

In terms of agricultural land usage, coconut is the major crop in Bohol. About 38,951 hectares are devoted to coco production utilizing approximately 38% of the province' agricultural farm area. Out of 1,109 barangays in Bohol, 1,067 barangays are coconut producing. There are about 211,664 coco farmers and farmworkers.

As of 2004 Coconut Statistics of the Philippine Coconut Authority (PCA), Bohol has a total of 5.02 million coco tree population. About 93% is bearing, numbering 4,662,534 trees, while the rest, approximately 7% are non-bearing. Of the total coconut area of 38,951 hectares, about 36,144 hectares are planted with bearing trees, while the non-bearing trees are scattered in about 2,807 hectares with an average planting density of 129 trees per hectare.



Coconut production is consistently included in the ten top outgoing commodities of the province, thus its economic value is quite important to the over-all agricultural sector. There is no significant increase in terms of land area planted to coconut but for the last five years production shows otherwise. Coconut production shows an increasing trend of 35% from 2000 up to 2004. The 2000 production of 91,823 metric tons increased to 111,419 metric tons in 2002, and an increase of 11% to 123,962 metric tons in 2004 (*Figure I-11*).

Based on the PRRA survey among key coconut growers in Balilihan, a hectare of coconut plantation (average of 130 trees) generates a net income of ₱13,010.00 per year from sales of copra and charcoal. Rural labor employment is estimated at 36 man-days, with 24 man-days family labor and 12 man-days of hired labor. *Table I-A.18* of the Annex report provides the financial cost and return analysis per hectare for full-bearing plantation.

3.1.5 Oil Palm

An emerging commodity which offers additional opportunities to hasten local economic growth and development is the oil palm. The industry has potential to become the leading vegetable oil in the world and market opportunities exist both domestically and internationally. Domestic demand for palm oil is projected to increase by 5% annually according to industry sources.

In the province, the overall effort to develop the industry is private-sector led particularly the Philippine Agriculture Land Development and Mill (PALM), Inc. in Calanggaman, Ubay, with the government providing necessary support. Initially, the first batch nursery was established last July 24, 2000. The plantations are located in 14 municipalities of the second and third districts of Bohol. As of 2004, the total area planted reached 4,785.46 hectares with 1,414 growers (see *Table I-*

22). The oil palm will produce five years after planting, and areas earlier planted had lately produced initial harvests.

Table I-22. Number of Oil Palm Growers and Area Planted by Phase/Year and by Municipality (As of August 26, 2004), Province of Bohol

Municipality	No. of Growers	Immature Area (Ha)-Year of Planting					
		2001	2002	2003		2004	Grand Total
		Phase I	Phase 2	Phase 2	Phase 3	Phase 3	
Alicia	15	14.815	92.435			27.414	134.664
Bien Unido	9	10.296	2.400	1.570			14.266
Buenavista	50	60.474	71.698	28.166	60.740	29.467	250.535
Calape	1			6.519			6.519
Carmen	7	347.060	69.240	2.030	19.741	8.081	446.152
Dagohoy	11	74.695	23.739	5.667	13.185	4.815	122.101
Danao	94	146.947	11.059	81.527	42.385	28.526	310.444
G-Hernandez	7		22.385		68.888	2.000	93.273
Getafe	41	5.467	+24.755	60.379	51.955	17.778	160.334
Inabanga	6		3.719	4.874		2.415	11.008
Jagna	3		85.230		19.259		104.489
Mabini	66	39.851	196.645	94.601	4.333	13.630	349.060
Pilar	108	235.739		2.474	1.970		240.183
Sagbayan	3		8.000		11.837		19.837
San Miguel	10	4.000	68.956	4.000	14.667	5.556	97.179
S-Bullones	54	42.349	26.385				68.734
Talibon	344	269.667	173.114	175.462	85.236	97.511	800.990
Trinidad	331	217.722	164.885	129.436	50.900	40.615	603.558
Ubay	251	378.438	8.126	17.400	8.667	13.504	426.135
Valencia	3		10.000		16.000		26.000
Total	**1414.000**	**1847.520**	**1062.761**	**614.105**	**469.763**	**291.312**	**4285.461**
Percent of Total (%)		**43.11**	**24.80**	**14.33**	**10.96**	**6.80**	**100.00**

Source: Outgrowers Division, Philippine Agriculture Land Development and Mill (PALM), Inc. (As of August 28, 2004).

Oil palm plantation development is an alternative in utilizing idle lands in the province. The industry is also a means to address rural unemployment and declining household incomes. The small landholdings classified as idle lands are utilized for oil palm through lease basis offered by a PALM corporation.

The necessary support of the government include facilitation in the identification of 15,000 hectares for oil palm including area mapping; assistance in community information and educational drive; monitoring of the oil palm nurseries (20 hectares in Ubay and 5 hectares in Carmen); and conduct of continuing research on the intercropping system at the early development stage of oil palm plantations.

3.1.6 Mango and Other Fruit Crops

There are 5 major fruit crops listed by BAS (1998-2004) which are planted in the province, namely; banana, calamansi, mango, papaya and pineapple. As of 2004, the total area planted was 5,629 hectares as shown in *Table I-23*. As per report from the Municipal Agricultural Officers, about 14,186 farmers are involved in mango planting which is dominated by backyard growers.

Table I-23. Summary of Area Devoted to Fruit Crops, Years 1998-2004 Province of Bohol

Fruit Crops	Area in Hectares by Year			
	1998	2000	2002	2004
Banana	2,552	2,680	2,674	2,719
Calamansi	13	14	20	23
Mango	2,050	2,220	2,220	2,735
Papaya	136	135	121	120
Pineapple	7	25	28	32
Total	4,758	5,074	5,603	5,629

Source: Bureau of Agricultural Statistics.

The fruit crop trends in terms of area planted, average yield per hectare and total production from 1990-2004 is shown in *Table I-A.19* of the Annex report. Mango has the largest area planted covering 2,735 hectares, from 800 hectares planted in 1990, the area has tripled in 2004 reflecting an increase of 242% in 14 years. Next is banana with 2,719 hectares; papaya, 120 hectares; pineapple with 32 hectares and calamansi with 23 hectares. No record is reflected for lanzones in 2004 from an area of 3 hectares in 1990.

Using mango as representative fruit tree crop, the PRRA survey among mango growers found out an average of 80% success in induced flowering and fruiting of 12-year old mango trees. On a per hectare basis (100 trees population), the net return is impressive at ₱40,200.00; a total of production cost of ₱60,600.00 and gross income of ₱100,800.00 for year 2004 (refer to *Table I-A.20* of the Annex report). Farm labor employment generation was estimated at 72 man-days, at least 32 man-days hired labor and 40 man-days family labor.

3.2 Livestock and Poultry Production

The major livestock and poultry commodities raised in the province include cattle, carabao, goat, hog, chicken and ducks. Based on the data from the Bureau of Agricultural Statistics over 5 years (*Table I-24*), poultry consistently accounted the highest number representing 82% of the total animal population followed by hogs and ruminants.

Table I-24. Livestock and Poultry Inventory by Type, Province of Bohol Years 2000-2004

Commodity	Total Inventory (in heads)				
	2000	2001	2002	2003	2004
A) Ruminants	***174,158***	***173,489***	***173,448***	***174,135***	***188,209***
Carabao	60,605	60,268	62,818	63,344	62,435
Cattle	65,265	65,853	70,503	65,791	70,644
Goat	48,288	47,368	40,127	45,000	55,130
B) Hogs	**265,197**	**276,460**	**268,422**	**289,460**	**340,510**
Total livestock	**439,355**	**449,949**	**441,870**	**463,595**	**528,719**
C) Poultry	***3,075,159***	***2,413,921***	***2,453,016***	***2,580,448***	***2,423,733***
Chicken	3,022,038	2,359,735	2,398,955	2,529,620	2,384,631
Ducks	53,121	54,186	54,061	50,828	39,102
Total Animal Population	***3,514,514***	***2,863,870***	***2,894,886***	***3,044,043***	***2,952,452***

Source: Bureau of Agricultural Statistics (BAS) – Bohol

3.2.1 Ruminant Production

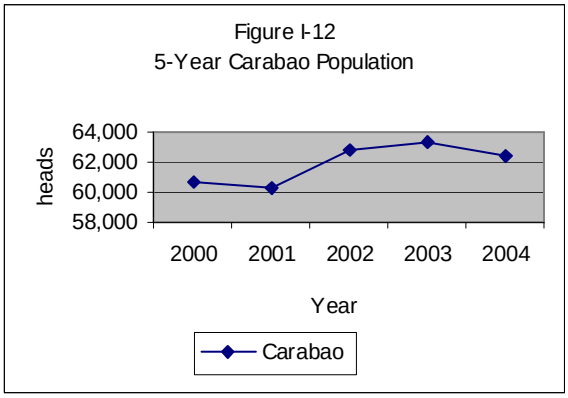
The ruminants are cattle, carabao, goats and sheep. Ruminant production is predominantly backyard and is usually done thru tethering and loose grazing under coconuts and open grasslands dominated by native growers like cogon and thimeda. Its population, based on the BAS data, increased by about 8% over 5 years but registered a decline between year 2000 to 2002 and increased in the succeeding years.

The ruminant population is dominantly native. However, on-going programs for upgrading such as artificial insemination and natural breeding thru the use of selected breeder bulls and bucks have been intensified to increase animal productivity. This upgrading program is undertaken by the Office of the Provincial Veterinarian, which is jointly and strongly supported by the Department of Agriculture through Ubay Stock Farm and the Philippine Carabao Center in Ubay. Presently, the status of Bohol as an FMD-free area per Office of the International Epizootic (OIE) declaration is a "plus" factor to the industry.

1) Carabao

Of the total ruminant population, the carabao ranks second to cattle. Over 5 years, its population posted a fluctuating trend with a slight but continuous increase from 2001 to 2003 (*Figure I-12*).

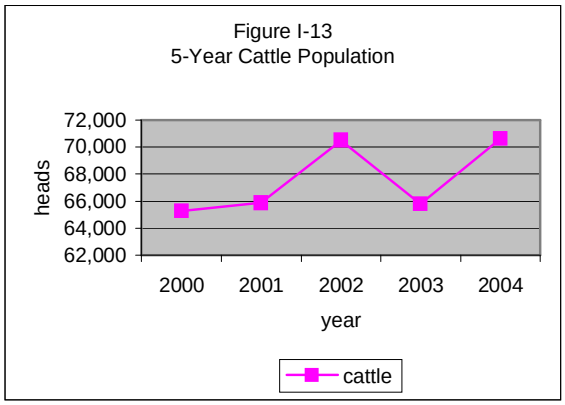
Figure I-12
5-Year Carabao Population



Carabao raising is predominantly backyard with a dominantly native population. Although there is only one (1) identified ranch-type raiser who qualifies in the commercial category, carabaos are raised all throughout the province primarily for draft or source of farm power. The OPV survey in 2002 showed that the large concentration of carabaos are in Districts 2 and 3, which is about 41% and 46%, respectively, of the total carabao-heads.

The inter-provincial movement of carabaos for the past 5 years posted an out-shipment of 11,132 heads with destinations to the provinces of Leyte and Cebu (*Table I-25*), while importation, which comes mostly from Negros Oriental, Cebu and Mindanao indicated a total of 6,707 heads. This importation is mainly a response to the implementation of different dispersal programs and slaughter requirements during fiesta season. Records of the National Meat Inspection Commission (NMIC) show that a total of 9,333 heads were slaughtered, where large volume is registered in District 1, followed by Districts 3 and 2.

2) Cattle



The inventory of cattle as of 2004 shows a total of 70,644 heads, which is barely 6.87 % higher than the previous year (*Figure I-13*). Since 2000, a slightly increasing number is manifested with a fluctuating trend from 2002 to 2004.

In 2002, the OPV records show that District 2 ranks first in terms of total cattle population, which accounted for 54%, followed by Districts 3 and 1 with 29% and 17%, respectively.

Although cattle population in the province largely comes from the smallholder operation, the Office of the Provincial Veterinarian has identified twenty nine (29) "invisible ranches" (IR) or cattle raisers each having about 25 heads or more distributed to farmer handlers through the "paiwi" system of management. The aggregate population of these IRs' is 3,599 heads or around 5% of the total cattle population in 2004. This group of raisers are organized into Bohol Cattle Raisers Association and served as conduit in the delivery of various support services of the sector such as the Bull Loan Project.

Table I-25. Live Animals and Livestock Products Shipped In & Out of the Province of Bohol, Years 2000-2004

Particular	2000	2001	2002	2003	2004	Total	Major Destination
SHIP-OUT							
I. Live	No. of heads						
arabao	2,173	1,995	2,358	2,020	2,586	**11,132**	Leyte, Cebu
Cattle	984	1,203	1,061	2,408	1,588	**7,244**	Leyte, Cebu
Goat	877	816	722	977	962	**5,554**	Leyte, Cebu
Hogs	23,218	27,190	26,956	28,829	42,093	**148,286**	Cebu
Chicken	18,692	14,110	15,760	16,606	15,895	**81,065**	Manila, Cebu,Cagayan
II. Meat	In kilograms						
Beef	-	-	89,232	89,985	52,628	**231,845**	Cebu
Pork	-	-	378,876	219,190	124,877	**722,943**	Cebu
SHIP-IN							Origin
I. Live	No. of heads						
Carabao	1,321	1,174	1,725	1,436	1,051	**6,707**	Mindanao, Negros, Cebu
Cattle	687	823	977	772	594	**3,853**	Mindanao, Cebu
Goat	55	114	30	261	37	**470**	Negros, Siquijor
Hogs	822	1,325	703	1,495	663	**5,008**	Mindanao, Cebu
Chicken	1,368	2,725	1,161	28,839	3,864	**37,957**	Negros, Cebu
Chicks	68,510	91,700	102,900	111,300	133,500	**507,910**	Manila, Cagayan, Cebu
II. Products	In pieces						
Eggs	-	-	10,160,334	12,174,650	13,332,302	**37,337,974**	Cebu, Cagayan
Balut	-	-	516,000	650,450	1,156,513	**2,345,043**	Manila, Cagayan
	In kilograms						
Chicken meat	-	-	702,385	665,015	820,420	**2,187,820**	Cebu, Cagayan

Source: Provincial and Municipal Veterinary Quarantine Offices, Province of Bohol.

Comparative figures of total cattle movement for 5 years indicate that a larger volume is shipped outside to destinations like Leyte and Cebu than the total number of animals coming into the province (*Table I-25*). These shipped-in are mostly coming from Mindanao and Cebu. Similar to carabaos, most of the cattle coming in are breeders used for dispersal purposes.

A continuous decline of cattle slaughter is manifested since 2001 to 2004 (*Table I-26*). The larger volume of slaughtered cattle is registered in Tagbilaran and Ubay, which mostly come from the Auction Markets of Catigbian and Sagbayan.

Table I-26. Total Livestock & Poultry Slaughtered by Type, Province of Bohol Years 2000-2004

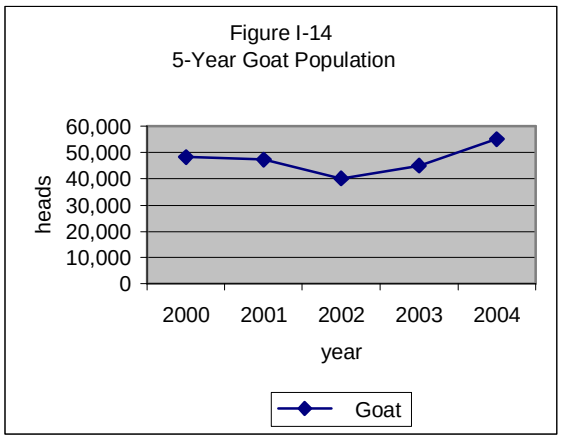
Year	Carabao		Cattle		Goat		Hog		Chicken	
	No.	D.W.	No.	D.W.	No.	D.W.	No.	D.W.	No.	D.W.
2000	1,297	166,458	15,079	1,202,701	627	5,735	48,307	2,387,522	259,254	317,078
2001	999	121,634	16,564	1,212,882	362	4,257	52,237	2,603,990	204,930	308,779
2002	1,196	156,613	16,521	1,297,091	381	3,484	58,128	3,051,336	596,119	596,821
2003	1,298	101,151	15,750	1,353,001	66	475	65,958	3,176,728	423,032	452,634
2004	1,344	162,952	14,269	1,197,831	89	915	64,291	3,298,301	691,676	688,410
Total	**9,333**	**708,808**	**77,597**	**6,263,506**	**1,545**	**14,867**	**427,074**	**14,512,877**	**2,388,879**	**2,363,722**

Source: Consolidated Monthly Slaughter Report of the National Meat Inspection Commission (NMIC–Reg.7.

3) Goat

Third among the ruminants, goat population consistently decreased for the past 3 years since 2000 and recovered with a continuous increase in the last 2 years (see *Figure I-14*). The OPV records in 2002 reveal that goats are widely distributed in the province and are heavily concentrated in the second district followed by the third and first districts. The significant increase is noted between 2003-2004, which is brought about by the implementation of dispersal programs both by government and non-government institutions.

Figure I-14
5-Year Goat Population



Goat raising is predominantly backyard and is gaining popularity and acceptance among farmers. An organization of goats raisers emerged in the middle part of 2004 and is now engaged in expansion and upgrading of stocks in tandem with the dispersal program of the Provincial Government. The NMIC report from 2000 to 2004 showed a fluctuating trend of slaughtered goats and do not include outside slaughter for consumption during special occasions (*Table I-26*).

3.2.2 Hog Production

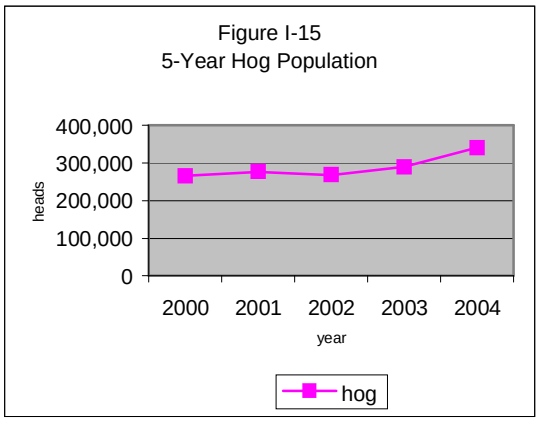


Figure I-15
5-Year Hog Population

Hog production is predominantly backyard, which accounted for 94.20% of the total population. The remaining 5.8% represents production in commercial farms. Based on BAS criteria, there are 102 hog farms in the province that qualify in the commercial category where large concentration is situated in District 3 with 52 raisers and Districts 1 and 2 with 28 and 22 raisers, respectively. The biggest commercial farms are found in Cortes and Sagbayan.

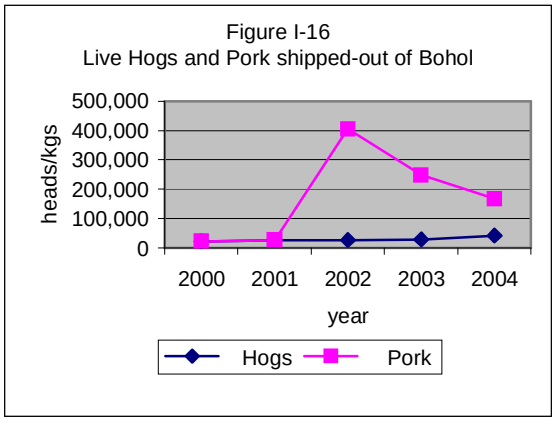


Figure I-16
Live Hogs and Pork shipped-out of Bohol

There is a noticeable steady increase in the number of live hogs shipped to Cebu from 2002-2004 and a declining volume of pork shipment in the past 3 years (*Figure I-16*). These meat products are mostly coming from one of the commercial farms.

3.2.3 Poultry Production

The types of poultry raised in the province include chicken (with strains of native, broiler, egg, dual types and game fowls), turkeys and ducks.

1) Chicken

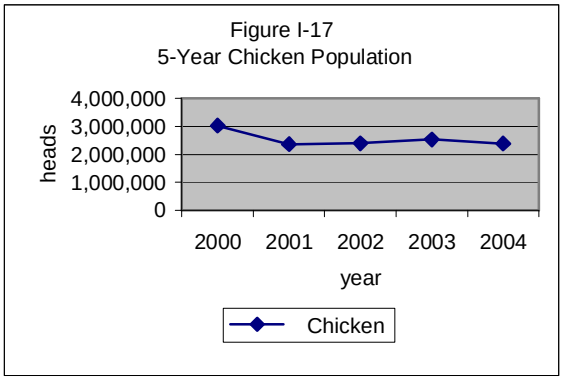


Figure I-17
5-Year Chicken Population

Native chicken constitutes about 96% of the poultry population, which is generally raised at the backyard level. Based on record of the Provincial Veterinary Quarantine Office, native chickens are shipped to Cebu, Manila and Mindanao.

There is no pure native chicken raised for commercial purposes. However, there are nine (9) identified commercial raisers for layers and broilers with 2 breeders for improved native chicken using sasso and kabir breeds. Most of the broiler farms are concentrated in District 3, while the layer farms and the biggest are situated in District 1. Chicks for commercial projects are dependent from outside sources. Records of the PVQO shows a total of 507,910 heads have come in for the past 5 years from Cebu, Manila and Cagayan de Oro.

2) Duck

Ducks are being introduced by the Department of Agriculture in the province primarily as a biological control against golden snail or "kuhol" pest in lowland palay areas. Comparatively, duck raising is not as popular as raising improved native chicken. However, a number of farmers are now starting to venture for "balut" production in a backyard scale.

As of December 2004, the OPV has identified only two (2) ducks raisers that would qualify in the commercial category. These are found in Tubigon and Ubay.

Of the total poultry population in 2004, ducks only represent 1.6%. For over 5 years, duck population has indicated a continuous decline where a greater percentage is manifested in 2004.

3) Other Poultry Products

Eggs. It is interesting to note that there is a high importation of table eggs into the province for the past 3 years. A total of 37,377,974 egg pieces mostly coming from Cebu and Cagayan , has been reported by the PVQO.

Balut. Most of the "balut" sold in the province are coming from Manila and Cagayan de Oro City, according to the PVQO report. A continuous increase of "balut" importation into the province for the past 3 years has been noted.

3.3 Fish Production

3.3.1 Municipal Fisheries

Bohol has 30 coastal municipalities including the City of Tagbilaran, 365 coastal barangays with 73 islands and islets. It has a coastline of 273.3 kilometers. Three (3) major fishing grounds surround the province. Its municipal waters cover an area of 624,506 has. With a coastal population of 480,247. Of the estimated 32,953 fishers province wide, approximately 8,952 are motorized and 11,686 are non-motorized (Amanda, et. al. 2004). There are 30 types of fishing gears commonly used, each of this type varies according to the species they intend to catch and the fishing ground location (refer *Table I-27*).

In Central Visayas, municipal fisheries provide food and direct and indirect employment to at least 2 million people. Municipal fishers now catch approximately 42% of the region's total fish catch, a far from the 70-75% they used to catch in the 1960s. Total fish production contributed by the municipal fisheries in the province is summarized below:

Year	Mun. Fisheries Production
1998	14,382 kg
2000	14,803 kg
2002	14,135 kg
2004	13,443 kg

The major fishing ground of fishers from eastern and southern Bohol and the southern municipalities of Siquijor is Bohol sea. Cebu Strait is the fishing ground of fishers from northwestern Bohol, southeastern Cebu, northern Siquijor, and southeastern Negros. The Danajon Bank is the fishing ground of fishers from northern Bohol and eastern coast of Cebu. However, the actual number of fishers on board each fishing unit depends on the size of the fishing craft, means of propulsion engine and type of fishing gear. This ranges from one fisher for simple hook and line to as many as five fishers for the gillnet types.

Table I-27. Inventory of Common Fishing Gear and Catch per Unit Effort (CPUE) in Kilograms Per Day from the Major Fishing Ground of Bohol, CY 2004

Common Fishing Gear	Local Name	Bohol Sea		Cebu Strait		Danajon Bank	
		No. of Fishing Gear	CPUE (kg./day)	No. of Fishing Gear	CPUE (kg./day)	No. of Fishing Gear	CPUE (kg./day)
Baby trawl	Palakaya	none	none	none	none	176	15.3
Beach seine	Baling	26	19.3	293	25.7	398	6.6
Bottom set gill net	Pata-an	1,181	5.5	1,227	7.1	4,050	7.7
Bottom set long line	Palangre	630	6.1	981	6.2	1,962	7.2
Crab pot	Pangal	53	2.3	38	2.8	672	4.2
Danish Seine	Hulbothulbot	53	2.3			204	65.1
Drift gill net	Palaran	2,595	12.6	3,476	10.4	1,280	13.2
Drive-in gill net	Bahan	62	18.1	212	15.0	117	27.0
Encircling gill net	Panglikos	181	13.7	131	16.9	352	12.9
Fish coral	Bungsod	275	16.0	361	3.9	802	6.3
Fish jig	Kab-it, helicopter	40		648	7.0	545	4.3
Fish pot	Bubo	461	6.3	1,229	7.1	934	10.5
Hook and line	Pasol	4,167	3.6	7,741	5.2	5,913	3.9
Hook and line w/ float	Palagdas	78	20.0	1,148	9.6	1,228	10.2
Multiple handline	undak	4,246	4.6	6,532	3.7	4,808	4.2
Push net, scissor net	sud-sud, dos-dos	364	1.5	536	39.3	664	11.3
Scoop net	Sapyaw, sigpaw	172	16.2	37	2.3		4.5
Scoop net with lights	Paapong, panulo	843	16.1	618	8.7	939	5.4
Set gill net	Patuloy	4	17.8	76	9.3	71	6.3
Spear fishing	Pamana	209	4.1	1,017	3.6	918	4.9
Spear fishing w/compressor	Buso	40	7.5	59	30.0	265	21.3
Spear fishing w/ light	Panamal	490		56	2.8	225	7.3
Sqid jig	Subid	3,673	3.5	3,807	4.0	2,801	4.1
Stationary lift net	Bintol, newlook	12	7.5	9	8.7	55	12.1
Surface set longline	Bahan, Tapsay	578	13.8	1,264	7.8	30	3.0
Trammel net	Tripple net, double	695	5.5	1,042	4.6	337	6.6
Troll Line	Subid	31	8.5	1,476	7.3		14.0

Source: CRMP Rep., 2004.

Relative to the length of coastline, Cebu Strait has the highest densities (units/km of coastline) of hook and lines and gill nets. In Danajon bank where catching of giant squid is prevalent, pots, traps and spear fishing gears are used. Gleaning is relatively widespread in the entire Bohol coastline.

3.3.2 Commercial Fisheries

Commercial fisheries are those using vessel of more than 3.0 gross tons. According to BFAR data, there are 27 registered commercial fishing boats provincewide whose gears vary from ring nets (likum), round haul seine (lawag) and danish seines (liba-liba or hulbot-hulbot). Some are fish carriers with an average production of 256 M.T./vessel for ten (10) months (refer *Table I-28*).

Table I-28: Number of Commercial Fishing Boats in the Province of Bohol, Year 2004

No. Of Vessel/Type	Fishing Gear	No. of Gears	Total G.T.Per Gear	No. of Operator	Address
4	Lawag	4	4.50	4	Buenavista
22	Ring net	22	200.15	13	Dauis
1	Lawag	1	2.70	1	Clarin
1	Ring net	1	2.50	1	Candijay
1	Ringnet	1	14.61	1	Baclayon
3	Ring net	3	31.34	3	Loon
4	Danish seine	4	33.07	3	Mabini
25	Ring net Cargo Drive-in-net	14 10 1	399.15 186.43 24.24	3 1 1	Tagbilaran
8	Lawag	8	10.70	8	Tubigon
2	Lawag	2	5.38	2	Talibon
8	Ring net Danish seine	1 7	25.50 23.49	1 4	Ubay
Total: 81		**79**	**963.76**		

Source: BFAR Region VII, Cebu City; May 2005.

Commercial fisheries have replaced municipal fishers as main catcher of fishery products with approximately 60% all landed fish in the region. In Bohol, there are 81 identified commercial fishing boats, mostly owned and operated by a select few who also own ice plants and distribution networks. *Figure I-18* shows the yearly commercial fisheries landing trends.

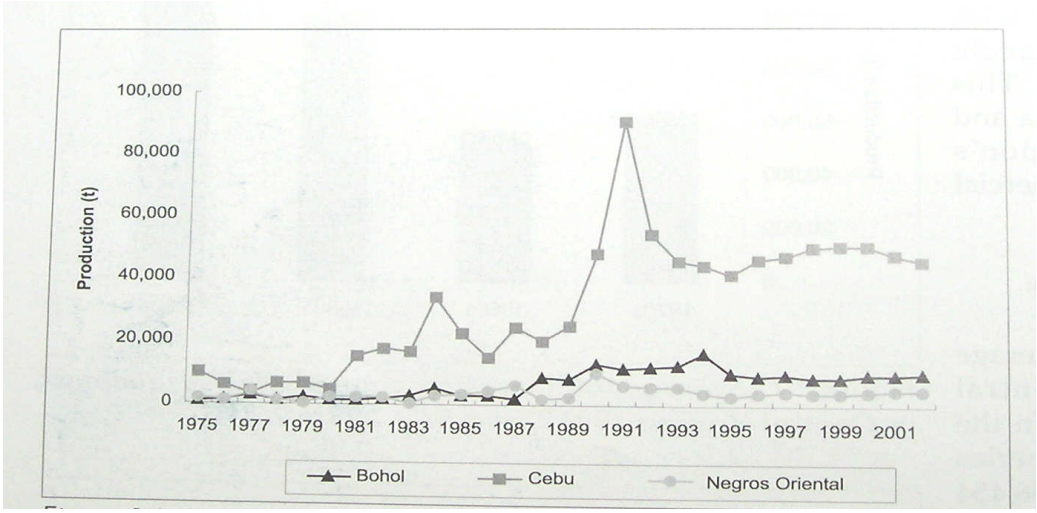


Figure I-18. Annual Commercial Fisheries Landings Trend, 1975-2002 (BFAR and BAS 1976-2002)

This industry is fast changing technologically. Operators are upgrading their smaller wooden hull boats to much larger ones with reinforced metal hulls. Fish finders are being replaced with equipment using sonar technology. Hence, the average gross tonnage of commercial fishing boats continue to increase as does the new fishing technologies.

Commercial fisheries production continued to increase for the last seven (7) years, from 8,744 m.t. in 1998 to 9,559 M.T. in 2004. Since1976, the average contribution of the province' commercial fisheries production in Central Visayas was 15.6 %.

3.3.3 Aquaculture

Aquaculture includes the production of commercial species like bangus, prawn, mudcrab, seaweeds, grouper and tilapia from brackishwater and freshwater fishpond. Based on the survey conducted by the Provincial Agriculture, there are 340 fishpond operators provincewide. Fishpond in mangrove areas is estimated at 4,738.2 hectares (Ong et. al., 2002). *Table I-29* shows the trend of production in aquaculture and other fishery products.

Table I-29. Aquaculture and Fishery Products by Type (in metric tons), Prov. of Bohol; 1998-2004

Particular	1998	1999	2000	2001	2002	2003	2004
Inland Fishing	4	3	4	21	33	27	36
Freshwater Fish Cage	-	-	-	-	-	-	0.10
Freshwater Fishpond	-	-	-	19	17.70	14.30	15.90
Marine Fish Cage	-	-	2.69	2.84	0.27	2.33	12.21
Marine Fish Pen	-	-	-	-	0.17	-	1
Brackish water Fishpond	4,701	4,534	4,186	4,040	3,831	4,193	4,121
Oyster	41	64	119	121	155	141	175
Seaweeds	39,076	41,099	43,124	74,753	79,961	71,873	77,522

Source: BAS.

Bohol has an area of approximately 8,000 hectares suitable for seaweeds farming. Some 2,281 hectares are presently producing while 5,000 hectares are potential areas for expansion. The average yield is 40,000 m.t. fresh seaweed per hectare per year with an average of 3 croppings yearly (see *Table I-30*). Bohol contributes about 60% to the total seaweed production in Region VII.

Table I-30. Seaweed Production in Bohol (in metric ton), Years 2000-2004

Particular	2000	2001	2002	2003	2004
Fresh	43,124	74,743	79,961	71,873	77,522
Dried	5,390	9,344	9,995	8,984	9,690
Area Harvested (Ha)	ND	1,957.80	1,962	1,657.80	1,776.30

Source: Bureau of Agricultural Statistics (BAS).

3.4 Agri-based Industries

There are only two agri-based enterprises that fall under the category as medium enterprise; the Alicia Milling and Marketing Cooperative in Alicia with ₱20 million capitalization, and the Marcela Feed Mill/Rice Mill in Ubay together with Poultry and Piggery Projects in Cortes with a total capitalization of ₱40. 42 million.

The only enterprise that belongs to the small-scale category is the Agro-Marine Development Corporation in Tubigon with capitalization of ten million pesos (P10M). As per records of the Department of Trade and Industry, out of the 349 enterprises registered, none belongs to the large enterprises and all the rest are considered as micro enterprises.

The highest number of registered agri-based enterprises is situated in District 1, reaching to 150 in all with a total capitalization of ₱31.01 million. In District 2, about 88 enterprises are registered with a total capitalization of ₱52.38 million, which is the highest among the three districts. In District 3, there are 111 enterprises registered with the lowest amount of capitalization at ₱19.92 million. For the whole province, a total of 315 enterprises are registered with an aggregate capitalization of ₱82.87 million.

3.5 Agriculture and Fisheries Marketing System

3.5.1 Crops Marketing System

Palay. Several Varieties of palay are available in the province, the most common being PSBRC-18 and PSBRC-82. They are most preferred because of relatively higher yields (about 4.2 mt/ha) compared to other varieties. Their varieties have good eating quality and are resistant to pests and diseases. However, in the most recent years, some organic MASIPAG rice has started to gain popularity among health conscious consumers even if the commodity commands high price. Although, production of the MASIPAG lines is still on the piloting stage, some are preferred by producers because of its minimal amounts of fertilizer requirements and resistance to pests and diseases. There are also red varieties preferred by Boholanos because of its aroma and the belief that red rice prevents diabetes.

Prices of palay differ according to moisture content. "Oga" is the ready-to-mill palay with 14% MC while "basa" is the newly threshed palay with more than 18% MC. Palay is considered "bahay" if threshed more than three days after harvest and has started to ferment. Rice prices also differ according to classification, the super white, regular white and bahay depending upon the degree of whiteness in color and the percentage of head grains to broken grains.

The peak harvest in the province for the wet season is from September to October which also corresponds to the peak trading months. Dry season harvest falls on February to March. The lean supply months are November to January and May to August. Traders thus store enough palay from the first and second croppings to ensure supply during lean months.

Palay prices are inversely proportional to supply. As the harvest begins to peak, prices decline and vice versa. Since rice is included in the "policy control" commodities, prices remain stable.

Farmers practice sundrying of palay on concrete pavements, basketball court, mats or canvass at roadsides. Availability of sunlight and post harvest facilities as well as the farmer's cash flow influences his decision on product disposal. High cost of inputs compels farmers to avail credit from traders and dispose of immediately their products to settle their obligations.

The major market channels of palay are the local traders and the millers. Before reaching the final consumers, rice is channeled through the wholesalers, retailers or the supermarkets. As per report from the National Food Authority (NFA) in 2004, about 95% of palay production was marketed locally while the remaining 5% was "exported" to the neighboring provinces in milled form.

One of the major products from rice developed in province is the "calamay" of the municipalities of Jagna and Alburquerque. It is a delicacy made out of coconut, sugar and glutinous rice stored inside the coconut shell. Other products include "ampaw", "suman", "puto" and "bibingka".

Corn. Two major corn varieties are planted in the province, the hybrid and the open-pollinated varieties. The main market outlet for the hybrid yellow variety is the Marcela Feed Mill in Ubay. The company accepts the product in shelled form or corn in the cob. An insignificant share goes to the local market in the form of cooked young corn ("tilaob") and direct consumers for feeds. Some farmers have entered into contract growing with the company but due to marginal suitability of some areas for corn, losses were experienced by them.

For open-pollinated corn varieties, the produce goes to the traders and millers. Channeled through wholesalers and retailers, consumers avail of the product in the form of grits for food, and corn bran, which is a by-product used for animal feeds.

This variety is usually sold in the local markets and schools as "tilaob". In the municipality of Bilar, vendors are selling "pintos", cooked grated young corn wrapped by its own husk.

The peak production months for corn are August to October while the peak demand is during December to March. There are only few marketing participants that are the farmers, the millers, and the traders.

Vegetable Crops. In the highland areas, the major vegetables grown are chayote and cabbage. These are sold to assemblers, wholesalers, retailers or direct to the consumers in the local markets during market days ("tabo"). Farmers have tried producing other semi-temperate vegetables but failed in penetrating the high end markets like supermarkets, hotels and restaurants because the supply from Mindanao and Cebu is already stable and sustainable. Farmers are selling their products in the local markets.

Lowland vegetable products go to assemblers, wholesalers, retailers, supermarkets and direct to consumers during market days. Lately, some farmers explored the market in Cebu City particularly those in the municipality of Calape which is very accessible to Tubigon where a wharf is located. Farmers market their products in Carbon Market of Cebu City while a few have explored the supermarkets where the products are delivered only to the pier. The buyer then claims them at the Cebu pier and payment is made through bank transactions. Since Tubigon is just a two-hour ordinary trip to Cebu, buyers should have preferred the products from Bohol. However, due to small landholdings and unconsolidated products, the supply is unstable and insufficient.

For vegetables consumed in the province, it is estimated that 80% of the supply volume comes from Mindanao and Cebu. However, farmers usually clamor that marketing remains a problem of vegetable production.

In most cases, farmers are not actively involved in price setting of products; they have to accept the price set by the traders. Due to high cost of inputs, some farmers avail production loans from informal sources, where it is more accessible to them and payment in kind is accepted. However, interest rates are charged against their sale of products. The high perishable nature of vegetables causes another problem to producers and traders where storage and transport facilities are also very limited.

Ube and Other Rootcrops. Ube is a favored crop in the province although production is generally in backyard level. The major market channels of ube are the retailers, local processors and consumers. Since the price of ube in the province is relatively high compared to other provinces, large scale buyers and processors from outside the province have diminished. Unlike other crops, the prevailing ube prices are usually determined by the growers.

Three (3) small scale processors of ube powder operate in the province where marketing of the product is direct to consumers. Food processors, on the other hand, are hesitant to venture into large scale production due to high price and seasonal supply of ube raw materials.

Cassava, another root crop grown in the province, involves only a few channels of marketing from production. Producers sell cassava tubers either to retailers, small-scale processors or the Philippine Starch Industrial Corporation. The rest go directly to consumers for food and animal use. Because of stiff competition of processed cassava products, the Philippine Starch Industrial Corporation has failed to upgrade the price of cassava tubers which discouraged farmers to produce more.

Gabi is another product sold directly to consumers or retailers for food. Processing has not been explored yet.

Coconut. Coconut products sold in the market are in the form of copra, dry nuts, young nuts, cooking oil, virgin coco oil and coconut wine ("tuba" or "bahalina"), among others. From the farmer level, copra is sold to middlemen who, in turn, sell the products to assemblers/shippers to Cebu where the oil manufacturing companies are located. Local small scale oil processors have diminished. In

places adjacent to the city and tourist sites like Dauis, Panglao, Loboc and Carmen, the selling of young coconut is very popular. Lately, dry coconut has found its way to market for processing of the "virgin coconut oil" aside from the usual cooking needs.

Other potential by-products like husks and shells are mainly used for kitchen fuel. Charcoal is also sold in the local markets.

Mango and Other Fruits. Mango is an emerging export crop of the province. In green or freshly harvested form, it is sold to assemblers, mostly the contractors in flower induction, although some growers sell their products to consumers as ripe fruits. From the contractors, the fresh mango goes to the wholesalers, retailers, processors and exporters.

Commercial mango growers sell their produce direct to processors and exporters based in Cebu, or to the local wholesalers and retailers. These growers have trained and skilled workers in flower induction and in plantation management.

Wholesalers in the province buy mango fruits not only from local suppliers but also from other sources like Mindanao and Cebu. During the peak months from April to July, large volume of fresh mango shipped into the province brings down the prices of local produce.

Banana is another fruit crop grown in the province. Dominated by the "Saba" or ("Cardaba") variety, the local market is its major outlet. Recently, the organically produced Cavendish ('Bongan") variety started to enter the Japan market but quantity and quality of the products are the major problems.

Green banana is generally sold to retailers, canvassers/assemblers, household level processors or direct to consumers. There are few farmers who enter into contract with local malls. This is common to the "Lakatan" variety.

For other fruits like calamansi, papaya, watermelon and pineapple, the fresh products are sold mostly to local retailers, wholesalers and/or direct to consumers. Production is mostly in backyard level except for pineapple and papaya. Fruit stalls have recently emerged along the highway in Carmen where pineapple growing is concentrated. In Duero, contiguous planting of papaya has emerged with the presence of a village level papaya soap processing.

3.5.2 Livestock and Poultry Marketing

In Bohol, livestocks particularly cattle and carabaos are sold live through livestock traders or through middlemen who come to the barangays. Sale is done on liveweight basis using ocular estimation or the so-called "mata-mata" system. Expenses for transport and transfer of certificates of ownership are the responsibilities of the buyer.

With the existing livestock marketing system, there are two primary channels of distribution for ruminants; the local market and the market outside the province. First, backyard raisers sell their animals at any age and at any condition to middlemen in order to avoid incurring transportation and handling costs. The

middlemen deliver the animals to traders or directly to Livestock "Oksyon" Markets (LOMs) and then brought to the abattoirs for primary processing. In this case, the middlemen control the price of the animals. Second, backyard raisers sell their animals directly to traders or middlemen and then brought to LOMs and shipped outside the province as live animals.

For hogs, backyard raisers usually market their animals both as live and in carcass form. Liveweight price is greatly affected by the presence of middlemen. There are also three (3) existing primary channels of distribution for hogs.

First, hogs are sold to the local middlemen who come to the barangay. The middlemen deliver the hogs to traders or retailers in the municipality or directly to Cebu City. In this channel, the middlemen usually dictate the price per kilo of the animal.

Second, hog raisers may sell their animals directly to retailers or traders who give a better price with the absence of the middlemen. Price is dictated by retailers and traders. Third, farmers may sell their animals directly to consumers in the community at a better price. Consumers may buy directly at the farm or the raisers display pigs during market days.

For poultry, marketing of live chicken is usually through middlemen, the existing marketing system especially for the native chicken. Price of live-weight per kilo is dictated by middlemen. In the case of broiler, which is commonly raised through contract growing, dressed chickens are directly sold to the contracting or financing company, which sets the price of the products.

3.5.3 Fish and Aquatic Products Marketing

Generally, high value fish and aquatic products are transported to Cebu as the marketing outlet particularly in the northern portion of Bohol where Cebu is more accessible and ensures a good price than the capital city of Tagbilaran. What remains locally are low-priced fish species that consumers are able to afford.

The distribution of fish catch takes different forms at the local level. Some fishermen market their catch directly to the local market places, others to "suki" system, a system of patronage in which a customer regularly buys from the same seller and receives special favors in return (World Bank 1980). In many cases, a patron-client relationship exist between the middlemen and the municipal fishers. During bad times when fishermen run out of money for their family needs, they ask the middlemen for loans which are paid from their share of catch, but the price of which is usually at the patron's convenience and advantage. Fishermen very rarely have contact with the final consumer of their catch.

Another form of selling is through middlemen. There are usually well-to-do fishermen who own commercial fishing boats of more than three (3) gross tons like likum, bag net and lawag, and employ resident fishermen to operate them. The fishermen are, in turn, required to deliver their catch to them as payment for debts. Many of the "suki" are also fish processors who are engage in "paksiw" processing of tuna during the months of March to June. Processed products are sold locally and some are transported to Mindanao.

Aside from the local market, bangus are also marketed direct to Cebu through pumpboats. Some portions of the bangus harvest including prawn are sold to processors in Tubigon where frozen products are exported to Japan and the U.S. Deboned and vaccum-packed bangus are also exported.

Grouper are sold live in hotels, restaurants and resorts locally or in Cebu together with mudcrab, oyster and lobster. Other marine products like sea cucumber are sold in dried form for export. Blue crabs are sold to processors at Ubay and Talibon. This has caused prices of blue crab to escalate.

Seaweeds are marketed raw in the local markets and in Cebu for food consumption. Dried seaweeds are marketed either in the local buying stations or direct to Cebu from the production areas through middlemen. Buyers of dried seaweeds in Cebu are either direct exporters or processors of carragenan.

Hatchery bred bangus fry are sold locally, but the bulk are sold outside of the province, i.e., Manila, Bulacan and Pangasinan.

4.0 INSTITUTIONAL SUPPORT IN AGRICULTURE

Policies and guidelines needed to ensure the successful implementation of various management and development programs more specific to agriculture sector are hereunder presented. In particular, these policies and guidelines have been formulated to effectively promote sustainable agricultural development.

4.1 National Government

At the national level, most notable to the agriculture sector is Republic Act 8435, or the Agriculture and Fisheries Modernization Act of 1997, commonly referred as AFMA. It seeks to modernize the Philippine Agriculture Sector, for the country to effectively compete in the global market.

Poverty alleviation, food security, rational use of resources, global competitiveness, sustainable development, people's empowerment and protection from unfair competition are the underlying principles promoted under the AFMA. At the operational level, three key areas of concern are identified, namely: (a) Network of Protected Areas for Agriculture Development (NPAAD); (b) the identification of Strategic Agricultural and Fisheries Development Zones (SAFDZ); and (c) the formation of model farms within the SAFDZs.

Appropriate Department Orders were issued to effectively support development programs within the agriculture and fishery sub-sectors.

4.2 Local Government

4.2.1 Local Policies and Legislations

The province has enacted a number of resolutions and ordinances to support the agriculture sector. These were issued either in support to a program or component of the program, or a package of program interventions.

Most notable is the Provincial Ordinance No. 010 series 2003 which provides stringent measures to safeguard the health of the Boholanos and protect the ecological soundness of the Province from possible disastrous ill-effect of genetically modified organisms.

Following is a list of resolutions and ordinances enacted at the provincial level in CY 2003-2004 to promote and/or support agricultural development and growth.

Resolution No.	Provincial Ordinance	Particular
2003-235		Declaring the province of Bohol to be GMO-Free or Free from Genetically Modified Organisms
2003-411		Authorizing the Honorable Governor Erico B. Aumentado to sign a MOA with the Phil Carabao Center regarding a loan program of breeding animal under the Agrikulturang Makamasa livestock program
2003-636		Authorizing the Honorable Governor Erico B. Aumnetado to sign a MOA between the provincial government of Bohol and the Heifer Project Philippines Partners Foundation Inc. for the implementation of strengthening the Barangay Livestock Aide
2003-088		Supporting and endorsing PDC ExeCom Resolution 2002-60 adopting and endorsing the sustainable organic agriculture program-Bohol to the RDC-7 for approval and endorsement of the same to the National Government or the Ambassador's fund for support.
2003-089		Supporting and endorsing PDC Resolution No. 2002-63 for the multi-livestock development project.
2004-142		Authorizing the Honorable Governor to sign a MOA with the municipalities of Carmen, Dagohoy, Trinidad, Sierra-Bullones and Danao for the Corn Farm Mechanization Program of the Department of Agriculture.
2004-002		Authorizing the Honorable Governor to sign a MEO between the provincial government and the First Eurasian Management Company, Inc. (FEMANCI) pertaining to the market assurance for small farmer crossbred cattle production project in Bohol.
	2003-010	Instituting stringent measures to safeguard the health of the Boholanos and protect the ecological soundness of the province of Bohol from possible disastrous ill-effects of genetically modified organisms, providing penalties for violations thereof and for other purposes.
	2004-007	Establishing a Trust Fund for the income derived from the farm machinery and post-harvest facility of the Provincial Agriculture Office for the maintenance and other incidental or contingent expenses of the said machineries and facilities owned and managed by the Provincial Government of Bohol.

4.2.2 Manpower Complement in Agriculture

The offices of the Provincial Agriculture and the Provincial Veterinary are the two frontline offices of the provincial government that implement agriculture programs and projects. Total manpower complement of these two offices is about 110 regular employees.

The Bohol Environment Management Office (BEMO), a satellite office under the Office of the Governor takes the lead role for environmental concerns. It has a manpower compliment of 21 regular employees seconded from other provincial offices including contractual staff. These three offices are complemented by the national line agencies' personnel who provide similar type of services in support to agriculture like research and development, trainings, commodities farming systems promotion, among others.

At the municipal level, the total manpower complement of all municipal/city agricultural offices is about 420 staff. Municipal level technical personnel have more than 10 years of field experience in their respective municipalities.

4.3 State Colleges and Local Resource Institutions

The Central Visayas State College of Agriculture, Forestry and Technology (CVSCAFT) is a state institution that provides courses in agriculture and forestry. It has four (4) sub- campuses located in strategic municipalities of Candijay, Clarin, Calape and the main campus in Bilar and in the City of Tagbilran.

The Agricultural Promotion Center (APC) of the Department of Agriculture provides a continuing agricultural research and development responsive to the needs of the Boholano farmers. It is complemented by the Agricultural Training Institute (ATI) offering trainings and related support to agriculture.

Other offices like the Bureau of Agricultural Statistics (BAS), the Bureau of Fisheries and Aquatic Resources (BFAR), Philippine Coconut Authority (PCA) and satellite units of the Department of Agriculture such as the Philippine Carabao Center and the Ubay Stock Farm have their own manpower complements. It supports the entire agriculture sector of the province in terms of backward and forward linkages.

4.4 Private Sector Organizations involved in Agriculture and Natural Resource

At the Provincial level, Non-Government Organizations under the umbrella of the Bohol Alliance of Non-government Organization (BANGON) are working in different municipalities whose primary interest is towards assisting the community in sustaining the livelihood of farmer groups.

The Bohol Chamber of Commerce is among the private sector organizations that directly support the agriculture sector. It is also compensated by a strong linkage between the local government units, the peoples' organization, the business/private sector and other NGOs.

The Provincial Agriculture Office has identified 358 PO – partners working in support to agriculture, while the Office of the Provincial Veterinarian has 157 PO partners under the LETS HELP Bohol Program. On the other hand, the total number of functional cooperatives is about 353 as compared to 663 registered under the Cooperatives Development Authority.

5.0 SUPPORT INFRASTRUCTURE AND FACILITIES

5.1 Role of Infrastructure in Agriculture Development

Infrastructure development serves as the backbone in support to agriculture as well as other support services to fight against poverty. Transport including communication provides critical inputs to improve the status of the poor. Good transport facilitates trade and increases access to services. It lowers the cost of agricultural production for the benefit of both farmers and consumers. Access to markets lead to the development of the non-agricultural economy and tourism. In rural areas where poverty is more widespread, inadequate transport contributes to high levels of deprivation.

The provision of water, both for domestic use and irrigation of farmlands, the emphasis is on sustainability or the continuous functioning and utilization of facilities. The strategy is to forge broad-based stakeholder collaboration to build linkages for addressing all aspects of poverty, enhance economic growth, and minimize wastage in resources. Stakeholder participation is necessary for making water resources benefit the poor.

Access to efficient and affordable energy sources leads to improvement in living conditions in both rural and urban areas. Providing power and energy in a sustainable manner generate resources and new investments that, in turn, benefit poor households.

5.2 Irrigation and Drainage

National Irrigation Authority-Bohol Provincial Office (NIA-BPO) has set for implementation ten (10) Communal Irrigation Systems for rehabilitation and/or improvement, three (3) small water impounding dams for construction, and installation of ten (10) projects under the Pump Irrigation category. Eleven (11) projects out of twenty-three (23) projects were completed. On the other hand, the Bohol Provincial Irrigation Office has accomplished 83% of their targets benefiting 458 hectares new service areas and at the same time, restored 187 hectares of service area.

The BHIP II is underway for implementation and will cover the irrigable areas of Ubay, San Miguel and Trinidad. Its target is 5,300 hectares when completed, and is expected to improve the province's yield per hectare of rice and other high value crops.

Potential irrigable area is about 40,800 hectares. There are two (2) National Irrigation System and about 215 Communal Irrigation Systems which are scattered

and operating in the different municipalities. The present irrigation facilities cover a service area of 14,436 hectares for a rating on irrigation development status of 35.38% only. The NIA fell short of its target due to limited government financial resources and other pre-investment problems such as the difficulties encountered in social preparation, right-of-way (ROW) acquisition and sourcing of counterpart funds.

5.3 Transport Infrastructure

5.3.1 Roads and Bridges

The major road network of the province is expected to promote agricultural, eco-cultural tourism and agro-industrial development. These are classified as provincial roads and mostly linked by temporary provincial bridges. There are 5,383.584 kilometers of road. Of which, 10.94% is national, 18.04% is provincial, 1.24% is city, 5.15% is municipal and 64.63% is barangay road. Likewise, there are 7,623.692 linear meters of bridges within the road network, of which 58.21% are concrete, 9.09% are steel, 16.43% are bailey and 16.27% are timber bridges. Temporary bridges comprise 32.7%, mostly in bad condition and impassable to traffic due to poor maintenance. Bridges that were constructed several years ago are not designed for heavier traffic loads of more than 25 tons.

About half of the arterial/primary roads throughout the province had been upgraded as part of the Bohol Circumferential Road Improvement Project (BCRIP). The other half, the Tagbilaran North Road (TNR)-Tagbilaran City to Calape, and Tagbilaran East Road (TER)-Tagbilaran City to Candijay, being part of the BCRIP Phase II under the Arterial Road Links Development Project, has a total road length of about 136.03 kms and is due for completion this year. On the other hand, portions of the national secondary roads under the three (3) Highway Engineering Districts are dilapidated and require improvement and upgrading. In the meantime, regular maintenance, especially for asphalt and gravel sections, is necessary.

5.3.2 Seaports and Fish Landing Ports/Wharf

Bohol, being an island, is supported with 5 major entry points that provide linkages to other points of destination bringing in and out major agricultural products. The Philippine Ports Authority (PPA), PMO-Tagbilaran is composed of a Base Port and four (4) Terminal Ports. The base port is located at Tagbilaran City and terminal ports are located at the municipalities of Tubigon, Talibon and Ubay providing alternative routes to Cebu, the center of commerce in the region. Jagna, on the other hand, is the major gateway to Mindanao regions. Sub-ports in Catagbacan, Loon, Tapal in Ubay and Getafe cater to ferry services using motorized bancas. The Port of Tagbilaran, which is considered a major port of entry, is 41 nautical miles from Cebu City. Its berth length is too short that it can barely accommodate a bigger ship like Super ferry and cargo vessels at a given time.

Tagbilaran has the highest number of ship calls followed by Tubigon, while Tapal wharf has the lowest with 7 ship calls. Given the increasing trend in ship calls and passenger volumes and cargoes, all existing port facilities are expected to be inadequate for future demand. The existing traffic for the municipal/fish ports are

small vessels, motor bancas, pump boats and fishing boats used for transporting agricultural, seawater products and live animals from and to the nearby islands and Cebu City.

Lighterage Cargo Transport (LCT) vessels used in loading and unloading of aggregates and heavy equipment utilizes Manga Fish Port, the ports of Bien Unido, Alburquerque Causeway and Loay River Quay.

The sub-ports also serve as fishing ports. In Tagbilaran City, two are identified as fish landing area, the Manga District and the Tagbilaran Causeway. Other major fish landing areas are located in the municipalities of Tubigon, Talibon, Candijay , Ubay and Mabini where the major fishing areas are located.

5.4 Post-Production Facilities

5.4.1 Drying, Milling and Warehouse

The post-harvest facilities for the crop sub-sector include palay thresher and blower, corn sheller, solar dryer, warehouses and corn and palay milling stations. The distribution of these facilities is presented in *Table I-31*.

Table I-31. Number of Units and Distribution of Post-Harvest Facilities for Grain Crops, Province of Bohol; May 2005

Type of Facility	District 1	District 2	District 3	Total
Palay Thresher				
Manual Pedal	256	625	666	1546
Mechanical Power	9	29	4	42
Blower				
Manual Pedal	20	242	25	287
Mechanical Power	10	-	-	10
MPDP Solar Dryer	66	83	141	356
Rice Milling Station	18	75	125	218
Corn Milling Station	1	2	5	8
Rice and Corn Milling Station	7	12	17	36
Warehouse	1	-	5	6
Corn Sheller		1	3	4

Source: MAOs, May 2005.

Most post-harvest facilities are located in the 2nd and 3rd districts of the province. This is expected since these areas are the major agricultural production zones particularly palay and corn.

5.4.2 Slaughterhouse/Dressing Plants

Slaughterhouses and Dressing Plants for livestock and poultry products are post-harvest facilities required to support the development program of the agriculture sector. There are about 26 units of slaughterhouses distributed in the three districts. The 3rd district has the highest number of slaughterhouses while 8 are in the 1st district and 6 are in the 2nd district. Of the total number of slaughterhouses, only two are classified and accredited as "AA" by the National Meat Inspection

Commission. These are the Visayas Integrated Livestock Facility Complex in Tagbilaran City and in the Municipality of Dauis owned and operated by the Alturas Group of Companies.

Based on the National Meat Inspection Commission (NMIC), "AA" slaughterhouses are those with operational facilities and procedures sufficiently adequate that livestock and fowls slaughtered within the facility are inspected and are certified for consumption.

For poultry, two poultry dressing plants are located in the municipality of Cortes, which is privately operated with a capacity of approximately 6000 heads per 8 hours operation. Another dressing plant is located within the Visayas Integrated Livestock Complex.

5.4.3 Cold Storage and Fish Processing Plant

Seven (7) cold storage facilities are located in the province. Two (2) are in the 1st District with a total capacity of 55 tons. The rest are located in the nothern part of the province where fishing industry has become a major earner. These facilities are as follows:

Name of Facility	Location	Capacity (in m.t.)
Santisima Trinidad	Albur	30
Tagbilran Bohol Enterprise Inc.	Tagbilran City	25
Trinidad Ice Plant	Trinidad	15
Ubay Rock Steel Plant	Ubay	10
A & E Ice Plant	Talibon	5
Loring Ice Plant	Talibon	5
PoblacionIce Plant	Talibon	5

Fish processing is becoming a major entry of investment in the province. At present, the Bohol Aqua Marine Development Corporation (BAMDECOR) is processing products like bangus and prawn for local market or exported to the USA and Japan. Another processing plant located in Ubay and Talibon offers to process crab meat that are sold in the region. Local fish processors producing smoked, salted or dried fish are also in the market catering the local and regional consumptions.

5.4.4 Sawmill and Wood based Processing

Bohol has 32 business operators of sawmills, mostly resawing and later on sold on retail (refer *Table I-A.21*of the Annex report). Large-scale sawmills have shifted to the use of smaller-diameter logs of deregulated species harvested from tree farms and permitted native premium species from the private lands. They have employed their own mobile chainsaw operators with the equipment to convert round timber into flitches or lumber pieces of desired sizes right in the field. Other mini-sawmills utilize coco-timber as an alternative lumber supply to meet with demands for low-cost light materials for housing.

Furniture making is one of the promising wood based industries in the province. Plant site are strategically located in the areas where premium timber species like molave are potentially growing.

The absence of integrated processing facilities including kiln drier and treatment plants, the supply of semi-processed wood products such as quality lumber, moldings, fancy boards and the like are imported.

5.4.5 Livestock Auction Markets

Livestock Auction Markets (Livestock "Oksyon" Markets) are established as a trading area for livestock. Basically, it is aimed at servicing farmers and buyers by providing centralized marketing facility. The use of weighing scale is intended to provide fair basis for the price of livestock being sold. The facility also provides important industry information such as livestock flow, price trend and grading system.

There are four (4) LGU-operated LOMs in the province strategically located in the municipalities of Catigbian, Sagbayan, Clarin and Trinidad. Of these four, the LOMs of Trinidad and Clarin are non-operational for the last five years. Operation of auction markets usually falls during market days in the respective municipalities.

5.5 Other ANR Support

5.5.1 Seedfarm and Agro-Forest Nurseries

Seed production is a strategic step towards sustainable agricultural production in the province. This is made possible by the continuous operation of (2) plant nurseries: Macaas, Tubigon Nursery, and Tagbilaran Nursery. These nurseries produce high quality planting materials such as grafted mango seedlings, which are sold at a subsidized price of ₱25 per seedling. Other than mango are some assorted fruit tree seedlings that are sexually and asexually propagated. Cutflower planting materials particularly anthurium and white dendrobium are also available at the Tubigon Plant Nursery for dispersal to the different cutflower growers in the province.

The Bohol Experiment Station in Ubay also has a plant nursery, which produces assorted cutflower and fruit trees. A Tissue Culture Laboratory within the area also produces Cavendish banana seedlings for dispersal to banana farmers participating in the export of organic "Bongan" banana.

For coconut, the Philippine Coconut Authority (PCA) operates the Coconut Nursery in Las Salinas Sur, Loay and the Hybrid Coconut Seedling Nursery in Calanggaman, Ubay. Both were established to complement the coconut replanting and expansion projects in the province.

For rice, different seed varieties suitable for Bohol condition are produced by the registered seed growers in the province. Rice farmers avail of good seeds to supply their planting needs.

Seedlings of agro-forest trees are locally available at the nurseries of the different municipalities in the province manned by the Municipal Agriculture Office. Farmer cooperators and other private customers can avail the seedlings at a low cost.

Satellite nurseries of agro-forest trees supervised by DENR are located in Canawa, Candijay, Loboc, Talibon and a central nursery in Tagbilaran. Some nurseries are also established and managed by People's Organizations within the 29 barangays at the Loboc Watershed area. Different schemes of seed availment are available for farmer cooperators and other private individuals like the Plant Now Pay Later; the seeds in exchange of seedlings scheme; and other arrangements.

Other than the government sector, private entrepreneurs are also producing and selling planting materials of high value crops. The Boholano farmers and agri enthusiasts or people who have developed a hobby for planting different crops have the option of securing seedlings from these private nurseries.

5.5.2 Stock Farm and Breeding Centers

1) Ubay Stock Farm

In Region 7, the center for livestock research and development is Ubay Stock Farm. Located in Lomangog, Ubay, it was established in 1917, and occupies an area of 1,200 hectares. With a manpower of 27 regular personnel, it caters to the needs of livestock entrepreneurs not only in Region 7, but nationwide as well. It is identified as a nucleus farm on beef cattle and multiplier farm for small ruminants. Just recently, the farm has been funded for the production of forage seeds with an area of 100 hectares.

As a major livestock facility, Ubay Stock Farm offers the following services: (i) production of genetically superior animals based on estimated breeding values, (ii) research and technical development on genetic improvement, (iii) genetic conservation, (iv) production of forage and pasture planting materials, (v) provision of technical services to neighboring municipalities and barangays, (vi) cattle breeding and livestock laboratory services.

At present, there are 220 heads of cattle with bloodlines of Simbrah, Bali and Brahman crosses, 70 Anglo Nubian and Boer goats, and 18 horses for herding support. The Regional Training Center on Livestock is also located within Ubay Stock Farm. It serves as the venue for all livestock related trainings in the region backstopped by a pool of competent livestock experts as resource speakers/trainers.

2) Philippine Carabao Center

The Center focuses on developing the carabao industry of the province. Situated in Lomangog, Ubay, it occupies an area of 705 has. At present, a total of 318 carabaos are raised at the Center; 241 heads of American Murrah Buffalo, 64 Philippine Native carabaos, 12 Bulgarian Murrah Buffalo and 1 Cambodian Cross.

With a manpower of 12 regular and 22 contractual personnel as of CY 2004, the Center implements the following projects:

a) Carabao upgrading thru artificial insemination with Bulgarian Murrah Buffalo and natural breeding by granting bull loans to individual farmers;
b) Genetic Improvement for meat and milk production;
c) Carabao-Based Enterprise Development where dairy buffalo modules are developed in the villages. To date 8 modules have been dispersed to different cooperatives namely: CEFEDCO, Compostela Dairy Coop in Cebu, Mabini, Ubay and Carmen with a total inventory of 166 heads;
d) Buffalo Impact Zone Development Project, which covers 28 carabao raisers associations in Mabini and Ubay with a total membership of 1,737; and
e) Technical assistance and trainings.

3) Swine Breeding Centers

Breeding Centers have been established in priority areas of the province to complement programs on swine development, primarily genetic upgrading/improvement of local stocks. To date, there are 19 functional swine breeding centers; five (5) are located in District I, 5 in District II and 9 in District III. The Provincial Government through the OPV provided the breeder stocks/boars in these centers. The municipal LGU, on the other hand, provided the building/center, budget for feeds as well as Livestock Technician to manage the facility.

Three (3) Centers are also established with fund assistance from DOLE as a livelihood project of the Bohol Association of Barangay Livestock Aides (BABALA). These are located in the municipalities of Calape, Jagna and Mabini. With breeder boars purchased from the Pig Improvement Company, these centers offer services on natural and artificial insemination services.

4) Provincial Livestock and Poultry Farm

Established in April 1999, the Provincial Livestock and Poultry Farm is developed to support the food security program of the province. It is located in a 25-hectare area in barangay Roxas, Bilar and is primarily established to; (i) showcase production technologies adaptable at farmers level, (ii) serve as training venue for students and farmers, (iii) a seed bank for forages, (iv) production center of breeding animals for dispersal to interested farmers, and (v) a pooling area for program animals under the LETS HELP Bohol Program.

To date, different projects are operational with funding support mostly from the 20% development fund of the province. These include poultry, carabao and goat production and forage and pasture development to support existing livestock. It has a manpower of 6 regular personnel who are also utilized as resource speakers during conduct of Animal Health Breeding and Nutrition Improvement Trainings. The farm also accommodates students from the nearby agricultural school undergoing on-the-job training and raisers interested in practical lessons.

5.5.3 Feedmill

There is only one (1) existing feedmill in the province, which is located in Lomangog, Ubay. It is owned and managed by a private corporation, the Alturas Group of Companies. The Marcela Feedmill is operating with a production capacity of 10 tons per hour in an 8-hour operation per day. Ninety percent (90%) of its production is for in house utilization while 10% are sold in the local markets within the province. The feedmill produces livestock feeds for hogs and chicken and also aqua and prawn feeds.

5.5.4 Soil/Plant Tissue Laboratory

1) Soils Laboratory

The Soils Laboratory is one of the facilities located at the Agricultural Promotion Center, Tagbilaran City. This facility has equipments for analyzing soils from the different municipalities of the province. The following are the equipments in the facility: distilling machine/apparatus, atomic absorption flame, photometer, spectrophotometer-meter, PH meter, soil pulverizer, electric oven, refrigerator, centrifuge machine, flume hood, glasswares and washing facilities.

There are six personnel managing the laboratory with the following position/specialization:

- 1 Center Chief II - Chemical Engineer
- 2 Agriculturist II - Chemical Engineer
- 1 Agricultural Technologist - Chemical Engineer
- 1 Soils Aide
- 1 Records Officer II

2) Plant Tissue Laboratory

The Plant Tissue Laboratory is one of the facilities located at the Bohol Experiment Station in Ubay. At present, the activities undertaken are the production and distribution of banana plantlets of "Bongolan" and "Lakatan" varieties. The production and distribution of the ubi plantlets is the next activity to be undertaken. The equipments and chemicals are provided both by the DA-BES and PAO. The produced plantlets are acclimatized at the constructed tunnel by the Department of Agriculture located within/nearby the building. The plantlets are sold at P15 per piece.

6.0 ON-GOING ANR PROGRAMS AND PROJECTS

The Province of Bohol has several on-going major programs/projects that could stimulate or enhance the socio-economic development of the province. These projects are initiated by the national government agencies (NGAs), local government units (LGUs) and/or Non-Government Organizations (NGOs) with assistance from International Donor Institutions.

6.1 National Government Initiated Projects

6.1.1 Kapitbisig Laban sa Kahirapan – Comprehensive Integrated Delivery of Social Services (KALAHI-CIDSS) Project

This project covers 12 municipalities, namely: Danao, Buenavista, Jetafe, Talibon, Bien Unido, Ubay, Carlos P. Garcia, Mabini, Carmen, Pilar, San Miguel, and Trinidad. Initial sub-projects identified are: purchase of certified rice and corn seeds; fertilizers and pesticides; construction of day care centers; construction of low cost housing; carabao dispersal; construction of barangay office; installation of jetmatic pumps; purchase of medicines; barangay road rehabilitation; ubi production; swine dispersal; construction of health centers; barangay session hall; construction of footbridge; barangay road maintenance; improvement of barangay health stations; installation of additional water pipes; electrification; fruit tree planting; training of day care workers; and purchase of medical equipment.

6.1.2 Early Childhood Development (ECD)

The ECD is implemented by the DSWD in cooperation with the LGUs in the province. It is assisted by the World Bank. The Project includes the establishment of Day Care Centers, training of Day Care Workers and purchase of instructional materials and equipment for day care children.

6.1.3 Coconut Farmers Food Access Project

The project is implemented jointly by the Philippine Coconut Authority and the National Food Authority covering 129 outlets in 109 barangays within 36 municipalities. It provides NFA rice to small farmers at lower price and provides outlet access to NFA rice at 2 kilos per head per week.

6.1.4 Maunlad na Niyugan Tugon sa Kahirapan Program

This project covers 15 barangays in 15 municipalities. It aims to increase productivity and income through implementation of coco-based integrated farming system approach.

6.1.5 Communities along Cambuhat River Ecotourism and Enterprise Development (CREED)

This is implemented by the Department of Environment and Natural Resources in cooperation with Tetra Tech Management, Inc. CID, DOST and TESDA. It aims to strengthen the existing community managed venture by building-up and

improving local capabilities. It also seeks to fine-tune the local products to provide ecological tour services that meet industry standards resulting in augmentation of income and increased employment opportunities.

6.1.6 Coastal Resource Management Project (CRMP)

The project covers 73 coastal barangays and 57 kms. of coastline in 5 municipalities. It provides assistance for micro-enterprises. It expanded to an additional 116 barangays and 125 kms. of coastlines in 8 municipalities, including Alburquerque, Anda, Candijay, Jetafe, Loay, Loon, Mabini, and Maribojoc. The Project is being assisted by the European Union (EU).

6.1.7 Belgian Integrated Agrarian Reform Support Project 3 (BIARSP-3)

The project is implemented by the Department of Land Reform (DLR) and assisted by the Government of Belgium. The components of the project include: organizational development; infrastructure support; social support services; livelihood development; and land distribution to farmer beneficiaries.

6.1.8 KALAHI in Conflict Areas

The project is being implemented by the Department of Social Welfare and Development (DSWD) in cooperation with the Provincial Government of Bohol, through the Bohol Poverty Reduction Management Office (BPRMO). It is assisted by the World Bank. The project covers a total of 41 barangays in 20 municipalities affected by insurgency.

6.2 Local Government Units Initiated Projects

6.2.1 **LETS HELP BOHOL Program** (Livelihood Enhancement Towards Sustainable Human and Environmental Paradigm for Bohol)

LHB Program is a 5-year integrated area development initiative that aims to catalyze growth in the rural areas, help rural families and create community life that is healthy, fulfilling and profitable.

The program focuses on creating viable communities, strengthening the family, increasing human dignity, promoting diversified and integrated farming systems, building local institutions, promoting and utilizing indigenous people, skills and resources, reducing urban migration, and caring for the earth.

Launched in April 28, 2000, this novel program is a direct tie-up between the Provincial Government of Bohol, 19 Municipal Government Units and a Non-Government Organization, the Heifer Project International (HPI). The program clearly established a partnership through contribution of program funds and the policy of shared management between partners.

Initially, the Program covers the seven (7) municipalities of Antequera, Balilihan, Batuan, Catigbian, San Isidro, Sevilla and Sikatuna. In year 2003, program coverage was expanded to 12 other municipalities to include Buenavista, Bien

Unido, Carlos P. Garcia, Dagohoy, Danao, Getafe, Inabanga, San Miguel, Sierra Bulllones Talibon, Trinidad, and Ubay. The Office of the Provincial Veterinarian - Bohol carries out the implementation of LHBP.

To date, there are 156 partner POs with a total membership of 7,267. A total of 1,175 carabaos, 1,116 goats and 1,274 chickens are already distributed to partner POs in the program areas using the HPI's passing-on-the gift principle. Other program components include: (i) Livestock Mortuary Assistance System covering 100% of the carabaos dispersed, (ii) an Agricultural Facility Credit Assistance Project (AFCAP), which offers an interest-free loan to partner POs within 2 years to be used for the procurement of agricultural equipment and tools and (iii) a community-based water quality and quantity monitoring which is performed by volunteer water-watchers called MAGTUBO for the past 3 years up to present.

6.2.2 Barangay Livestock Aides (BALA) Program

BALA is a provincial-initiated program, which aims to institutionalize a barangay-based livestock service delivery mechanism through volunteer livestock aides. The program involves recruitment, training and designation of community volunteers, organization of municipal BALA Association and capacitating activities for both the association and its individual members. To date, a total of 1,1185 volunteer livestock aides are operating in the 47 municipalities of the province. Among its major contribution to the industry is the conduct of a per household livestock survey that is very helpful for planning purposes. Through BALA, effective communication and monitoring network has been established at the barangay level particularly on animal disease incidence, providing quick response to control and prevent further spread of diseases.

6.2.3 Localized Artificial Insemination Program

The Localized Artificial Insemination Program is the Boholano's version of the then JICA-DA supported AI program of the 90's. It is a joint effort of the Provincial Government of Bohol, the Confederation of Boholanos in USA and Canada (CONBUSAC) and the Bohol Association in Texas, Inc. (BATI), the Department of Agriculture-Region 7, the Livestock Development Council, the Heifer Project International and the participating municipalities. This partnership recognizes the importance of resource complementation, linkage enhancement and stakeholder participation in order to achieve common goals and objectives, which are:

a) To increase the genetic potential of carabaos and cattle as a source of meat, milk, hide and/or draft;
b) To make available the services of AI to the far-flung barangays; and
c) Improve livestock productivity of covered communities at the same time increasing income of participating families.

To date, the program covers 32 municipalities with 33 AI technicians who are actively extending AI services in the communities.

6.2.4 Aquaculture for Rural Development Project

The project covers 19 municipalities; Albur, Antequera, Pilar, Catigbian, Guindulman, Candijay, Loon, Baclayon, Dauis, Jetafe, Bien Unido, Calape, Loboc, Mabini, Trinidad, Buenvista, and Talibon. It has established 6 test plants sites for seaweed nursery; 6 rice-fish culture; 6 marine cages, 7 mudcrab fattening projects; and 5 oyster culture projects. It has generated 142 jobs for the communities.

6.2.5 Community-based Resource Management (CBRM) Project

This project provides loan-grant equity scheme to strengthen LGUs in enhancing CBRM and livelihood of poor communities; organizational development through formation of people's organizations; and enterprise development through livestock assistance. Sub-projects include: hog raising; water and sanitation; nursery development; bee culture; forage bank establishment; natural vegetable strips farming; multi-cropping and agro-forestry farming. The Project is assisted by the World Bank.

6.2.6 Bohol Technology and Livelihood Development Program

The program seeks to promote and support countryside economic development and facilitate the cooperation of LGUs, organizations, groups and individuals; mobilize resources and facilitate cooperation in the formulation of development plans and the conduct and promotion of livelihood and enterprise development activities; and establish community-village enterprises. It is implemented by the Provincial Government through the Office of the Governor.

6.2.7 Panglao Craft Village Development Project and the Bohol Loomweaving Development Project

This project is implemented by the Provincial Government of Bohol in cooperation with the Department of Tourism, Department of Labor and Employment, TESDA and Department of Trade and Industry. It is benefiting 772 plant-based weavers; 2,305 home-based weavers; 1,729 support workers and operates at least 16 production centers all over the province.

6.3 Non-Government Organizations and Civil Society Initiated Projects

6.3.1 Loboc (Area-Focus Approach) Watershed Development Project

The 3-year project is implemented by the Bohol Alliance of Non-Government Organizations (BANGON). This was started in 9 barangays inside the Loboc Watershed covering Calangahan and Canmaya in Sagbayan; Alegria, Montevideo, Nueva Vida Norte in Carmen; Cabacnitan in Batuan; Owac, Villa Aurora, and Zamora in Bilar. It has now expanded to cover 27 barangays.

There are 28 water systems constructed, 27 of which are fully operational and serving 742 households or 46% of the total household population in 8 barangays.

The program has established 9 nurseries. A total of 25,671 fruit trees out of the total target of 24, 512 seedlings were produced.

There are 7 community projects starting to integrate livestock production. A total of 90 swine, 66 goats, 11 cattle and 5 beehives were dispersed to 100 farmers. About 83 farmers are engaged in home-based vermin composting. A total of P39,103.20 credit fund was released to 55 beneficiaries, of which 53% are women. There is 100% repayment rate recorded on the first release.

6.3.2 Sustainable Agriculture and Enhancement Project

The project is implemented by the Feed the Children, Philippines with assistance from the PACAP Facility of the AusAID. It has covered 150 individual beneficiaries in Cayam, Garcia Hernandez. The project aims to assist children in poor families in their health and nutrition, emergency assistance and livelihood development needs; to assist communities in developing productive and sustainable development models of managing upland/lowland and coastal/marine resources; and to promote children's welfare and basic rights.

6.3.3 Calangahan Sustainable and Integrated Agriculture Development Project

The project covers 120 households of Calagahan, Sagbayan. It has developed potable water system of the barangay; promoted sustainable natural resources management and protect/preserved the watershed area; introduced to farmer-beneficiaries alternative sources of income; and improved natural resources management and access to organic agriculture inputs and farm production capital needs of farmers.

6.3.4 Livelihood Project for Women's Organization in Loboc

The project is implemented jointly by the University of Bohol Community Development Foundation and by the Community Economic Ventures. It covers 2 barangays in Loboc (Villaflor and Jimilian). The project provided capital for livelihood undertakings of families and skills training on basic accounting for the beneficiaries.

6.3.5 Oil Palm Project

The project is implemented by the Oil Palm Incorporated in the municipalities of Ubay (San Vicente, Soom) and Trinidad (Cagting and Binliw). The project aims to equip knowledge and skills to oil palm growers in managing their respective association.

6.3.6 Biodiversity Conservation and Management of the Bohol Marine Triangle

The project seeks to strengthen government and community institutions to facilitate the application of a coastal management framework with the establishment and maintenance of marine reserves; develop and apply policies and guidelines that will facilitate the elimination of destructive activities; use relevant and reliable information for monitoring and inventory as basis for

establishing sustainable harvesting; sustain livelihood activities through established benefit sharing and revolving fund schemes; targeted ecosystem rehabilitation to improve overall ecosystem health and contribute to improve well-being of local communities; and establish and operationalize an integrated master plan for the Bohol Marine Triangle. It is implemented by the Bohol Integrated Development Foundation (BIDEF); the First Consolidated Bank Livelihood Foundation, Inc. (FCB LFI) in cooperation with the UNDP-Global Environment Facility, Foundation for Philippine Environment (FPE), World Bank-Community-based Resource Management (WB-CBRM), German Development Service (GDS), and World Wildlife Fund-Kabang Kalikasan ng Pilipinas (WWF-KKP)

6.3.7 Financial Assistance Program

The project covers 9 municipalities in the province: Talibon, Trinidad, Sagbayan, San Miguel, Bilar, Sevilla, Loboc, Sikatuna, Baclayon and Tagbilaran City. It is implemented by the World Vision through the Community Economic Ventures in cooperation with the Land Bank of the Philippines and with other Rural Financing Institutions (RFIs) in Bohol. The Project has already assisted 7,425 families and 1,105 entrepreneurs.

It has provided agricultural loans which involve all crop/livestock/fishery production related activities; working capital loans for trading and other forms of business; and fixed asset acquisition such as pre-and post-harvest facilities, farm implements, equipment and construction of buildings. It also seeks to enhance earning capacities; development of enterprise management and skills, employment generation, savings mobilization and increase productivity.

6.3.8 Fishery Development Program

Implemented by the PROCESS Foundation, the project covers 24 barangays in 10 municipalities. The project promotes organizational development through POs formation; enterprise development though mudcrab culture, training on mushroom culture, fish cage and floating cottage projects.

6.3.9 Marine Conservation Program

The project is implemented by the Bohol Federation of Women Cooperatives (BFWC) with assistance from PACAP Facility of AusAID. It covers 2 barangays of Dauis (Mayacabac and San Isidro). The project supported environmental conservation and rehabilitation activities initiated by communities; technical assistance for institutional and human capability building; and micro lending for livelihood activities.

Part II

SITUATIONAL ANALYSIS, DEVELOPMENT SCENARIO & STRATEGIES

BOHOL AGRICULTURE MASTER PLAN: CY 2006-2026

PAHRDF An Australian Government Initiative

BOHOL PROVINCIAL GOVERNMENT

PART II
SITUATIONAL ANALYSIS DEVELOPMENT SCENARIO AND STRATEGIES

1.0 SITUATIONAL ANALYSIS

1.1 Land Resource Use Analysis

Guided by the principles set forth under Republic Act 8485 or the Agriculture and Fisheries Modernization Act of 1997 that seeks to modernize the Philippine Agriculture Sector and for the country to effectively compete in global market, the Province of Bohol has delineated its land and water resources for a more rational and appropriate use.

1.1.1 Protection of Agricultural Lands for Food Security and Income Generation

The vital services provided by the upland, lowland and coastal agricultural ecosystems are the capacity to satisfy the demands of a growing population for food security and to meet adequate food supplies for nutritionally balanced diets. There are other commodities intended to supply the raw materials requirement of agri-industries. The total area devoted to agricultural use is about 184,874 hectares or 45% of the total provincial land area and 54.5% of the total agricultural lands. Of the total agricultural land area, about 38.58% or 71,338 hectares are utilized for rice production. An expansion of 40,800 hectares is identified as potential irrigable areas, which would require detailed studies to determine the technical and economic viability of the proposed irrigation systems. The existing irrigable and non- irrigable areas are classified as priority agricultural areas.

1.1.2 Natural Protection and Landscape Management

A total of 75,766 hectares of Bohol's area is under protection as initial component of the National Integrated Protected Area System (NIPAS Act of RA 7586). These are identified for protection purposes and for the conservation of flora, fauna, biological diversity and natural heritage areas, conservation of forest cover as well as provision of livelihood opportunities. As development in these areas may arise, relevant provisions as embodied under the National Integrated Areas System must be followed. The present NIPAS areas in the province are summarized in *Table I-3 of Part I* report.

1) Forestry

The total area classified as timberland or forestation in Bohol is 101,271 hectares or 24.4% of the total land area of the province. About 17% or 17,216.84 hectares are covered with forest. The rest are grass and shrub lands. Based on the standard that at least 40% of the total land area of the province shall be covered with

forest, the present forestlands is way below the standard. Moreover, the actual forest vegetation cover is critically deficient.

2) Natural Forest

Natural forest in the province is still evident. However, flora of the family dipterocarpaceae, leguminoceae and verbanaceae are becoming very rare. Biodiversity in Bohol forest is little understood since very limited studies/surveys on this aspect have been conducted.

3) Man-Made Forest Plantations

The urgency to provide immediate vegetative cover in the forestlands devoid of forest cover has prompted local initiatives on reforestation. The existing plantations are located in the municipalities of Bilar and Loboc with a total land area of about 9,601 hectares. Necessarily, reforestation activities through active community participation need to be pursued and expanded.

4) Mangrove Forest

Mangrove forest plays a vital role in shaping the ecology and economy of the province. Ecologically, mangroves are among the most productive coastal resources serving not only as feeding ground but more as breeding and nursery grounds of many aquatic and terrestrial species. It also serves as natural barrier or structure against destructive waves and current along the shorelines and coastal communities. Bohol rank first in Central Visayas as having the biggest mangrove areas of about 14,502 hectares which need vigilant protection and conservation.

1.1.3 Settlement/Housing and Other Competing Land Use

About 27,027 hectares are identified for built-up areas and 536 hectares for commercial and industrial zone over the medium term, which is approximately 6.05% and 0.12%, respectively, of the province's land area. It is expected that the built-up areas will increase as the province' population grow and will exert more pressure on land conversion.

Most of the identified built-up areas are found in or adjacent to poblacion areas of fast growing municipalities. Tagbilaran City and the municipalities of Dauis, Albur, Baclayon, Balilihan, Pilar, Inabanga, Calape, Tubigon, Dimiao are identified as major built-up areas.

The increasing pressure on competing land uses is best described with the land to person ratio. Over the ten-year period, the land to person ratio is expected to decrease from 0.272 hectares per person to about 0.206 hectares per person. This means further reducing the average farm size of 0.6 hectare/family, which is way below the economic size of at least 3 hectares per farming family.

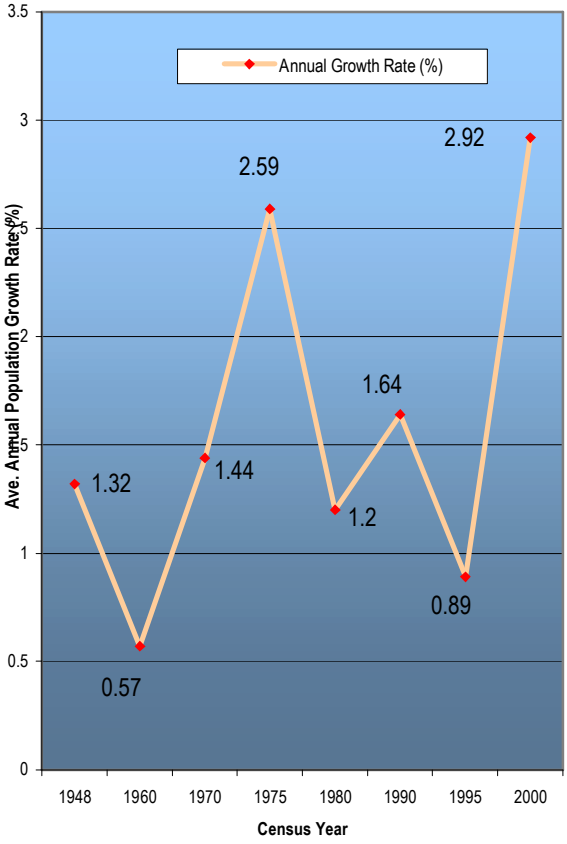
1.2 Food Supply and Demand Analysis

1.2.1 Population Growth and Supply and Demand of Major Agricultural and Fishery Products

1) Population Growth

Bohol's population almost quadrupled since its first recorded population census in 1903, increasing by almost 90 thousand annually. From 1903-1995, its population grew at an average rate of 1.5% per year *(Fig. II-1)*. Five years thereafter, Bohol's population increased by 2.92% (1995-2000) annually, higher than the country's annual population growth rate of 2.36 percent and the regional growth rate of 2.79 percent. At this rate, Bohol's population is estimated to double in 24 years.

Fig. II-1 Average Annual Population Growth Rate (%) of Bohol at Various Censuses: 1948-2000



The physical impact of population expansion upon the natural environment, as well as the need for an increase in production for the expected increase in consumption is so critical an issue. While there remains a range of estimates of what Bohol's population will be in the years to come, the raw figures are daunting especially when placed in historical perspective. In the 1903 Population Census,[1] it took 24 years for Bohol to have a population of 269,223 *(Table II-1)*. In the next 45 years (1903-1948), Bohol's enlarged population was annually adding about 6 thousand persons. In the 1960 to 1995 period, Bohol's population almost doubled, adding about 13 thousand people annually. Only 4 years thereafter (1996-2000), Bohol's population was increasing by as much as 36 thousand people annually.

Table II-1. Population Increase Per Year, Bohol Province

Censal Year	Interval Years	Population Difference	Population Increase Per Year
1903 – 1948	45	284,184	6,315
1960 – 1995	35	441,033	12,601
1996 – 2000	4	142,828	35,707

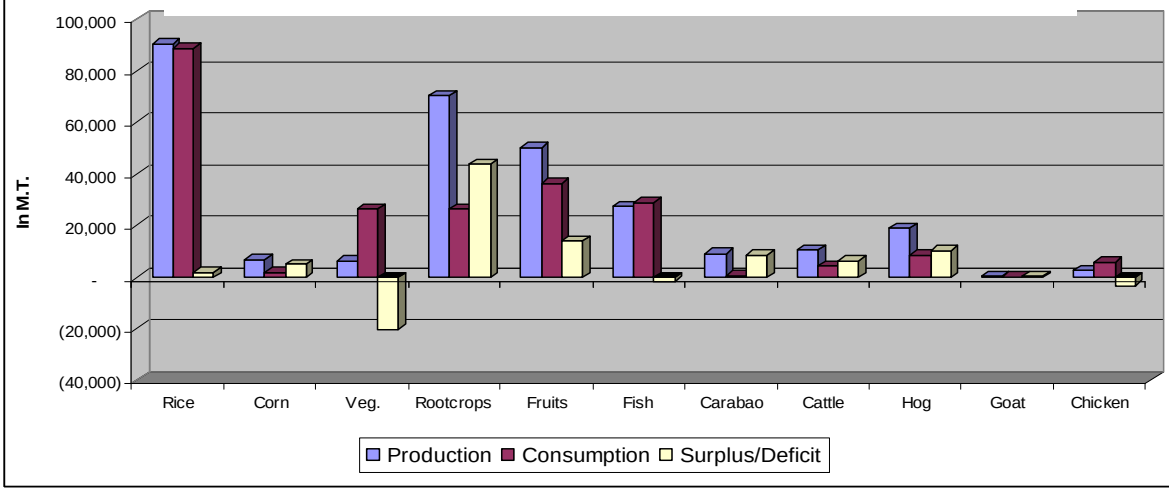
Such rapid population growth, if not addressed immediately, will have alarming impact on Bohol's resources and environment and, in turn, on its development.

[1] Sanger et al, United States Bureau of Census, 1905

2) Demand and Supply Conditions

Based on current production figures as against the consumption survey of the Bureau of Agricultural Statistics - Food Consumption Survey (BAS-FCS), Bohol has a deficit in the following food commodities: vegetables, fish, chicken and eggs *(Figure II-2)*. It has a surplus in the production of rice, corn, rootcrops, fruits and livestocks, i.e.,beef/carbeef, pork and chevon.

Figure II-2. Production and Consumption of Major Commodities, CY 2004



3) Food Requirements

Table II-2 summarizes the demand-supply condition of major food items as measured against the per capita food requirement recommended by the Food and Nutrition Research Institute (FNRI).

Table II-2. Food Balance Analysis (In Metric Tons); Province of Bohol

Commo-dity	2000			2002			2004		
	Prod'n. 1/	Consump-tion	Surplus/ Deficit	Prod'n.	Consump-tion	Surplus/ Deficit	Prod'n.	Consump-tion	Surplus/ Deficit
Cereals	92,929	124,190	(31,261)	94,926	129,455	(34,529)	97,177	134,981	(37,805)
Fruits	45,266	87,172	(41,906)	43,606	90,867	(47,261)	50,188	94,747	(44,559)
Rootcrops	71,994	68,907	3,087	68,093	71,828	(3,735)	70,376	74,895	(4,519)
Vegetables	4,168	62,265	(58,097)	4,449	64,905	(60,456)	6,333	67,676	(61,343)
Meat	37,407	37,678	(271)	37,934	39,275	(1,341)	42,050	40,952	1,098
Fish	28,530	34,869	(6,339)	27,973	36,347	(8,374)	27,363	37,899	(10,536)
Eggs	2,700	4,526	(1,826)	3,325	4,718	(1,393)	2,940	4,920	(1,980)

Source: 1/ Bureau of Agricultural Statistics (BAS)
FNRI Per Capita Consumption

Based on the FNRI per capita consumption for Year 2000, the province had a deficit in almost all major commodities except for rootcrops. The situation worsened in 2002 wherein it experienced a deficit in all identified commodities. In 2004, only meat production had a surplus as against its consumption for a nutritionally adequate diet. If present production will continue, Bohol will experience severe deficits to meet the per capita food requirement of its population.

4) Projected Agricultural Production and Demand

The projected agricultural production is presented in *Table II-3* hereunder as basis for determining whether Bohol can meet the food requirements of the population during the planning period.

1.2.2 Water Supply and Demand Analysis

Bohol is largely characterized by a karst topography; basically made up of limestone from a former coral reef *(MTDP, CY 2004-2009; Bohol Province)*. Technically, this karstic formation translates to high water infiltration rate and has direct bearing on both surface and sub-soil water resources of the province.

1) Water Supply for Domestic Use

The data provided by SWECO indicate that domestic water consumption will increase by 1.5% and 1% per year for both urban and rural consumers *(Table II-4)*. In urban settlements, water consumption for residential or households domestic needs account for 48% of the total consumption volume. Industrial consumption is set at 25%, which anticipates more vigorous development of agri-industries and industrial establishments. The commercial and institutional consumption account for 5% and 2%, respectively, and the declared policy on water losses is 20% of the total water consumption.

In the City of Tagbilaran where a reliable supply of domestic water is the determinant for sustained economic growth, the projected daily consumption is approximately 10,000 m^3/day. The current production is about 15,000 m^3/day at 70% to 75% production capacity. With the complete rehabilitation and improvement of the water supply system, the average production level is projected to increase to 24,000 m^3/day.

Table II-5 show the trend and projection of water demand based on the population for both urban and rural settlements. As the province' population will predominantly remain rural (about 62% in 2010), the projected water demand for domestic use is about 75,555 m^3/day or 44.74% of the total water demand in year 2010. This estimate also takes account of the 15% allowance for other uses.

Table II-3. Projected Production and Consumption (In Metric Tons), Province of Bohol; Years 2005, 2010, 2015 and 2020

Commodity	2005			2010			2015			2020			2025		
	Prod'n	Consump-tion 1/	Surplus/ Deficit	Prod'n	Consump-tion	Surplus/ Deficit	Prod'n	Consump-tion	Surplus/ Deficit	Prod'n	Consump-tion	Surplus/ Deficit	Prod'n	Consump-tion	Surplus/ Deficit
Cereals 2/	172,575	137,847	34,728	186,381	153,277	33,104	205,019	170,731	34,288	227,571	190,499	37,072	254,880	212,913	41,967
Fruits 3/	52,698	96,758	(44,060)	60,603	107,589	(46,986)	75,753	119,840	-44,087	106,055	133,715	(27,660)	159,082	149,449	9,633
Rootcrops 4/	115,355	76,485	38,870	121,123	85,046	36,077	130,813	94,731	36,082	143,894	105,699	38,195	161,161	118,136	43,025
Vegetables 5/	7,479	69,113	(61,634)	22,437	76,849	(54,412)	44,874	85,600	-40,726	89,748	95,511	(5,763)	161,546	106,749	54,797
Fish 6/	29,005	38,703	(9,698)	43,377	43,036	341	76,444	47,936	28,508	147,185	53,486	93,699	309,140	59,779	249,361
Meat 7/	46,137	41,821	4,316	91,755	46,503	45,252	218,245	51,798	166,447	589,362	57,795	531,567	1,932,688	64,595	1,868,093
Eggs 8/	3,000	5,024	(2,024)	7,130	5,586	1,544	25,379	6,223	19,156	113,799	6,943	106,856	729,419	7,760	721,659

NOTE :

1/ Consumption based on FNRI Per Capita Consumption as follows:

Food Item	Per Capita Consumption (kgs)
Cereals	109.2
Fruits	76.65
Rootcrops	60.59
Vegetables	54.75
Meat	33.13
Fish	30.66
Eggs	3.98

% Incremental Production

	2005	2010	2015	2020	2025
2/ Cereals	5%	8%	10%	11%	12%
3/ Fruits	5%	15%	25%	40%	50%
4/ Rootcrops	3%	5%	8%	10%	12%
5/ Vegetables	10%	200%	100%	100%	80%

6/ Finfish only except seaweeds production

% Yearly Incremental Production

2004 - 2007	6%
2008 - 2010	10%
2011 - 2015	12%
2016 - 2020	14%
2021 - 2025	16%

7/ Meat

Annual Growth Rate:

Carabao	2.49%	Year 1-5
	3.49%	Year 6-10
	4.49%	Year 11-15
	5.49%	Year 16-20
Cattle	1.65%	Year 1-4
	3.65%	Year 5-8
	4.65%	Year 9-12
	5.65%	Year 13-15
	6.65%	Year 16-20
Hogs	21.78%	
Goat	2.83%	Year 1-3
	4.85%	Year 4-7
	6.85%	Year 8-11
	8.85%	Year 12-15
	10.85%	Year 16-20
Chicken	15.0%	Year 1-3
	25.0%	Year 4-8
	35.0%	Year 9-15
	45%	Year 16-20
Ducks	10%	Year 1-3
	15%	Year 4-8
	20%	Year 9-15
	25%	Year 16-20

8/ Eggs

15%	Year 1-3
25%	Year 4-8
35%	Year 9-15
45%	Year 16-20

Table II-4. Water Consumption for the Population Served by Levels 1, 2 and 3 Water Supply Systems, Province of Bohol; 1995-2010

			Year			
			1995	**1998**	**2003**	**2010**
i) Urban Population, L3	Unit	Cons Growth Rate	1.015	1.015	1.015	1.015
Domestic Consumption	l/c/d		120.0	125.5	135.2	150.0
Industrial Consumption	l/c/d	25% of DC	30	31.4	33.8	37.5
Commercial Consumption	l/c/d	5% of DC	6.0	6.3	6.8	7.5
Institutional Consumption	l/c/d	2% of DC	2.4	2.5	2.7	3.0
Consumption sub-total	**l/c/d**		**158.4**	**165.6**	**178.4**	**198.0**
Losses	l/c/d	20% of EC	39.6	41.4	44.6	49.5
Equivalent Consumption	**l/c/d**		**198.0**	**207.0**	**223.0**	**247.5**
ii) Rural Population, L1 & L2	Unit	Cons Growth Rate	1.01	1.01	1.01	1.01
Domestic Consumption	l/c/d		75.0	77.3	79.6	82.0
Other Uses	l/c/d	15% of DC	11.3	11.6	11.9	12.3
Equivalent Consumption	**l/c/d**		**86.3**	**88.9**	**91.6**	**94.3**

Source: SWECO, June 2005.

Table II-5. Domestic Water Demand (in m^3/day) Based on Population, Urban and Rural, Province of Bohol; 1998-2010

Particular	**Target Year**		
	1998	**2003**	**2010**
i) Urban			
Population	357,156	399,527	464,417
Water Demand	60,061	72,364	93,318
ii) Rural			
Population	683,041	710,194	744,273
Water Demand	61,317	67,093	75,555
iii) Province Total			
Population	**1,040,197**	**1,109,721**	**1,208,690**
Water Demand	**121,378**	**139,457**	**168,873**

Source: SWECO, June 2005.

By 2010, the per capita consumption for water is projected at 247.5 liters per capita/day for urban and 94.3 liters per capita/day for the rural dwellers.

2) Irrigation Water Supply

The NIA-Provincial Irrigation Office for 2004 show that the actual areas provided with dependable irrigation water are approximately 15,732 hectares. The summary inventory is as follows:

Irrigation System/Project	**Service Area (Ha)**	**% of Total**
i) Communal Irrigation Systems (215 CIS)	8,949	56.88
ii) National Irrigation Systems		
• Bohol Irrigation Project –Stage I	4,960	31.53
• Capayas Irrigation System	600	0.46
iii) Other Projects		
(SWIP, SFRs, PIP/Shallow Tubewells,etc.	1,223	11.13
TOTAL	**15,732**	**100.00**

The present irrigated areas account for 38.55% of the total potential irrigable lands of 40,800 hectares (NIA-PIO, 2004). It also includes the on-going Bohol Irrigation Project–Stage II with a target service area of 5,300 hectares (effective target in CY 2004).

NIA-PIO has targeted for implementation an additional ten (10) CIS for rehabilitation and/or improvement, three (3) SWIPs for construction and ten (10) pump irrigation projects. These target projects are distributed in selected municipalities of the province, and its detailed plans should reckon with the karstic terrain in the project sites.

1.3 Farming Systems Analysis

1.3.1 Farming Systems of Selected Crops

Under ***Section 3.1: Crops Production in Part I report***, provides data and discussion of the trends and status of crops production in the province. It also details the number of farmers, the status and size of their farmholdings, the total area devoted to each crop type and the prevailing farming systems and practices. To establish the present farm level data, the Participatory Rural Resources Appraisal (PRRA) survey on the farming system for selected crops in the key production zones have been conducted. Among others, the survey findings provided the estimates for CY 2004 production cost and return per crop type.

The existing farming activities, both the irrigated and rainfed paddies and the upland to highland farmsteads, serve as the primary source of subsistence and cash income for the farm households. The findings indicate that the areas devoted to short-duration crops production vary by season and by year, generally influenced by rainfall and soil moisture availability, most especially for food and crops like rainfed and upland palay, corn, vegetables and rootcrops.

1.3.2 Analysis of Yield Levels

Analysis of the prevailing yields of selected crops planted indicate a highly subsistence level of farming. This is generally characterized as follows: poor or defective cropping calendar, use of low yielding or inferior seed materials, low usage of farm inputs like fertilizer and plant growth enhancers, poor or inadequate crop protection and maintenance. The yield determinants in most crops are the combination of good seeds and appropriate farm management.

Table II-6 provides the analysis of the yield level of selected crops under Bohol conditions compared with potential yield at medium level of technology application. For grain crops, the current average yield of 3.89 metric tons per hectare for inbred palay is equivalent to 81.04% of the potential yield set at 4.80 m.t. per cropping/hectare, which is the highest among all crop types. Hybrid palay, the most recently introduced rice variety in Bohol, yielded 4.43 m.t. per hectare or about 59% of potential at medium level technology (the highest yield record is 11.80 m.t. per hectare under high technology level of production; DA-BSWM, 2004) Hybrid yellow corn yield level is equivalent to 60.83% of potential while the white open pollenated varieties' yield of 0.82 m.t. per hectare corresponds to only 37% of potential harvest. This supports the findings that at

least 20% (approximately 6,000 hectares) of the present corn areas are either marginally suitable or unsuitable for corn production. These are areas with very shallow-to-shallow soils, marginal uplands, the sloping and hilly areas including hillsides which could be devoted to less exacting and hardy tree crops such as mango and forest trees or developed into pasture grasses for ruminants.

Table II-6. Years 2000 and 2004 Average Yield Per Hectare (Metric Ton) of Selected Crops in Bohol Compared to Potential Yields at Medium Level of Technology Application

Crop Commodities	Average Yield by Year (Bohol Conditions)		Potential Yield[1/] (Medium Level Technology)	% of 2004 Yield to Potential Yield
	2000	2004		
Irrigated Palay				
• Hybrid var.	-	4.43	7.50	59.07
• Inbred var.	3.62	3.89	4.80	81.04
Rainfed Palay (Inbred)	1.58	1.81	4.80	37.70
Upland Palay (Exotic)	ND	0.48	1.20	40.00
Corn				
• Hybrid Yellow	0.92	2.19	3.60	60.83
• OPV-White	0.70	0.82	2.20	37.27
Vegetables				
• Fruit veg. (tomato, eggplant, squash)	1.50	1.67	15.00	11.13
• Leafy veg. (pechay, cabbage)	1.20	1.25	10.00	12.50
• Legume veg. (mongo)	0.58	0.79	1.20	65.83
Rootcrops				
• Ube	4.83	4.91	10.00	49.10
• Cassava	10.51	10.02	14.20	70.56
• Sweet potato	3.34	3.82	8.80	43.41
Perennial/Fruit Tree Crops				
• "Carabao" mango	3.83	6.00	15.00	40.00
• "Saba" banana	13.12	11.70	16.20	72.22
• Pineapple	ND	3.60	20.00	18.00
Coconut, nuts/tree/year	40	38	97[2/]	39.17

[1/] Agribusiness Data Compilation, Year 2002; DA-Agribusiness Section, Central Office, Diliman, Quezon City.
[2]/ National Average Yield Per Tree, Year 2004; PCA-CO, Diliman, Quezon City.

The present yields of vegetables are very low compared to potential yield levels (i.e., 11.13% for fruit vegetables, 12.5% for leafy vegetables and 65.83% for mongo). Of all crops, vegetable production has the greatest potential for development. The highland resource zone offers the best environment for year-round growing of semi-temperate high value vegetable crops.

For permanent crops, the 6.0 m.t. per hectare yield of "Carabao" mango is equivalent to 40% of potential production level. Coconut production at 38 nuts per tree/year is approximately 39% of the national average yield of 97 nuts per tree/year.

1.3.3 Analysis of Profitability Levels

Because of low yield level, the profit margin derived from crops production is also low. As shown in *Table II-7*, the commodity with the highest net income is "Carabao" mango with about ₱40,200 per hectare in Year 2000. It also required a high production cost estimated at ₱60,600 for 12-year old bearing trees. The second most profitable is the hybrid yellow corn production with net income of ₱18,204 per hectare/cropping, followed by full-bearing coconut plantation with net income of ₱13,010 per hectare.

Table II-7. Total Production Cost, Gross and Net Income (Php) Per Hectare Production of Selected Crops, Prov. of Bohol Conditions; CY 2004

Crop Commodities	Production Cost	Gross Income	Net Income	Return on Investment (%)
Palay Production				
• Irrigated	18,970.00	31,800.00	12,830.00	67.6
• Rainfed	16,235.00	18,100.00	1,865.00	11.5
Corn Production				
• Hybrid Yellow	26,796.00	45,000.00	18,204.00	67.9
• OPV-White	21,813.00	30,000.00	8,187.00	37.5
Vegetables Production				
• Eggplant (lowland)	17,220.00	22,500.00	5,280.00	30.6
• Cabbage (Highland)	15,320.00	22,500.00	7,180.00	46.8
"Carabao" mango (bearing 12-year old)	60,600.00	100,800.00	40,200.00	66.3
Coconut (full bearing)	7,010.00	20,020.00	13,010.00	185.6

Irrigated palay farming produce net return of P12,830 per hectare/cropping, or P25,660 per hectare yearly given the present two croppings per year. Rainfed palay, on the other hand, show a very low net income of P1,865 per hectare/cropping or approximately 14.54% of the net income from palay farming provided with reliable irrigation water supply.

The estimates of the Return on Investment (ROI) show the following top five (5) commodities:

	Crop	ROI (%)
1st	Coconut	185.6
2nd	Hybrid Yellow Corn	67.9
3rd	Irrigated Palay	67.6
4th	Carabao Mango	66.3
5th	Cabbage (Highland)	46.8

1.3.4 Farm Labor Employment Generation

The current highland cabbage production system generates approximately 86 man-days farm labor employment per hectare/cropping comprised of 17% hired labor and 83% contributed by the farm family members; the highest among the crop commodities *(see Table II-8)*. Second is "Carabao" mango production which generated 72 man-days per hectare, about 32 man-days hired and 40 man-days family labor. Given the total area of 2,735 hectares mango plantation, this would translate to approximately 196,920 man-days labor requirements for the commodity in 2004.

Table II-8. Farm Labor Employment Generation (man-day) Per Hectare Production of Selected Crops, Prov. of Bohol Conditions; CY 2004

Crop Commodities	Labor Employment		Total Labor Employment
	Family	Hired	
Palay Production			
• Irrigated	16	31	47
• Rainfed	18	31	49
Corn Production			
• Hybrid Yellow	35	15	50
• OPV-White	31	15	46
Vegetables Production			
• Eggplant (lowland)	53	18	71
• Cabbage (Highland)	71	15	86
"Carabao" mango (bearing 12-year old)	40	32	72
Coconut (full bearing)	24	12	36

Because of the extensive area of 30,855 hectares devoted to rainfed palay production, this commodity generated the highest farm labor employment estimated at 1.51 million man-days; about 63% or 951,300 man-days comprising the hired labor component. The second highest farm labor employment generator is irrigated palay production with about 1.48 million man-days, followed by coconut production system which required 1.30 million man-days and the open pollenated white corn farming for 642,804 man-days for the year.

The above analysis shows that the intensification and expansion of crops production systems, as and where technically viable, could provide productive employment to the present and future available rural labor force.

1.3.5 Livestock and Poultry Farming Systems Analysis

1.3.5.1 Ruminant Production System

Ruminants, mainly composed of carabao, cattle, goat and sheep, are good source of food protein in the forms of meat and milk. Classified as herbivores, these animals require lower and cheaper inputs as it can subsist on low-cost feeds such as forages and crop residues. Based on the agricultural data of 2004, there are about 340,000 metric tons of dry crop residues and 142,000 metric tons fresh ones available annually. This can support the feed requirements of about 100,000 heads of ruminants in one (1) year.

Ruminant raising complements with other farming systems, both upland and lowland. It provides a good source of organic fertilizer and energy through its manure. Carabaos and cattle, particularly bullocks, can also be used as draft animals. Generally raised at backyard level, these animals have been an important component of programs on food sufficiency and sustainability addressing malnutrition and providing additional income to farmers. Unlike crops, ruminants can be produced and marketed at anytime of the year.

Ruminant population has increased by 20% from 2000. The infusion of breeder animals in 2002-2003 for the different dispersal programs implemented by both the

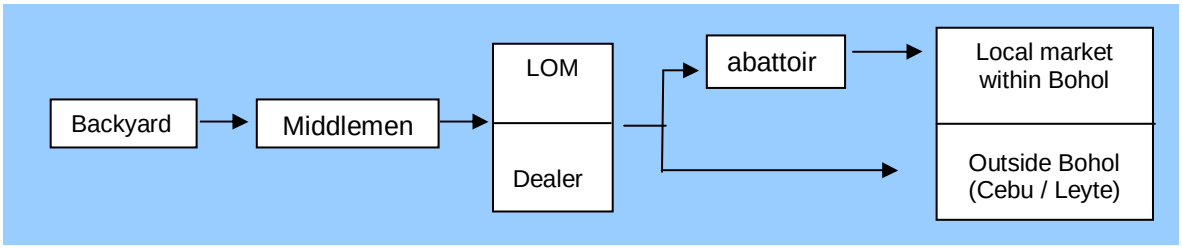
government and non-government organizations and the additional offspring production may have attributed the increase in the population in 2004.

Meat produced per NMIC report of 2004 indicates that an average live weight of 130 kgs. for carabao, 90 kgs. for cattle and 11 kgs. for goat , were slaughtered. These data from the municipal abattoirs represent local meat consumption and would reflect that smaller animals are being slaughtered for local market. Based from the interview with meat inspectors, it was learned that local meat vendors prefer younger and smaller animals for slaughter because of the absorptive capacity of the market which prefers fresh meat, the availability of storage facilities to keep surplus meat for 1 day requirement and the difficulty to transport bigger animals.

During fiestas and other special occasions where the "hulog-hulog" or sharing system applies (about 10 people or less contributes a certain amount to buy live carabaos and equally share the fresh carabeef), bigger animals are slaughtered. Quarantine inspectors also revealed that bigger animals with an average of 300 kgs. for carabao and 250 kgs. for cattle, are being transported outside the province. This shows that bigger animals are shipped-outside of the province compared to those slaughtered locally.

There are two (2) primary channels of distribution for ruminants; the local market and the market outside the province *(see Figure II-3)*.

Figure II-3. Local Ruminant Marketing Channel, Province of Bohol



First, backyard raisers sell their animals at any age and at any condition to middlemen to avoid incurring transportation and handling cost. These middlemen deliver the animals to traders or directly to Livestock "Oksyon" Markets (LOM) and further to abattoirs for primary processing. The meats are then sold by retailers and vendors in the local market or supermarkets.

Second, backyard raisers sell their animals directly to traders or middlemen then brought to LOMs and shipped outside the province as live animals.

Generally, cattle and carabaos are sold live through livestock traders or their middlemen who come to the barangays. Sale is done on a live weight basis using ocular estimation or the so-called "mata-mata" system. Expenses for transport and certificates of ownership and transfers are the responsibility of the buyer.

The poor access of farmers to price information results to minimal profit in livestock ventures. Price trend in the LOM transaction report revealed that on the average,

a one (1) year old caracalf could be sold between ₱7,000 - ₱11, 000 and for calf between ₱6,000 - ₱9,000.

Other benefits gained thru ruminant raising include rental for carabaos on per man-day basis of the farmers owner, milk from goats and the availability of organic fertilizer from ruminant manure.

1) Carabao Production System

Production Trend. Based on the trend for the past 5 years, the carabao population has not made significant change except for a slight increase in CY 2003, which could be attributed to the coming in of breeders used in the different government and non-government dispersal programs. Although there are attempts to increase the breeder-base, the increased number of slaughter as a result of the lifting of the slaughter ban has negated the efforts.

The growing consciousness of consumers on health values and the natural preference of the Boholanos for carabeef as a special cuisine have continually contributed to the increasing number of carabaos being slaughtered especially during fiestas. The total volume of carabeef consumption from 2000-2004 is 708.80 metric tons or an average of 141.76 m.t. per annum. Livestock handlers revealed that a certain percentage of these carabeef consumed in the province comes from the carabaos shipped into the province that do not qualify the dispersal program or those that are transported mainly for meat purposes.

The LOM reports for the past 5 years showed a steady increase in sales volume for carabaos. Shipment records also revealed a similar trend for carabeef going to Cebu, which indicates that Cebu could be a potential market for an expanded carabao production ventures. The importation requirements of Region 7 for carabeef for the past 5 years is 19,054.63 metric tons; which means a big opportunity for the local industry to fill in.

Present Farming Systems. Carabao raising in the province is usually in the farmer's backyard as a source of draft power in farming operations. Because of the inherent adaptability of carabao to Bohol condition and its ability to subsist on low quality feed stuff, farmers seldom give concentrates or other supplemental feeds. Tethering is the major means of feeding the animal. This is usually augmented by giving forage grasses and crop residues on a cut-and-carry basis.

Most of the breeder females are also used for work, and very often, the mating of the caracow/caraheifer is deferred to give way for the work schedules especially during cropping seasons. Boholano farmers usually maintain about 2 carabaos both for draft and breeding. Carabaos serve as fall back during times of exigencies or emergency for the family.

Problems and Threats. The existing commodity profile showed a slow progress in the production trend. This indicates that the commodity is in a very precarious situation that a little upsurge of the threat factors might trigger a downtrend.

The following factors are identified to be contributory to these problems and threats:

- Dwindling population of breeders due to consumption pressures
- Poor quality of breeder stocks/breeder base due to non-observance of strict culling and selection
- Diluted use of breeder base because caracows / caraheifers are also used as draft animals
- Poor management in terms of feeding, breeding, shelter, health care and stress control
- Breeding "skips" from non-detection of estrus because of difficulty in detecting heat signs and also its short duration. In many situations, an AI technician or breeding carabull is not available to serve the female animal on time.
- Non-conservation of breeder stocks – absence of measures to save breedable carabaos from slaughter or shipment outside the province.

Potentials/Opportunities

- Because of its unique quality as meat, carabeef will remain the main ingredient of a similarly unique Boholano cuisine.
- Despite the strong promotion for farm mechanization, the draft carabao will continue to serve as the main source of farm power especially amidst the ever-escalating price of fuel.
- Bohol is traditionally a carabao country and it will remain to be so because of the presence of the Philippine Carabao Center (PCC) in Ubay and the abundance of feed resources in terms of forage grasses and crop residues.
- Many meat processors and canning factories in Metro Cebu get their raw materials, which is usually carabeef from outside sources. Carabeef produced in Bohol could very well supply that need.
- Upgrading programs are on going, both thru the collaborative efforts of the Provincial Government as well as the National Government Agencies like DA and PCC.
- Strong support for development programs from the LGUs.
- Existence of carabao raisers association.

2) Cattle Production Systems

Production Status. Cattle production in the province is predominantly backyard serving as secondary integral part of the farming system of the Boholano farmer. It mainly serves as additional source of farm income. Cattle ranching (where a number of cattle are raised within a wide range of grasslands) is not widely practiced anymore in the province except for Ubay Stock Farm, which is a government-owned institution. The so-called "invisible ranching" seem to have replaced the open-range ranching and this is practiced by the identified 29 cattle farmers who raise 25 heads or more each through the so-called "paiwi" system or some sort of dispersal scheme (OPV record year 2000).

Population record shows an increase in 2002, which may be attributed to the importation of breeders from other provinces and regions for the different dispersal programs in the province both by government and non-government

organizations. Moreover, the intensification of the artificial insemination programs has improved cow-calf production.

The decline of cattle population can be attributed to the out-shipment of 3,064 heads of live animals mostly to Cebu and Leyte and the slaughter of 77,597 heads per NMIC report, for the past 5 years, equivalent to 6,207.76 metric tons of beef which is partially consumed within the province and partially exported to Cebu.

Present Farming Systems. Most cattle farmers still practice the traditional tethering or loose grazing of animals in open meadows and under coconuts and fruits trees and in non-irrigated rice lands after harvest. Usually, this is done by any family members but oftentimes by the more matured children. This activity approximately utilizes 2 hours daily farming activities. Feeding through cut and carry basis is done during rainy days or bad weather condition when the animal cannot be grazed in the open field or in times that it is on its unhealthy state.

When grazing in open meadows or native pastures, the animal fed on young cogon, carabao grass and some thimeda and alabang X that usually abound in these areas. Some farmers' plant improved varieties of grasses such as napier, but only on limited scale and volume, and they use this as roughage being fed the animals.

Pollard or rice bran or corn bran, whichever is available, are given as additional supplemental feed. A minimal amount of salt is also added as source of mineral and to induce the animal to drink more water.

Cattle owners have learned to accept the use of either natural or artificial breeding. Natural breeding uses good quality bulls either privately owned or from dispersal programs, with preference of the Brahman bloodline. For privately owned bulls, the owner charges ₱100 upon calf dropped. Unlike carabaos, there is less incidence of breeding skips in cattle because they are not used for work. However, there is a felt need for live bulls for immediate service to in-heat cows since these animals have very short estrus duration that is difficult to detect.
Production losses are usually due to mortalities and morbidities caused by diseases, which include malnutrition, parasitism and other infections especially if these are not properly treated. Losses are also attributed, to some extent, to wastage of by-products which otherwise could have added to the value of the animal if properly utilized such as the hides, horns and the hooves.

Basic animal health program like vaccination, deworming and other technical services are regularly conducted by the Office of the Municipal Agriculturist and the Provincial Veterinary Office, for free. These are usually rendered through the assistance of the trained Barangay Livestock Aides (BALA) in the respective barangays.

Provision of shelter comes in the form of open corrals for animal safety during nighttime. Generally, cattle are not provided with sheds as they are left in the open field or kept under tree shades near the house of the farmer.

Problems and Threats

- Poor cattle management practices
- Low quality of cattle stocks
- Inefficient marketing system
- Lack of appropriate policies on shipment and slaughter and the poor enforcement thereof
- Non-conservation of breeding stocks
- Dangerous communicable diseases
- Lack of breeding bulls of good quality

Potentials and Opportunities

- Status of the province as FMD-free area per declaration of the OIE
- Availability in the province of support services to increase production like artificial insemination, dispersal programs, financing or credit institutions and learning center like Ubay Stock Farm
- Industry expansion in the areas of dairying and processing of cattle by-products like hooves and horns; commercial feedlot or leisure ranching
- Proximity to market centers
- Availability of a large volume of crop residues that can augment feed requirement
- The absence of seasonality of cattle commodity
- Can complement with other farming systems
- Presence of organized cattle raisers in Bohol (Bohol Cattle Raisers Association).

3) Goat Production Systems

Production Status. From 2000 to 2002, Bohol produced about 14.86 metric tons of chevon based on the slaughter report of NMIC. This represents 20% of the total ruminant production. Within 2000 – 2003, goat population has decreased by about 13.09%, which could be attributed to high extraction rate as shown in the slaughter report and data of shipment outside the province for the 3-4 year period. However, population was restored in 2004 and this could be due to the introduction of new breeders for genetic upgrading thru dispersal programs of government and non-government organizations.

There is a high demand for chevon in the domestic market. The regional quarantine report showed around 300-500 goats are shipped out to Manila on a weekly basis. There is no importation for chevon (NMIC-Region 7 data), implying a big opportunity for local raisers to produce more to be able to supply the domestic demand.

Present Farming Systems. Goat production in the province is traditionally at the backyard level except in areas that are recipients of government programs where new technologies has been introduced. The latter group has somehow elevated their status to medium-scale projects because of increasing stocks to maximize service of dispersed breeders and provision of housing for the animals are requisites.

Based on actual observations and interviews with several farmers, goats are raised by tethering in open grassland and in areas sparsely planted with crops. No supplementation of concentrates and minerals is being practiced. Usually, farmers housed their animals in an improvised manner by utilizing spaces within the vicinity of their houses, e.g. house pens, copra dryers and others.

For breeding goats, most farmers borrow bucks from neighbors to breed their does. The animals are taken cared of by members of the family oftentimes by children who are already big enough to perform assigned task. Because of lack of good management practices, goats are easily affected with diseases. Pneumonia is quite common especially during rainy season, as goats could not stand the cold and wetness of the weather. Parasitism is also common and considered one of the causes of high pre-weaning mortalities.

Problems and Threats

- High production costs / losses
- Poor quality of stocks
- Lack of breeder bucks
- Vulnerability to parasitic infestation
- May damage plants if raised in free range

Potentials and Opportunities

- A good prospect for export outside the province and considerably to non-pork eating countries where it opens for more venues for commercial production with the advantage as an FMD – free province.
- Bohol is FMD-free
- Proximity /Accessibility to big markets like Cebu, Manila and Muslim Mindanao
- Relatively less investment is required to start with good business
- Superior quality of goats' milk as food
- Goat manure is superb as fertilizer
- Additional income from by-products such as hide and offals
- Availability of indigenous feed materials and appropriate technologies
- High demand for chevon resulting to high price of meat
- Potential for development of new products / menu
- Existence of an organized raisers (Bohol Small Ruminant Raisers Association)

1.3.5.2 Swine Production Systems

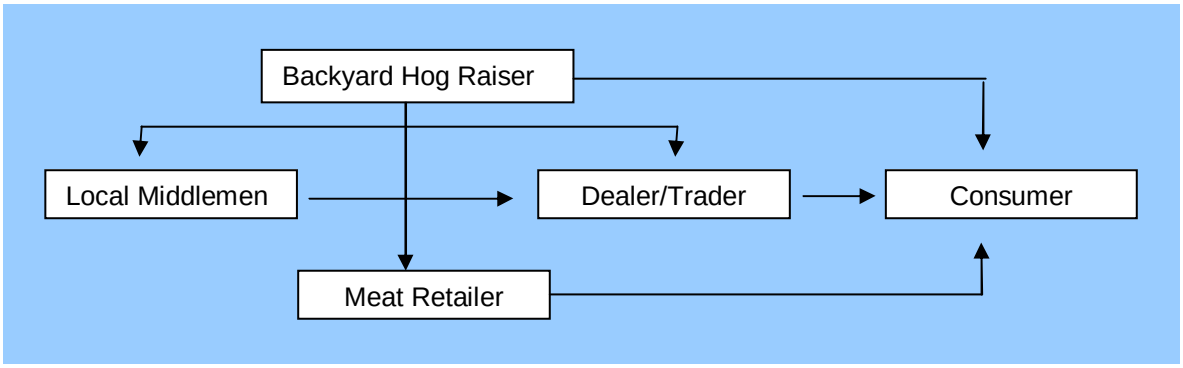
Importance. Swine raising is a very popular enterprise in Bohol. Almost every farmer household particularly in the rural areas raises swine more as fallback for cash during emergency than anything else. Very often, the farmer does not care much whether he earns from his project or not and seldom keeps record.

Production Trend. For the past 5 years, swine population showed a slight increase of 9.0% from year 2000 to date, which is equivalent to 24,363 heads. Of the total hog population in the province, 94.2% is raised at the backyard level while 5.8% is in commercial farms. The large backyard production of swine is located in the municipalities of Ubay, Carmen, Garcia-Hernandez, San Miguel, Inabanga and

Talibon. Based on BAS definition, there are 102 commercial hog raisers in the province. For the year 2004, pork production in Bohol has reached to 7,736 metric tons. An analysis of the situation indicates that the swine industry is moving towards self-sufficiency in pork production with the private sector playing a big role in the development of the industry.

Hogs are usually marketed both as live animals and in carcass form. Some are also in the form of processed products. The price of live weight is greatly affected by the presence of middlemen. About 90% of pork production is absorbed in the domestic market. There are 4 primary channels of distribution of hogs (see *Figure II-4*).

Figure II-4. Local Hog Trading Channels, Province of Bohol



First, backyard raisers may sell hogs of any age to local middlemen who come to the barangay. The middlemen deliver live hogs to local dealers within the municipality or directly to Cebu City. In this channel, raiser avoids incurring transportation and handling costs.

Second, hog raisers may sell directly to meat retailers or dealers in the municipalities or the City. These meat retailers/dealers usually dictate the farm gate price leaving the farmer no choice to negotiate.

Third, hog raisers may sell directly to consumers in the community at a better price because of the absence of middlemen. On the other hand, consumers may directly buy at the farm or the raisers display pigs during market days or "Tabo".

Based on NMIC data, hogs slaughtered showed an increasing trend from 2002, with a total of 64,291 heads slaughtered in 2004. Aside from the domestic market, hogs are also shipped out to Cebu. As reported by the Veterinary Quarantine Office, an average of 30,000 heads of swine was shipped out annually from 2002 to 200

Present Farming Systems. Majority of farmers raise 1 to 2 heads of swine in their backyard utilizing commercial or semi-commercial feeds. In the barangays, some are still utilizing indigenous feeds such as camote tubers and leaves, cassava chips, rice bran, corn and corn by-products which are usually mixed with swills. Grated coconut and even chopped banana stems and leaves are also included. To the farmer, recommended nutrients are not much consideration as long as the animal is fed.

A cost-benefit analysis of a 2-head level swine-fattening project shows negative profit if labor cost is computed. It appears that the farmers consider raising pigs in the backyard with the expectation that labor will be converted into cash not minding whether the capital inputs (animal, other materials) give profit or not.

Problems and Threats. Despite the apparently bright future of the industry, however, there are several constraints. These are identified as high cost of feeds, possible flare-ups of diseases of economic importance, lack of production and post-production support facilities and inefficient marketing systems.

Potentials and Opportunities. Considering the high demand for pork, there is a great potential for the swine industry in the province. Consumption of pork locally and in nearby metropolitan Cebu has been increasing for the past 3 years. With the declaration of Bohol as FMD-free area, swine products can easily be shipped out of the province for the export market.

1.3.5.3 Poultry Production

- **Production Status**

Chicken. Based on records, chicken population has decreased in year 2002 from 3.0 M to about 2.5 M in year 2004. The decrease is mainly due to the increasing demand for poultry products considering its high nutritive value and very affordable price.

A total of 2.17 million heads of chicken were slaughtered from 2000 to 2004 (NMIC report). The rate ranges from 8.58% to 29.01% of the total population during the previous years, which attributed to the decrease of the population. The data indicates an increase in the demand of poultry meat in the local market both for the native and commercial chicken. Native chickens are also shipped outside the province with its major destinations to Cebu, Mindanao and Manila.

With the results of the survey of the Provincial Veterinary Office, there are nine (9) commercial raisers engaging in egg production with 78,479 heads of layer producing about 23 million table eggs annually.

Duck. Duck population has slightly decreased over the years from 53,121 heads in 2000 to 50,828 heads in year 2004. The slight decrease in population maybe attributed to different factors, like the common perception that water is a requisite for duck raising and low campaign in promoting duck raising as an enterprise. Ducks are being introduced by the Department of Agriculture as a biological control against golden snail or "kuhol'.

"Balut" importation has gained significant increase for the past 3 years. Based on the data of the PVQO, a total of 2.34 million pieces of "balut" has been shipped into the province. These baluts mostly come from Laguna and Cagayan de Oro City. For the year 2004, shipment reached 1.16 million pieces implying an increasing demand in the local market.

- **Existing Farming Systems**

Based on interviews with farmer raisers and livestock technicians, native chickens are the common fowl found in most households. Farmers raised their chicken in a traditional way, which utilizes farm products and by-products such as corn, palay, corn or rice bran. Feeding is done twice daily by broadcasting or placing feeds in troughs near the farmers' houses to develop "homing" instincts of the chicken. At the backyard level, native chickens are raised in range to allow the birds to look or scavenge for food.

The traditional practice of rearing native chicken is without housing. Most birds perched on trees during nighttime, which make them prone to attack by predators. In most instances, birds are affected by adverse weather conditions. Disease incidence is quite high especially during seasonal outbreaks of new castle disease and fowl cholera usually in the months of June-July and December-January where high mortalities are noted.

Marketing of poultry products is done thru a "comprador" that buys live chickens during market days. Most farmers sell their chickens at the age of 5 to 8 months with an approximate weight of 0. 80 to 1.0 kgs. Eggs are also sold thru a comprador or directly to sari-sari or grocery store owners.

- **Problems and Threats**

  - Traditional and inefficient management systems of raising native chicken
  - Prevalence of destructive poultry diseases and lack of poultry health programs for disease eradication measures
  - Limited credit financing and fund infusion to backyard producers
  - High cost of commercial feeds
  - Presence of avian flu in neighboring Asian countries
  - Influx of imported low-cost poultry products as a result of trade liberalization
  - Unorganized backyard raising
  - No local source of chicks for commercial poultry raising

- **Potentials and Opportunities**

The poultry industry forms part as an integral component of the agriculture sector that provides additional income to farmers and economic growth to the province. The potentials are the following:

  - Based on the per capita consumption, poultry products (meat and eggs) requirement is still high versus local production of supply.
  - Native chicken constitutes more than 90% of chicken population and its production requires minimal inputs.
  - Native chicken is more resistant to diseases thus less usage of drugs which is preferred by health conscious consumers aside from its good taste.
  - Chicken dung is good organic fertilizer for fishpond and crops.
  - Feather and offals can be rendered into feed ingredient.
  - Duck eggs are best for balut and salted eggs, which command good price in the market.

- Duck meat is also becoming popular for some delicacies such as duck "caldereta", "patoten" and ham.

Because of its high feasibility, backyard poultry raising can be a good anti-poverty project in the rural areas.

1.3.6 Fishery and Fishing Systems Analysis

Coastal and fishery resources in the province, considered open access resources, are now severely degraded due to years of poor management and neglect. The municipal waters, which is even larger than the total land area of the province, continued to be exploited by the 1/3 of the Boholanos who depend primarily on fishing as their main livelihood and source of food. Of the estimated total number of fishers provincewide, 53.3% comes from the nine (9) municipalities facing Danajon Bank; 43.5% with non-motorized and 62.1% with motorized fishing boats. The Cebu/Bohol Strait and Bohol Sea municipal fishing grounds have relatively lesser number of fishers but continue to increase per year.

The state of coral resources in the three (3) major fishing ground is also an indication of the trend and volume of catch of fishers. Based on the documented studies of the total reefs covered by Danajon Bank area , about 74% are in poor condition, 14% in fair condition and only 12% are in good condition. Cebu/Bohol Strait, on the other hand, covers 75% in poor condition, 17% in fair condition and only 8% are in good condition. Current situation of Bohol Sea, however, is not so serious compared to the two fishing grounds (BFAR, 2002; CEEF, 2004; Ong, et.al, 2002; Reefcheck, 2001 and White et. al, 2002).

High and highest concentration of fishers is in Danajon Bank which constitutes a hundred to more than 200 fishers per km^2 area of fishing ground. Per inventory of common fishing gears and catch per unit effort, the gear with the highest CPUE are danish seine or "libi-liba" with 65.1 kgs/day, spear fishing with the use of compressor at 21.3 kgs/day and baby trawl with a CPUE of 15.3 kgs/day (Armada, et. al, 2004). The use of these gears is commonly found in Danajon Bank areas which contribute to over-exploitation of fishery resources.

Mangrove resources are also declining. The national scenario revealed that in the year 1918, mangroves had an estimated area of 450,000 hectares, and in the year 1993, the remaining mangrove areas were only 138,000 hectares (DENR, 2001 and World Bank, 1998). This was attributed to the changing policy of the national government to support fish production program by encouraging the conversion of mangrove areas for fishpond development for the culture of bangus and prawn in the 1980s. The declining condition and state of corals, mangroves and seagrass resources coupled with the unsustainable fishing practices in the fishing grounds collectively affected the continuing decline in the productivity of the fishery resources.

In the years 1976 to 2000, Central Visayas contributed 3.7% to 7.7% of the total national fisheries production. In 2002, the region contributed about 6.0% of the total marine capture fisheries production (both municipal and commercial sectors) of the country, down by 1.7% from year 2000 volume. In 1976, Bohol contributed an average of 15.6% to the total fisheries production of Central

Visayas (40% of which were landings from the municipal marine capture fisheries). Cebu's contribution was 73.5% and Negros Oriental contributed 10.6% (BFAR and BAS, 1976-2002).

The trend of provincial fisheries production has been influenced primarily by the fishery population of two (2) major fishing ecosystems, namely: the Bohol Sea with 7,968 km^2 and the Danajon Bank with 2,475.6 km^2, with a gross total of 574.3 kilometers of coastline.

Over a span of two (2) decades from 1970s to 1980s, there had been nine (9) major types of commercial fishing gears used in fishing. During 1990s however, some were banned (i.e., muro-ami, drive-in-nets and danish seine) and were declared illegal due to their defined active gears under Fisheries Administrative Order No. 207. Since 1986, commercial fisheries have replaced municipal fishers as the main catcher of fishery products with approximately 60% of all landed fish in the region. From 8,744 m.t. in 1998, it has increased to 9,559 m.t. in 2004 (BAS). The majority of the Boholano fisherfolks are becoming more and more marginalized while a few commercial fishers are making a good living at the expense of the small fishers. Reduced fish catch, more mouths to feed, increased prices of fishing inputs and increasing number of competing fishers characterize the present and foreseeable conditions of the fishing industry in the province.

Available information show that for seven (7) years, production from the ten (10) sectors of marine, aquaculture and other fishery products made an increase of 57% from 66,948 m.t. in 1998 to 104,886 m.t. in 2004. Such increase was largely due to the production of seaweeds which contributed 58.4% in 1998 and increased to 74% in 2004. With exclusion of seaweeds, the total production of marine capture fisheries and crustaceans including oyster from 1998-2004 declined by 1.82%; from 27,872 m.t in 1998 to 27,363 m.t. in 2004 (BAS, 2004).

Another important aspect that influenced fisheries production is the increasing population, with Bohol having an annual growth rate of 2.9%. In the municipal fishery sector, most coastal fishing families' elder sons usually follow the fishing profession of their fathers and likewise enter the dwindling fishery resources. While the population keeps on increasing, the demand for fish products is also increasing. These increasing population and fish products demand trends and the current declining trend of fisheries production are among the challenges that the fisheries program will address.

1.4 Climate/Rainfall Normals Analysis

Climate and rainfall pattern, as well as land topography and soils characteristics, are basic considerations in agriculture since these factors determine the suitability of crops and cropping combination, the cropping calendar or seasonality of cropping, the level of farming technology and farming practices, among others. In the rainfed and upland zones most predominant in the province, rainfall intensity, frequency and distribution are critical aspects that determine soil moisture regimes, which directly impact on the growth and development of crops. It also affects performance of poultry and livestocks.

In Bohol, the rainfall normals (period averages computed for a uniform and relative long period comprising of at least three consecutive 10-year period; BSWM, April 2005) showed at least four dry months from February to May with monthly averages from 68.2 mm to 78.7 mm rainfall. The remaining eight (8) months from June to January have average rainfall normals above 103 mm per month (refer *Table I-1 of Part I report*). Rainfall distribution and intensity varied in terms of location, with the surrounding coastal areas experiencing less precipitation compared to the interior mountainous zones.

In general, rainfall increases with the increase in land elevation. The incremental increase in monthly rainfall per meter increase in elevation is approximately 0.36 mm within elevation of 300 meters and 1.35 mm above 300 meters elevation (BSWM-LREP, 1986; CVRP-Central Cebu Hillyland Development Project, 1988; and DA-Cordillera Highland Agriculture Resource Management Project, 1997). These findings show that the lowland to uplands with elevation 300 meters is more prone to soil moisture stress and drought than hillylands above 300 meters elevation and highlands with elevation above 500 meters. Considering further that rainfall and adequacy of soil moisture are key determinants on the crop types and yield levels under the karstic terrain of Bohol's agricultural lands, the selection of crop commodities particularly sensitive to moisture stress should be guided by the limit of elevation, soil moisture and land suitability.

1.5 Technology Changes in Agriculture

Technological advances in agriculture (i.e, crops, poultry and livestocks, fisheries, agri-processing) are key inputs that would propel increased economic activity and productivity in the province. Several of these technologies which require low investment cost, considered environment-friendly, practical and easy to apply by the farmers and/or their POs and appropriate to Bohol conditions are discussed below.

1) **Technologies Promoting "Back to Organic Farming Systems".** The local government units (LGU) of Bohol have made significant steps in terms of policy support and local advocacy for the promotion of organic-based farming systems. This direction is consistent to sustainable agricultural development considering the unique karst topography and water resources of the province.

   The Plan components fully support the "back to nature" thrust and consider both indigenous and new technologies in organic agriculture. These include (i) deliberate bias to soil enriching legume crops in the promotion of bio-intensive gardens, multistorey and diversified cropping schemes; (ii) support to zero burning of farm wastes; (iii) promotion of integrated farming which effectively use the waste products from one commodity as production inputs for another commodity, i.e., utilization of corn stover as forage for ruminant and use of livestock manure as organic fertilizer material for crops and fishponds; (iv) maximize utilization of locally available organic fertilizer sources such as guano, chicken and livestock manure, decomposed farm wastes; (v) use of bioenzymes, beneficial micro-organisms and other biological agents for rapid decomposition of biodegradable farm wastes; and (vi) integration/linkaging with the LGUs material recovery facility component of their landfill and/or solid

waste management initiatives to supply the organic fertilizer requirements of the agricultural production activities.

New technologies on integrated pest management (IPM) particularly through biological means will be promoted. The protection of the Kibyawan bird and local bats which feed on crop insect pests and mosquitoes (e.g., 24-hour effective security) will be a major concern.

2) **Intercropping and/or Multistorey Cropping Systems.** This farming system is a simple form of crop diversification which supports the "survival strategy" adopted by small farmers. It cushions the impact in case of failure or drastic drop in price of one commodity through the produce and income from other commodities included in the cropping system.

   The PCA-Provincial Office presently promotes the coconut-based multistorey cropping in several municipalities of the province. The intercrops include the "Saba" and Cavendish bananas, pineapple, white corn, legumes and rootcrops like ube, cassava and sweet potato. This scheme could be expanded especially among small farmholders (about 2.0 hectares or less) of coconut, mango and other permanent crops. The benefits of this scheme include the increase in rural labor employment, provide additional food items for household members, diversify farm income sources and increase the income of farming families.

3) **The Sloping Agricultural Land Technology (SALT)** is a form of agroforestry farming system oriented to soil and water conservation for sustainable land productivity. There are, at present, several farmer-managed pilot farms in the watershed domain of the province.

   The SALT scheme is ideal for the tropics with torrential rains inducing water run-off and rapid erosion of the topsoils. However, its establishment and subsequent maintenance of SWC structures are quite laborious and pose difficulty for local farmers thus limiting wider adoption. Farmer adopters, for instance, found out that the established contour hedgerows impede field preparation and crop maintenance operations as well as serving as host of snakes, rats, snails and crop pests.

   The component project of the Plan, therefore, addresses the constraints through practical modification of the SALT scheme. As applied to the highland vegetables farming system, it would utilize upright-growth fruit trees planted in the contour strips instead of the commonly recommended multipurpose tree species and forage grasses. This modified SALT scheme will also be promoted for application in the sloping "kaingin" farmlots of farmer settlers with or without Certificate of Stewardship Contract (CSC) and/or the CBFMAs of POs.

4) **The Culture of High Value Crops Under Shelter and Controlled Environment** has been gaining popularity in the Cordillera Administrative Region (CAR), Cavite, Laguna and Bukidnon. Progressive farmers in these provinces practice the combination of sheltered and open field growing of HVCs particularly lettuce, tomato, melon and condiments. With regular and stable production volume, farmers are able to enter into lucrative contract arrangements with fastfood

establishments, supermarkets and hotels. Several of them also operate specialty vegetable outlets and restaurants adjunct to their HVCs farming enterprises.

Greenhouses (also called "tunnel crop shelters") provide shelter for year-round growing of HVCs. The NETAFIM, an Israeli private corporation with pioneering demonstration farm cum training center in Silang, Cavite, has developed and markets two greenhouse models; the crop protection and the Negev greenhouse models. Each is provided with irrigation water system, either or combination of drip, overhead mist or gravity irrigation.

The sheltered and open field growing of HVCs will be most appropriate for the highland vegetables farming. The highlands are soil areas with a wide range of slopes and are located in elevations greater than 500 masl. Highland temperatures are cool (< 25°C) and exhibit a narrow range of fluctuation, i.e., daily temperature variation is less than 5°C. The potential highland HVCs production zone in the province is located within a CADC domain that straddles the municipalities of Jagna, Duero, Guindulman and Sierra Bullones.

5) **Use of Flower Inducer and Related Plant Growth-Modifying Chemicals.** The technology on flower induction specifically for mango is an innovation of the old practice of "smoking" mango trees through burning of farm wastes and debris underneath (Barba, et. al.; 1973). Smoking of mango is still practical since smoke contain ethylene gas which induces physiologically matured terminals to flower.

Nowadays, mango growers in Bohol predominantly use commercially prepared flower inducers. Contractors come to their farm and offer to provide equipment, chemical sprays and services to do force-flowering of mango trees for a share of fruit harvest. Some offer to lease contract the plantation over a specified season. In either or both arrangement, it exerts tremendous stress on the mango trees.

The component project of the Plan advocates the moderate use of chemical sprays for flower induction in mango. Forced-flowering chemicals/hormones retard or inhibit the normal vegetative growth and flushing of trees aside from its effect on the micro environment of mango plantations.

In the case of pineapple, the moderate use of flower inducing chemicals (or even bean-size "kalburo" placed at the heart of the crown) sprayed to physiologically matured pineapple plants will be encouraged. The same will be promoted for fruit ripening inducers in banana.

There are several other technological advances (e.g., use of hybrids; mass propagation through tissue culture of selected crops; reforestation with mixed forest trees, palms, bamboo and vine species to simulate tropical forest ecosystem; mixed culturing of bangus, sugpo and mud crab in fishponds; mudcrab fattening module in naturally growing but fenced mangrove resource; upgraded native chicken production module; etc.), and more are expected to be developed over time. Appropriate flexibility is a built-in feature during the succeeding implementation of the Agriculture Master Plan so that

key technological advances could be adopted to ensure the sustainable management of agricultural programs.

1.6 Externalities

1.6.1 The Manila Action Plan for APEC

APEC is an association of 18 economies that share Pacific Ocean's boundaries. This cooperation among member-nations aims to bring down the trade barriers and ease the exchange of goods, services, resources and strengthen economic and technical cooperation within the Asia Pacific region. Its' three economic goals include the resistance towards protectionism by maintaining the momentum of trade liberalization brought about by the uncertainty in global trading systems; counteraction of inward looking regionalism; and to provide a better way to deal with economic conflicts (Policy Update, December 1996).

In November 1996, the APEC members produced the Manila Action Plan for APEC (MAPA). This output includes an individual and collective action plan that would enhance trade and investment liberalization and foster technical cooperation. The movement of goods, services and capital around the region would be more predictable, cheaper and faster with APEC around. Five themes were highlighted around the MAPA as discussed in the July issue of Policy Update (1996):

1) **Greater Market Access**. APEC members will lower down their respective tariff and non-tariff barriers. In the case of the Philippines, it committed to achieve a uniform rate of tariff at 5% by the year 2000 except for sensitive agricultural products *(see Table II-9)*. Furthermore, non-tariff barriers inconsistent with the WTO will also be removed. Transparency on tariffs and non-tariff measures will be made accessible through the internet through the APEC database of customs and applied tariff.

Table II-9. Philippine Action Plan for APEC in Agriculture

Market Access	• The Philippines has committed to phase down tariffs to a uniform rate of 5% excluding sensitive agricultural products, by 2004. This move is consistent with the country's' unilateral tariff reform program as mandated by EO 264 and EO 288.
Reducing Cost of Doing Business	• This can be achieved by liberalizing trade, eliminating administrative burdens and lowering down technical barriers to trade through the use of technologies and cost efficient processes. Specifically, RP will focus on: 1. A voluntary mechanism of Mutual Recognition Agreement (MRA) on Food and Food Products designed to facilitate trade by minimizing food inspection controls at the point of entry on the basis of assurance provided through pre-export conformity assessments using official and officially recognized inspection and certification systems, and by establishing a mechanism for resolving issues which may disrupt trade; 2. Exchange of information among APEC economies pertaining to change in legislative, regulatory and administrative requirements relating to food and food product standard, consistent with the GATT-UR agreements on Technical Barriers to Trade and the application of Phytosanitary and Sanitary Measures (SPS);

	3. Cooperation in Technical Infrastructure (TID) to upgrade and built-state-of-the-art laboratory facilities and food inspection system; 4. Align the food labeling standards with the international standards such as the ISO, among others, to harmonize food labeling, and thus facilitate trade; and 5. Align domestic legislation with the WTO-TRIPS Agreement and strengthen intellectual property rights enforcement and update the administrative structure.
Strengthening Economic and Technical Cooperation	• RP looks forward to an aggressive program in Agricultural Technology and Cooperation (ATC). This would include greater access and faster development of technologies resulting in increased productivity in the agricultural sector; greater rural employment and incomes; and sustainability of the resource base. • Specific areas of cooperation which includes (a) plant and germplasm exchange; (b) biotechnology research and development; (c) marketing and processing of agricultural products; (d) regional cooperation in plant and animal quarantine; (e) cooperation in the development of agricultural finance; and, (f) technology transfer and training. • On fisheries and marine resources, the Philippines would like to focus on promoting sustainable development, enhancing food safety and quality, and addressing common management problems.

2) **Market Access in Services.** This entails the opening of the country's services to the most favored nation (MFN) and national treatment for traded services. MFN highlights the idea that the favor one extends to a country will also be the same to the other while national treatment does away with discrimination against foreign suppliers of traded services as they will be offered the same business privileges like those of the country's citizens.

3) **Open Investment Regime**. Foreign investment rules under this agreement will be relaxed. APEC hopes that investment policies of other countries will provide MFN and national treatment to foreign investment.

4) **Reduction of Business Cost.** APEC members agreed to the following measures in lowering business cost: (a) transaction cost reduction through the simplification, harmonization and computerization and ensuring the transparency of customs laws and procedures; (b) reduction in the cost of compliance with diverse standards and technical regulations through "mutual recognition agreement", alignment of APEC standards with international standards and ensuring transparency of standards and conformity assessments; (c) facilitate business mobility through APEC-wide business cards, simplifying visa requirements, etc; (d) ensure transparency in government procedures through databases and contact point in each economies; (e) compliance on internationally harmonized rules of origin and publish a two volume compendium of rules and origin within APEC; (f) alignment of legislations on WTO agreements on trade related aspects of IPR according to WTO timetable; (g) publish a list of dispute settlement mechanisms available in each economy; and (h) share information and experience as well as establish appropriate cooperation arrangements on competition policy among members.

5) **Open and Efficient Infrastructure.** Members of APEC pledged to enhance sector participation in the construction, management and ownership of construction facilities throughout the region through a transparent and liberal infrastructure policy. Specifically, ecotech, aims to address the "Structural, policy and administrative bottlenecks to sustained equitable growth, …. And strengthen economic performance through accelerated technological development, training, sharing of best practices…". Sustainable development in the work program was also included as well as the establishment for the APEC center for technology and exchange and training for small and medium enterprises in the Philippines and the setting up of the Asia Pacific Research Center in Japan.

1.6.2 Social Reform and Poverty Reduction Act (RA 8425)

RA 8425 aims to address the concerns of the basic sectors of society with a key guiding principle in the formulation and implementation of a "policy environment conducive to a sustainable social reform agenda". The agenda encompasses farmers and landless rural workers, fisherfolk, urban poor, indigenous peoples, workers particularly in the informal sector, and other disadvantaged groups. The Social Reform Agenda is concentrated on three reforms: sustainable development of production resources, access to economic opportunities, and institution building and participation in governance.

Agricultural development is one of the nine flagship programs of the social reform agenda. The program is geared towards the modernization of Philippine agriculture through investments in rural infrastructure, cooperatives development, research and development, and the agrarian reform program. It aims to provide the tillers of arable lands the ownership, access and control of arable lands, and the opportunity to improve their incomes through higher productivity and better marketing opportunities. A key strategy for accomplishing the objectives is the development of the Agrarian Reform Communities (ARC).

1.6.3 Food Security Policy

Food security aims at providing access to affordable and stable prices of food staples to the population on a year round basis. This also means a generalized effort on the part of government to achieve self-sufficiency through sourcing food requirements locally. Self-sufficiency is defined as 'the availability of enough food produced domestically". Food security, however, does not preclude recourse to importation as a means of securing food supplies and stabilizing prices when the situation warrants. This would have benefited consumers because those produced abroad are essentially cheaper than the ones produced locally due to the distortions created by food protection on domestic prices. However, aside from ensuring that food grains are readily accessible to consumers at low prices, the government, on the other hand, also seeks to protect food grain farmers through restricting the flow of imported food grains to promote self-sufficiency.

To achieve the inconsistent objectives of making consumers happy through low prices and, subsequently, pleasing farmers through higher prices, the government

must be willing to subsidize prices. One of the common tools used is the setting up of price bands.

1.6.4 Price Band for Rice

An important component of food security strategies in developing countries such as the Philippines is the adoption of prices bands which is normally defended by the government through grain procurement and disbursement. This task is under the administration of NFA which distribute rice stocks at official retail prices when market prices are high compared to the official price. Moreover, it procures grains at procurement prices when farmgate prices fall below the official rate.

Price norms are usually reflected by the prevailing border price of grains which are distorted by the setting up of price bands. Nonetheless, price bands are encouraged by the government to stabilize domestic prices in the midst of low and fluctuating international rice supply. Price stabilization is critical given that such commodity is an essential food item.
Another criticism leveled against the price band is in the nature of intervention aimed at defending the band which is usually done through the changes in reserve/buffer stocks of the commodity. Buffer stocks are used for emergency purposes and to forestall any speculative attacks of the private traders at the upper boundary of the price band. The government maintains a buffer stock of 15 days at any given time while maintaining a 90-day reserve at the start of the lean season.

1.6.5 Corn Policy

One important regulation about corn is the import licensing levied against it which affects the livestock sector. Every first quarter of the year, DA determines the quantity of corn imports and the time it will be imported. Despite the claims of the country's self-sufficiency in corn, shortages and surpluses in corn output is still expected to occur during the course of the year due to its seasonality. During the lean months, feed millers and livestock producers request permission to import corn, but this is still a subject of debate between the users and producers of corn.

One problem that is usually encountered is that the decision to import takes a long process, such that by the time the imported corn arrives, the farmers have already started harvesting their corn. Thus, this depresses the domestic corn price which could hurt producers. In the meantime, the price of corn soars up during the lean months due to supply constraints.

Policymakers must further realize that the country is sufficient in white corn grain since it is not traded and the fact that there is still room to improve its' productivity. Problems of insufficiency in corn could have been avoided if yellow corn is freely importable for livestock purposes which could have prevented users from tapping white corn supply.

2.0 DEVELOPMENT CONTEXT, SCENARIO AND STRATEGIES

2.1 Development Context

2.1.1 Role of Bohol in Regional Development

The province of Bohol, which is envisioned to become an agri-industrial hub and eco-cultural tourism center (Bohol MTDP, CY 2004-2009) will be an integral part of the hierarchy of growth centers in the Central Visayas region. Its major contributions to the development of the region will come from its population and labor force structure, productive agricultural lands and fishery resources, unique natural endowments, indigenous culture and other tourism assets. As a major growth center in the hierarchy, the functions of the province are linked to Metro Cebu, the urban centers of Dumaguete and Bais in Negros Oriental, Ormoc and Maasin of Leyte and the Provinces of Surigao del Norte. Agusan del Sur and Misamis Oriental of Northern Mindanao (see Figure I.1: Location Map in Part 1 report).

The economic and social functions of Bohol within this hierarchy will include the following:

- Production, handling/processing and transport of high value products (i.e., beef/carabeef and pork, fish and fisheries products, grains, fruits and highland vegetables) for both the domestic and foreign markets
- Investment/Employment in agro-industrial enterprises
- Eco-cultural tourism destination
- Residential/Rest and recreation services
- Social services and facilities (education, health, welfare)
- Local governance: community organization, financial services, political participation, administration/taxation, etc.

2.1.2 Contribution to Poverty Reduction/ Socio-Economic Context

The agricultural development of Bohol primarily and basically addresses the welfare of the rural population, e.g., coastal, lowland, upland and highland communities. The Local Poverty Reduction Action Program database (2004) indicates that 47.3% of the households are below the poverty threshold level, and the "poorest of the poor" are, mostly the small farmers, assetless fishers and upland settlers. It is envisioned that through agricultural and natural resources improvement of the province, especially in the production components for selected crops, livestock and poultry and fisheries sub-sectors, the poverty situation would be mitigated.

Part of the millennium development goals at the national level and the Provincial MTDP development agenda will be reflected within the plan implementation period, in particular, the major targeted positive changes include the following:

- Food security and nutrition improvement in the food intake of rural household members
- Increased and sustainable agricultural productivity and income
- Increased farm labor employment

- Development of agri-based industries and rural enterprises
- Improvement in women and youth participation to community development activities
- Greater assurance of environmental sustainability.

2.1.3 Environmental Context

What can be considered the third most important design parameters of the Bohol Agriculture Master Plan is its environmental context. This has implications on human welfare, sustainable land & water productivity, and ecological and natural resource conservation. The last 40 years or so of existence of Bohol, substantial damage to natural forest and biodiversity have been inflicted, which is further threatened by continuing economic activities and population growth. The BAMP shall ensure that the rehabilitation of denuded forest and protection of remaining stands, control of further erosion and loss of soil fertility are included in its development objectives.

The anticipated downstream economic activities of the marine-based, coastal and land-based production system will themselves generate environmental problems, which shall also be addressed by the plan. New technologies in coastal, lowland/rainfed, upland and highland production systems shall thus discourage the use of chemicals and inorganic fertilizers, which might affect the quality of surface and ground water especially with the karstic typology in the province. On-site processing of agricultural products might result in environmental loss, such as use of fuel wood from forest cuttings, intensive consumption of water or other effects that would require mitigation measures. Further, rural in-migration as a result of attractive opportunities for farm employment might push back further the landless/marginalized groups and indigenous peoples. The latter might be mainstreamed into the new economy at the expense of their cultural wealth.

All of these environmental concerns shall be addressed in the BAMP. A distinct component is that the natural resources development and management is included. Moreover, appropriate matching of the production components with resource system's attributes and limitations have been factored in the design parameters.

2.2 Planning Principles

The formulation of Bohol Agriculture Master Plan follows the planning principles discussed below:

Maximum participation of stakeholders in the development activities. Active and maximum participation of stakeholders in problem identification or needs assessment, project identification, project implementation and project monitoring and evaluation shall be promoted and institutionalized. The active participation of stakeholders in development activities is expected to strengthen the sense of ownership of stakeholders on development projects, promote a more favorable environment for project sustainability, and encourage the deepening of social capital among the community members.

Equity, effectiveness and efficiency. The Bohol AMP should promote equity; hence policies, programs and projects must results to the improvement of the standard of living of the people in the production communities. Consequently, the vulnerable/marginalized groups, who in most cases are the ones in need of social and technological services, must receive the highest priority. Programs and projects must also follow the principle of effectiveness, that is, it should respond to the priority needs of the community residents. Finally, because local resources are scarce, programs and projects should operate on the principle of achieving the highest quality of service or output at the lowest possible cost.

Sustainability. It is expected that development activities in the project area shall follow the policies and strategies laid down by the Philippine Agenda 21 as well as the Bohol Environment Code. In watersheds where damage to the natural ecosystem has already occurred, it is necessary that strict adherence to existing environmental laws and regulations be instituted. Because most programs on sustainable development are best performed as a common activity or activities of a group, community action in environmental enhancement, protection and management should be supported.

Gender and development. Full and active participation of women shall be promoted to the full range of development activities. Women shall be considered as full partners of men in the process of development. Women, in particular, shall assume full partnership with other local actors in the development of coastal and land-based production projects, management of economic enterprises, management of social improvement activities, and on the management of environmental programs.

Accountability and transparency. The cooperation and confidence of people on public leadership are strong when the public sector is transparent and accountable for all its actions. The local government units (provincial, city/municipal and barangay) therefore shall practice open public bidding in all its projects and procurements as defined by government rules and regulations. In addition, all transactions of the LGUs shall be open for public scrutiny, and it should let the people know by appropriate means its annual accomplishments, and the revenue and expenditures of all local government.

2.3 Development Scenario

The development scenario by the end of the long-term period is that: The production and protection zones of Bohol, e.g., crops, livestock and poultry, fisheries and forest resources, shall have been developed and managed on a sustainable manner to support agri-industrial and eco-cultural tourism development; with dependable transport and related infrastructure and facilities support for improved productivity and employment opportunities of an empowered populace.

The development scenario anchors and embraces the twin concerns embodied in the Provincial Medium-Term Development Plan (CY 2004-2009), namely: (i) poverty reduction, and (ii) sustainable development. Over time, this scenario shall have resulted to:

- Food security and nutritional sufficiency attainment of the target participants/poverty groups and, through their POs, access technologies and resources for their engagement in second generation rural enterprises.

- Improved productivity and employment opportunities in the rural production zones would effect controlled influx of the population to the urban centers.

- Effective and dependable implementation of forward linkages of crops, fisheries, livestock and poultry and forest products.

- Established effective coastal and watershed resources management policies, supported with zoning ordinances and firm implementation management systems.
- Increased capability of the LGUs as provider and/or enabler of proactive strategies in planning, coordinating and managing local resource-based, integrated and participatory development programs and projects.

- Effective participation of the national government agencies, local resource institutions and NGOs, and mainstreaming of their agencies' resources and services support to agriculture and natural resources projects and activities.

2.4 Goals and Objectives

Goal I: **Contribution to Reduction of Poverty Incidence**

Objectives:

- To increase the outreach of programs and projects and increase access to technologies and basic services; and
- To increase adoption of cost-effective and environment-friendly technologies.

Goal 2: **Increased Productivity**

Objectives:

❖ Crops
- ✓ To promote farmer entrepreneurship and agribusiness;
- ✓ To enhance sustainable farm household level productivity and profitability compatible with ecological balance; and
- ✓ To ensure prompt and effective delivery of agricultural support services.

❖ Livestock and Poultry
- ✓ To ensure the production of livestock and livestock products in a sustainable and environment friendly manner;
- ✓ To provide breeding stocks in the barangay and ensure operationalization of animal dispersal;
- ✓ To perform genetic upgrading of local stock through artificial insemination and natural breeding; and

- ✓ To transfer livestock technology and profitable entrepreneurial concepts to beneficiaries.

❖ Fishery
- ✓ To promote inland aquaculture;
- ✓ To integrate fish culture with rice production;
- ✓ To protect and conserve aquatic fishery resources; and
- ✓ To increase productivity of aquaculture in fresh and marine waters.

Goal 3: **Developed and enhanced technical and managerial capabilities of entrepreneurs and workers.**

Objectives:

- To provide a conducive business climate through investor friendly policies;
- To promote total development of micro, small and medium enterprises that are globally competitive;
- To develop and enhance technical and managerial capabilities of entrepreneurs and workers;
- To strengthen functional government organization and business sector partnership;
- To provide clients with adequate, timely and relevant market information; and
- To provide better access to credit, training and savings services to economically active but disadvantaged entrepreneurs.

Goal 4: **Well-balanced natural resources.**

Objectives:

- To protect the natural resources against degradation through proper land management systems and practices;
- To protect and maintain soil biodiversity as an important ingredient for habitat, soil and water development;
- To safeguard the forest areas for climate regulation, soil and water generation; and
- To reduce soil erosion and sedimentation in the critical watershed areas.

2.5 Approaches and/ or Strategies

2.5.1 Integrated and Resource-based Development Planning Process

The strategy of agriculture development in the province provides for the spatial and environmental (area and resource-based) dimension of the priority production sectors to focus on high potential commodities with competitive advantage in both domestic and foreign markets. The strategy anchors on the natural resource suitability and greater capacity for sustainability geared towards:

- Food security of every household to meet food requirements from a nutritional content standpoint. Self-reliance of farming households in accessing and producing a checklist of food items will be supported through both backyard and farm multiple cropping schemes; and

- Commercial production of high potential commodities for agri-based industries and generating employment of rural labor.

2.5.2 LGU-led and Managed Development Initiatives

The Bohol AMP development is recognized as a pioneering initiative of the provincial political leadership in close partnership with the stakeholders, in particular, the local chief executives, NGOs through its Bohol Alliance of Non-Government Organizations (BANGON) and several POs, e.g., Agrarian Reform Beneficiaries Association (ARBA), Irrigators Association (IA), Bohol Cattle Raisers Association (BCRA), Small Coconut Farmers Organization (SCFO) and Bohol Mango Growers Association (BMGA), among others. This initiative appreciates the development of agriculture, i.e., fisheries, livestock and poultry, crops and agro-forestry, as the spearhead and vehicle for rural poverty reduction. It likewise addresses the major issue of development imbalance by placing the rural production zones as the priority development and investment focus for the incoming years.

The Provincial Program Planning Team (PPT), which was trained and who actually conceptualized the Bohol AMP, will be maintained. As necessary, the PPT membership will be expanded in order to respond to the succeeding activity of translating the plan into detailed Project Implementation Plan (PIP) through on-the-job training of selected staff from participating municipal LGUs. Thus, the PPT shall provide technical guidance and direction to the municipal technical working groups (TWG) in preparing their PIPs within the context of the Bohol AMP. Local units then shall be better equipped in terms of technical and managerial skills for resource-based and participatory development of projects which, in turn, will enhance their confidence and capability to manage the implementation of their LGU's projects.

2.5.3 Participatory Development

The implementation of development programs and projects should always provide the mechanism for optimum participation of stakeholders. This may be in the aspect of community organizations who are provided appropriate training to enable them to participate actively in project implementation, or making stakeholders members of committees on project implementation, monitoring and evaluation. Stakeholders should be also encouraged to contribute either in kind or in cash to the project especially for operation and maintenance.

To institutionalize community participation, social preparation at the community or cluster of communities shall be conducted. The social preparation should at the minimum organize the community into a cohesive group. These community groups shall be trained on the basic responsibilities of an organization, group dynamics, problems and needs identification, community development planning and project implementation, among others. It should also instill among the members of community groups their responsibilities in the attainment of their community's development objectives, as well as, the benefits of development to individuals and groups.

2.5.4 The Combination of Community Organizing (CO) and Community Development (CD)

The general CO approach views problems and constraints as primarily structural. i.e., people are excluded from economic benefits derived from resources and political power by strategies that promote inequity. The CD approach, on the other hand, sees problems as more than economic in scope and, hence, involves other concerns such as technology, health and sanitation, education and skills orientation, and general welfare. The combined and balanced application of these two approaches could bring into focus the direction of both LGU and NGO efforts. This will also bridge the perceived gaps between the NGO organizing activities and technical and resource inputs of LGUs.

The CO for CD activities will involve community social preparation, values clarification and reorientation, revival of dormant/inactive community organizations and formation of new organizations, organizational strengthening and mobilization to maximize their involvement and participation to the various development interventions. The POs shall be assisted to form their cooperatives or corporatives, to access technologies and resources, and to plan and engage in rural enterprises found viable after thorough study.

2.5.5 Institutional Capability Building

Strong and capable institutions are indispensable to sustainable development of Bohol. This is because only capable institutions could recognize and identify development problems, formulate solutions to these problems and manage the process of development.

Besides the local government units, a number of organizations, which are directly concerned with the development in the rural/poverty communities, exist and operate in the province. Most are dedicated and committed organizations, but are hampered by lack of training and logistics support.

Institutional capability building, to have depth and sustainability, should be broad-based and have the support of the government. Ideally, it should be integrated in the formal and informal educational system especially on the value formation of the youth, and on the literacy and other educational programs of informal education. Under the Bohol AMP, a series of training courses and modular sessions for institutional capability building of both LGUs, NGOs, POs, and other stakeholders have been identified for implementation.

2.5.6 Gender and Development

Women appear to be active in development activities in most communities in the province. This participation of women in development activities shall be supported and further promoted. It is now accepted that women assumes a much greater role in development compared to what had been previously perceived. For example, women appeared to have a better record in repayment of loans compared to men, and therefore may be a much better manager of micro-enterprises. Development projects therefore should provide special attention to the role of women starting from project identification to implementation, monitoring and evaluation, operation and maintenance.

Cooperating Agencies:

PROVINCIAL PLANNING & DEVELOPMENT OFFICE (PPDO)
OFFICE OF THE PROVINCIAL AGRICULTURIST (OPA)
OFFICE OF THE PROVINCIAL VETERINARIAN (OPV)
BOHOL ENVIRONMENT & MANAGEMENT OFFICE (BEMO)
BOHOL POVERTY REDUCTION MANAGEMENT OFFICE (BPRMO)