



Republic of the Philippines
PROVINCIAL GOVERNMENT OF Bohol

Bohol Agricultural Master Plan



An output developed under the HR training activity on Modular Course on Agri Master Plan – an initiative of the Provincial Government of Bohol with funding support from AusAID through Philippines – Australia Human Resource Development Facility (PAHRDF).

TABLE OF CONTENTS

Volume 1

PART I – RESOURCE PROFILE

<u>Title</u>	<u>Page</u>
1.0 PHYSICAL AND NATURAL RESOURCE ATTRIBUTES	I-1
1.1 Location and Land Area	I-1
1.2 Geomorphology	I-1
1.2.1 Geologic Features	I-1
1.2.2 Physiography	I-1
1.2.3 Major Drainage Systems	I-3
1.2.4 Mountain Ranges	I-3
1.3 Climatology	I-4
1.3.1 Climate and Rainfall Pattern	I-4
1.3.2 Temperature and Relative Humidity	I-4
1.3.3 Wind Speed and Direction	I-5
1.4 Land Resource Base	I-5
1.4.1 Soils	I-5
1.4.2 Slope	I-7
1.4.3 Land Classification and Existing Land Use	I-7
1.5 Forest Resources	I-10
1.5.1 The Protected Areas	I-10
1.5.2 Watershed Forest Reserves	I-11
1.5.3 Production Forest	I-12
1.5.4 Man-made Forest	I-14
1.5.5 Mangrove Forests	I-14
1.5.6 Biodiversity	I-15
1.6 Water Resources for Fisheries	I-15
1.6.1 Background Information	I-15
1.6.2 Inland Waters/Freshwater	I-16
1.6.3 Coastal and Nearshore Waters	I-16
1.7 Mineral Resources	I-20
1.8 Environmentally Constraint Areas	I-22
2.0 SOCIAL DEMOGRAPHIC ATTRIBUTES	I-22
2.1 Population and Demography	I-22
2.1.1 Population Growth Rate	I-22
2.1.2 Population Density	I-23
2.1.3 Age-Sex Structure	I-24
2.2 Income and Poverty Incidence	I-25
2.2.1 Income and Expenditure Pattern	I-25
2.2.2 Poverty Incidence	I-26
2.3 Employment/Underemployment	I-26
2.3.1 Labor Force Situation	I-26
2.3.2 Employment Status	I-27
2.3.3 Employment by Sector	I-28

<u>Title</u>	<u>Page</u>
2.4 Mortality and Morbidity	I-28
2.4.1 Mortality Status and Causes	I-28
2.4.2 Morbidity Status and Causes	I-29
2.4.3 Malnutrition	I-30
2.5 Potable Water Supply	I-30
2.6 Household Sanitation	I-30
3.0 AGRICULTURE AND FISHERIES	I-32
3.1 Crops Production	I-32
3.1.1 Rice Production	I-32
3.1.2 Corn Production	I-34
3.1.3 Vegetable Production	I-36
3.1.4 Coconut	I-38
3.1.5 Oil Palm	I-38
3.1.6 Mango and Other Fruit Crops	I-39
3.2 Livestock and Poultry Production	I-40
3.2.1 Ruminant Production	I-41
3.2.2 Hog Production	I-44
3.2.3 Poultry Production	I-44
3.3 Fish Production	I-45
3.3.1 Municipal Fisheries	I-45
3.3.2 Commercial Fisheries	I-47
3.3.3 Aquaculture	I-48
3.4 Agri-based Industries	I-49
3.5 Agriculture and Fisheries Marketing System	I-49
3.5.1 Crops Marketing System	I-49
3.5.2 Livestock and Poultry Marketing	I-52
3.5.3 Fish and Aquatic Products Marketing	I-53
4.0 INSTITUTIONAL SUPPORT IN AGRICULTURE	I-54
4.1 National Government	I-54
4.2 Local Government	I-55
4.2.1 Local Policies and Legislations	I-55
4.2.2 Manpower Complement in Agriculture	I-56
4.3 State Colleges and Local Resource Institutions	I-56
4.4 Private Sector Organizations involved in Agriculture and Natural Resource	I-56
5.0 SUPPORT INFRASTRUCTURE AND FACILITIES	I-57
5.1 Role of Infrastructure in Agriculture Development	I-57
5.2 Irrigation and Drainage	I-57
5.3 Transport Infrastructure	I-58
5.3.1 Roads and Bridges	I-58
5.3.2 Seaports and Fish Landing Ports/Wharf	I-58
5.4 Post-Production Facilities	I-59
5.4.1 Drying, Milling and Warehouse	I-59
5.4.2 Slaughterhouse/Dressing Plants	I-59
5.4.3 Cold Storage and Fish Processing Plant	I-60
5.4.4 Sawmill and Wood based Processing	I-60

5.4.5	Livestock Auction Markets	I-61
5.5	Other ANR Support	I-61
5.5.1	Seedfarm and Agro-Forest Nurseries	I-61
5.5.2	Stock Farm and Breeding Centers	I-62
5.5.3	Feedmill	I-64
5.5.4	Soil/Plant Tissue Laboratory	I-64
6.0	ON-GOING ANR PROGRAMS AND PROJECTS	I-65
6.1	National Government Initiated Projects	I-65
6.1.1	Kapitbisig Laban sa Kahirapan – Comprehensive Integrated Delivery of Social Services (KALAH-I-CIDSS) Project	I-65
6.1.2	Early Childhood Development (ECD)	I-65
6.1.3	Coconut Farmers Food Access Project	I-65
6.1.4	Maunlad na Niyugan Tugon sa Kahirapan Program	I-65
6.1.5	Communities along Cambuhut River Ecotourism and Enterprise Development (CREED)	I-65
6.1.6	Coastal Resource Management Project (CRMP)	I-66
6.1.7	Belgian Integrated Agrarian Reform Support Project 3 (BIARSP-3)	I-66
6.1.8	KALAH-I in Conflict Areas	I-66
6.2	Local Government Units Initiated Projects	I-66
6.2.1	LETS HELP BOHOL Program	I-66
6.2.2	Barangay Livestock Aides (BALA) Program	I-67
6.2.3	Localized Artificial Insemination Program	I-67
6.2.4	Aquaculture for Rural Development Project	I-68
6.2.5	Community-based Resource Management (CBRM) Project	I-68
6.2.6	Bohol Technology and Livelihood Development Program	I-68
6.2.7	Panglao Craft Village Development Project and the Bohol Loomweaving Development Project	I-68
6.3	Non-Government Organizations and Civil Society Initiated Projects	I-68
6.3.1	Loboc (Area-Focus Approach) Watershed Development Project	I-68
6.3.2	Sustainable Agriculture and Enhancement Project	I-69
6.3.3	Calangahan Sustainable and Integrated Agriculture Development Project	I-69
6.3.4	Livelihood Project for Women's Organization in Loboc	I-69
6.3.5	Oil Palm Project	I-69
6.3.6	Biodiversity Conservation and Management of the Bohol Marine Triangle	I-69
6.3.7	Financial Assistance Program	I-70
6.3.8	Fishery Development Program	I-70
6.3.9	Marine Conservation Program	I-70

PART II – SITUATIONAL ANALYSIS DEVELOPMENT SCENARIO AND STRATEGIES

<u>Title</u>	<u>Page</u>
1.0 SITUATIONAL ANALYSIS	II-1
1.1 Land Resource Use Analysis	II-1
1.1.1 Protection of Agricultural Lands for Food Security and Income Generation	II-1
1.1.2 Natural Protection and Landscape Management	II-1
1.1.3 Settlement/Housing and Other Competing Land Use	II-2
1.2 Food Supply and Demand Analysis	II-3
1.2.1 Population Growth and Supply and Demand of Major Agricultural and Fishery Products	II-3
1.2.2 Water Supply and Demand Analysis	II-5
1.3 Farming Systems Analysis	II-8
1.3.1 Farming Systems of Selected Crops	II-8
1.3.2 Analysis of Yield Levels	II-8
1.3.3 Analysis of Profitability Levels	II-10
1.3.4 Farm Labor Employment Generation	II-10
1.3.5 Livestock and Poultry Farming Systems Analysis	II-11
1.3.5.1 Ruminant Production System	II-11
1.3.5.2 Swine Production Systems	II-17
1.3.5.3 Poultry Production	II-19
1.3.6 Fishery and Fishing Systems Analysis	II-21
1.4 Climate/Rainfall Normals Analysis	II-22
1.5 Technology Changes in Agriculture	II-23
1.6 Externalities	II-26
1.6.1 The Manila Action Plan for APEC	II-26
1.6.2 Social Reform and Poverty Reduction Act (RA 8425)	II-28
1.6.3 Food Security Policy	II-28
1.6.4 Price Band for Rice	II-29
1.6.5 Corn Policy	II-29
2.0 DEVELOPMENT CONTEXT, SCENARIO AND STRATEGIES	II-30
2.1 Development Context	II-30
2.1.1 Role of Bohol in Regional Development	II-30
2.1.2 Contribution to Poverty Reduction/Socio-Economic Context	II-30
2.1.3 Environmental Context	II-31
2.2 Planning Principles	II-31
2.3 Development Scenario	II-32
2.4 Goals and Objectives	II-33
2.5 Approaches and/ or Strategies	II-34
2.5.1 Integrated and Resource-based Development Planning Process	II-34
2.5.2 LGU-led and Managed Development Initiatives	II-35
2.5.3 Participatory Development	II-35
2.5.4 The Combination of Community Organizing (CO) and Community Development (CD)	II-36
2.5.5 Institutional Capability Building	II-36
2.5.6 Gender and Development	II-36

SUPPORTING TABLES AND FIGURES

Part I List of Tables

<u>Table</u>	<u>Title</u>	<u>Page</u>
I-1	Climatological Normal Values for Bohol Province, 1971-2000	I-5
I-2	Existing General Land Use of Bohol Province, 2002	I-10
I-3	Summary of NIPAS Areas in Bohol (As of May 2005)	I-11
I-4	Inventory of Bohol Watersheds (As of May 2005)	I-11
I-5	Lumber Production and Disposal of Bohol (As of April 2005)	I-12
I-6	Man-made Forest in Bohol (As of May 2005)	I-14
I-7	The Total Area of Different Fisheries Ecosystems Including Area Outside of Central Visayas, May 2005	I-18
I-8	Mineral Deposits, their Location and Estimated Grade/ Tonnage, Province of Bohol; May 2005	I-21
I-9	Fastest Population Growing Municipalities (with Yearly Population Growth Rate of 2.5% or more) in Bohol Province, 1995-2000 Census	I-23
I-10	Trend of Population Increase, Bohol Province, 1903 – 2000	I-23
I-11	Top 10 Most Densely Populated Municipalities in Bohol Province, Year 2000	I-24
I-12	Top 10 Municipalities with the Most Number of Elderly Population vis-à- vis Municipal Population, Bohol Province, CY 2000	I-24
I-13	Total Population 15 Years Old and Over and Employment Status, Bohol Province; 2001 – 2003	I-27
I-14	Projected Labor Force, Bohol Province; 2003 – 2020	I-27
I-15	Distribution of Deaths By Age Group and Sex, Bohol Province; Year 2000	I-28
I-16	Ten (10) Leading Causes of Death in 2004 Compared to Past 5 Years, Number and Rate per 100,000 Population, Bohol Province	I-29
I-17	Distribution of Morbidity By Age Group and Sex, Bohol Province; Year 2004	I-29
I-18	Top 10 Municipalities With Households Without Sanitary Toilets, Bohol Province; CY 2003	I-31
I-19	Palay Production Trends: Area Harvested, Average Yield and Total Production for Irrigated and Rainfed; Province of Bohol, CY 1998-2004	I-32
I-20	Corn Production Data: Area Harvested, Total Production and Average Yield per Hectare, Hybrid and OPV; Province of Bohol, CY 1990-2004	I-34
I-21	Vegetable Production Trends: Area Harvested, Average Yield and Total Production of Selected Vegetables, Province of Bohol; 1990-2004	I-36
I-22	Number of Oil Palm Growers and Area Planted by Phase/ Year and by Municipality (As of August 26, 2004), Province of Bohol	I-39
I-23	Summary of Area Devoted to Fruit Crops, Years 1998-2004 Province of Bohol	I-40

<u>Table</u>	<u>Title</u>	<u>Page</u>
I-24	Livestock and Poultry Inventory by Type, Province of Bohol Years 2000-2004	I-40
I-25	Live Animals and Livestock Products Shipped In & Out of the Province of Bohol, Years 2000-2004	I-42
I-26	Total Livestock & Poultry Slaughtered by Type, Province of Bohol; Years 2000-2004	I-43
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	I-46
I-28	Number of Commercial Fishing Boats in the Province of Bohol, Year 2004	I-47
I-29	Aquaculture and Fishery Products by Type (in metric tons), Prov. of Bohol; 1998-2004	I-48
I-30	Seaweed Production in Bohol (in metric ton), Years 2000-2004	I-48
I-31	Number of Units and Distribution of Post-Harvest Facilities for Grain Crops, Province of Bohol; May 2005	I-59

Part II List of Tables

II-1	Population Increase Per Year, Bohol Province	II-3
II-2	Food Balance Analysis (In Metric Tons); Province of Bohol	II-4
II-3	Projected Production and Consumption (In Metric Tons), Province of Bohol; Years 2005, 2010, 2015 and 2020	II-6
II-4	Water Consumption for the Population Served by Levels 1, 2 and 3 Water Supply Systems, Province of Bohol; 1995-2010	II-7
II-5	Domestic Water Demand (in m ³ /day) Based on Population, Urban and Rural, Province of Bohol; 1998-2010	II-7
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	II-9
II-7	Total Production Cost, Gross and Net Income (Php) Per Hectare Production of Selected Crops, Prov. of Bohol Conditions; CY 2004	II-10
II-8	Farm Labor Employment Generation (man-day) Per Hectare Production of Selected Crops, Prov. of Bohol Conditions; CY 2004	II-11
II-9	Philippine Action Plan for APEC in Agriculture	II-26

Part I List of Figures

<u>Figure</u>	<u>Title</u>	<u>Page</u>
I-1	Location Map	I-2
I-2	Soils Typology Map	I-6
I-3	Slope Map	I-8
I-4	Existing Land Use Map	I-9
I-5	Watershed and River Systems	I-13
I-6	Municipal Waters of Bohol	I-17
I-7	Map of the Major Fishing Ground of Bohol	I-19
I-8	Age-Sex Population Pyramid, Bohol: 2000	I-24
I-9	Poverty Incidence	I-26
I-10	Employment by Major Industry Group, Bohol Province, CY-2003	I-28
I-11	Coconut Production and Area	I-38
I-12	Five-Year Carabao Population	I-41
I-13	Five-Year Cattle Population	I-42
I-14	Five-Year Goat Population	I-43
I-15	Five-Year Hog Population	I-44
I-16	Live Hogs and Pork Shipped-out of Bohol	I-44
I-17	Five-Year Chicken Population	I-44
I-18	Annual Commercial Fisheries Landings Trend, 1975-2002	I-47

Part II List of Figures

II-1	Average Annual Population Growth Rate (1%) of Bohol at Various Censuses: 1948-2000	II-3
II-2	Production and Consumption of Major Commodities, CY 2004	II-4
II-3	Local Ruminant Marketing Channel, Province of Bohol	II-12
II-4	Local Hog Trading Channels, Province of Bohol	II-18

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

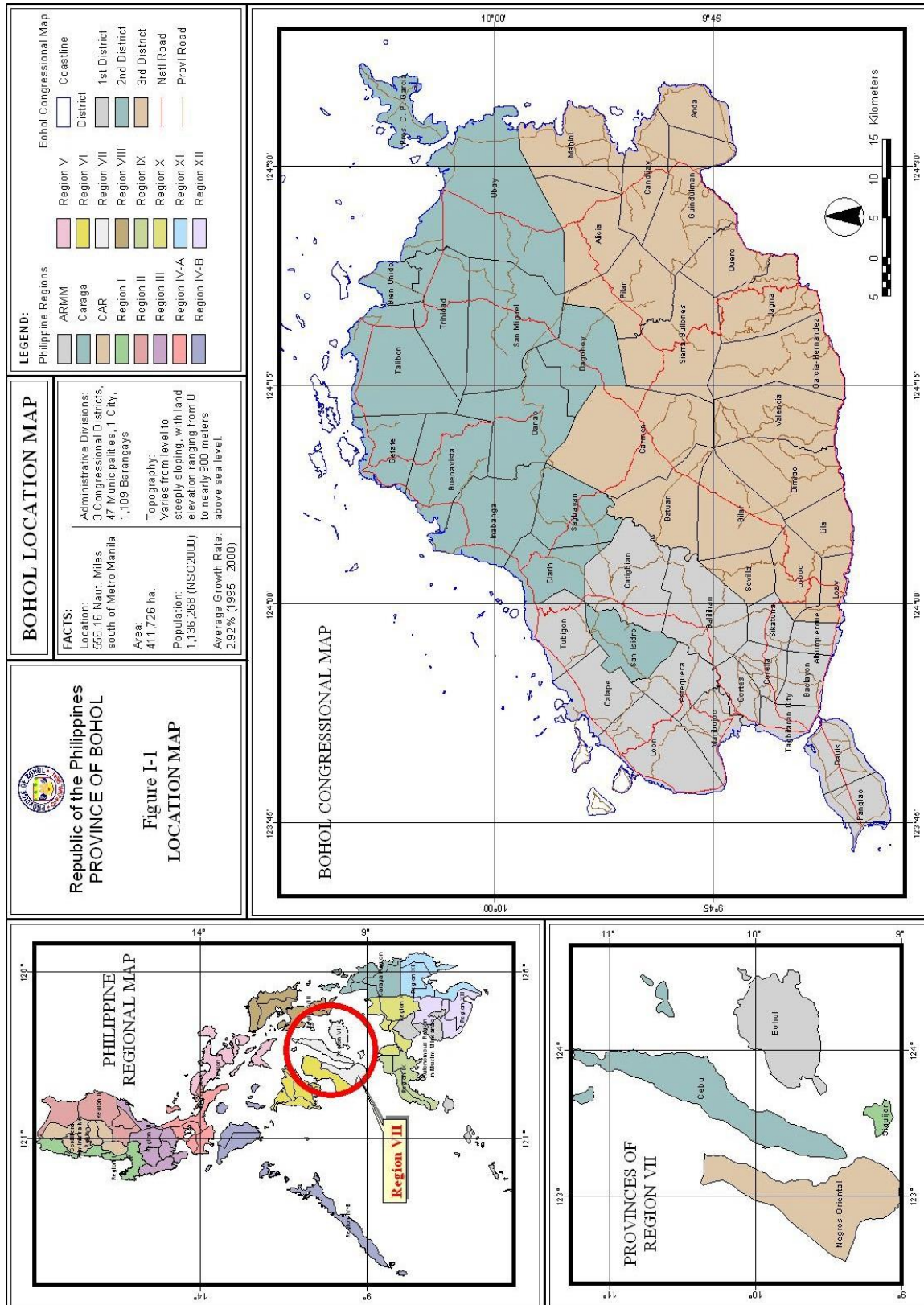
Bohol may have been developed from the magnetic tectonic mechanism which resulted from the under thrusting of the southwest Philippine Plates east of Samar island and Surigao in Northern Mindanao. The Alicia Schist, the oldest known rock formation in the island, is inferred to be part of the Bohol crystal 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.



- 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:

<u>River System</u>		<u>Estimated Drainage Area</u>
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 data 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

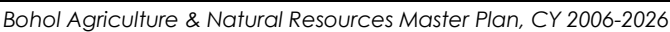
The prevailing wind direction from November to April is towards northeast with average speed of 2 miles per hour ([Table I-1](#)). The months of May to October experience gentler winds oriented southward.

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 occurrence, 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 occurring 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.



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.

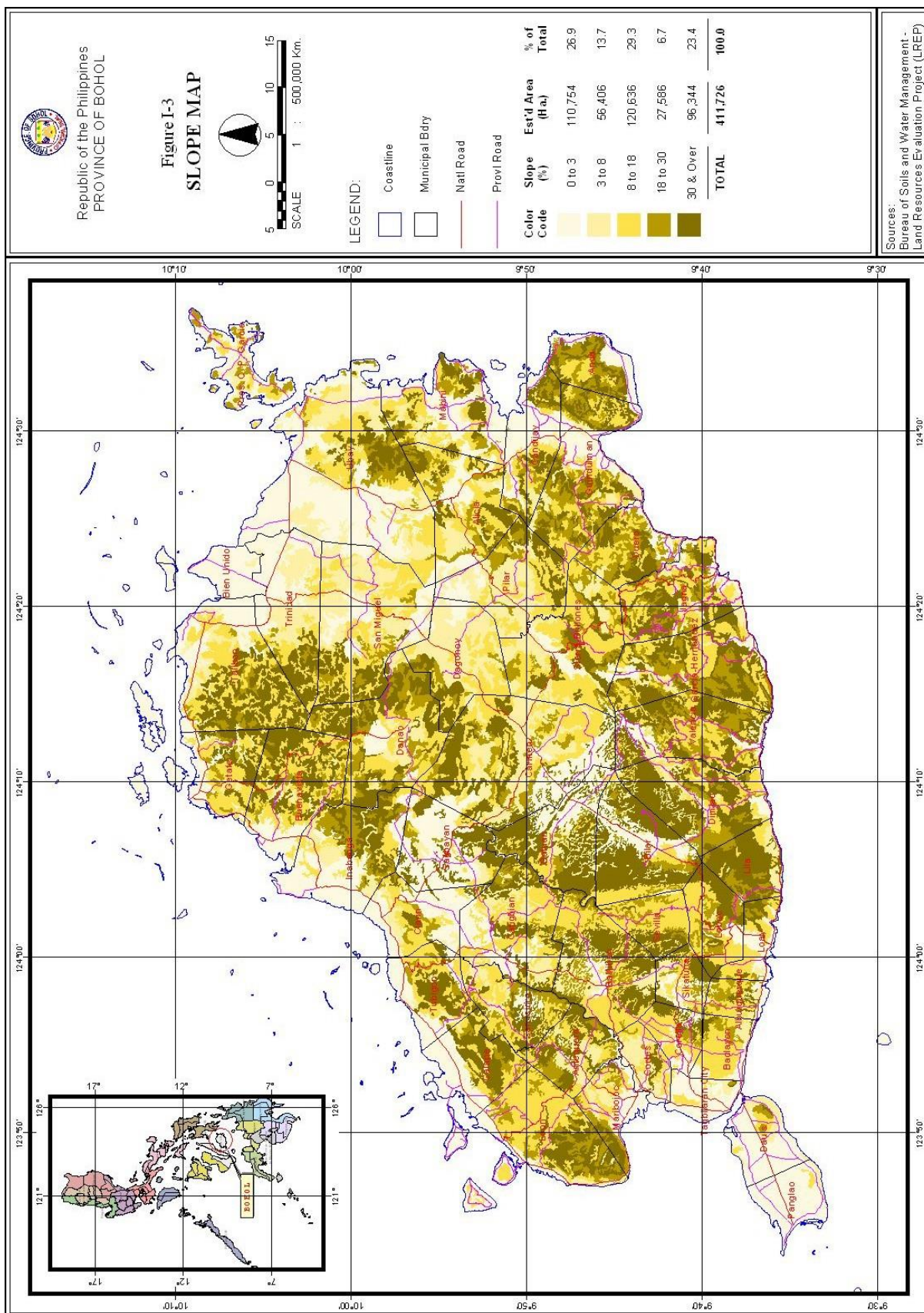
1.4.2 Slope

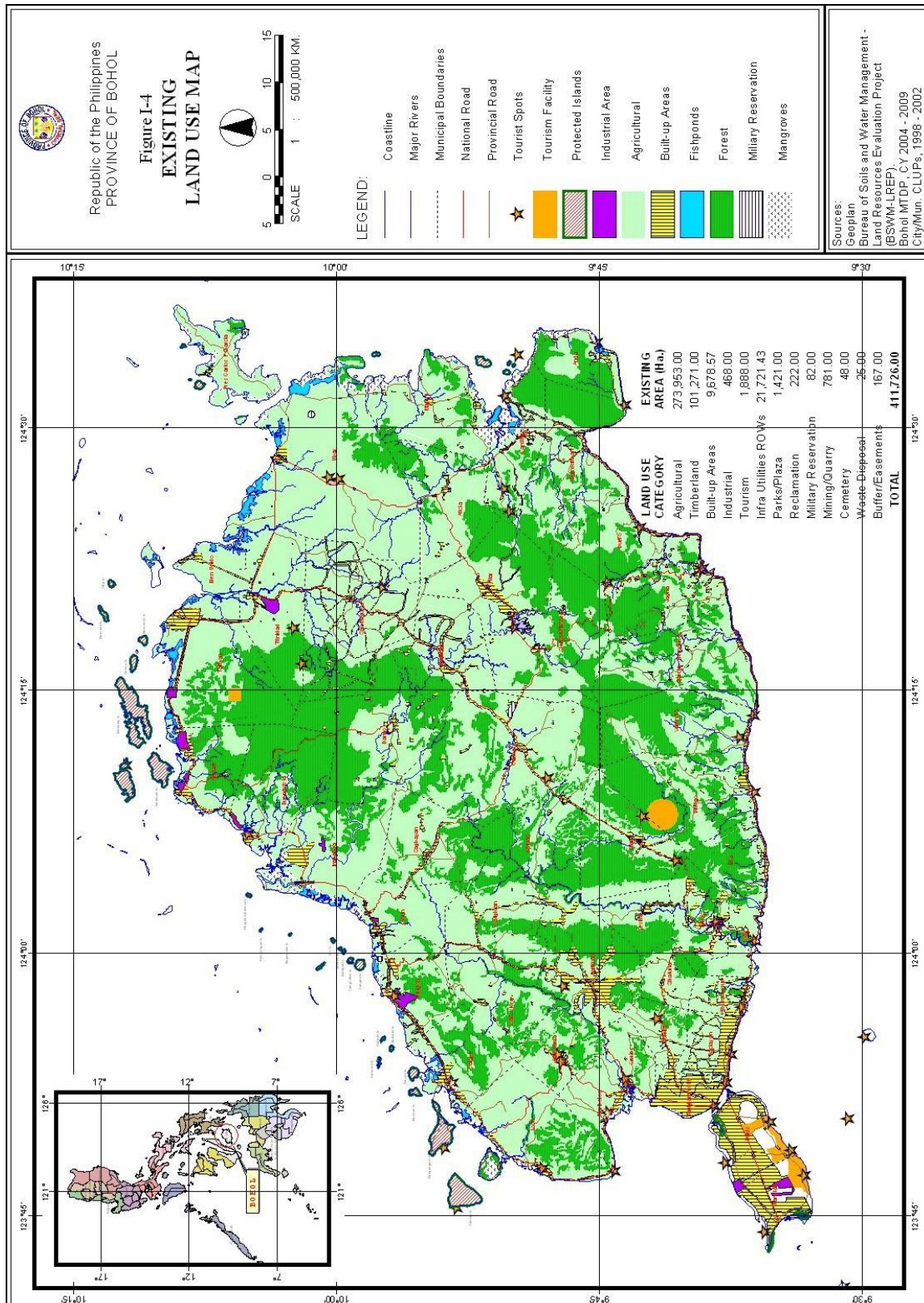
Approximately 167,160 hectares or 40.6% of the total provincial land area have slope gradients of 0-8%, largely covering the central to northern areas which comprise the prime agricultural zone utilized for irrigated and rainfed palay and corn production. The areas with 8-18% slopes accounted for 29% (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.





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

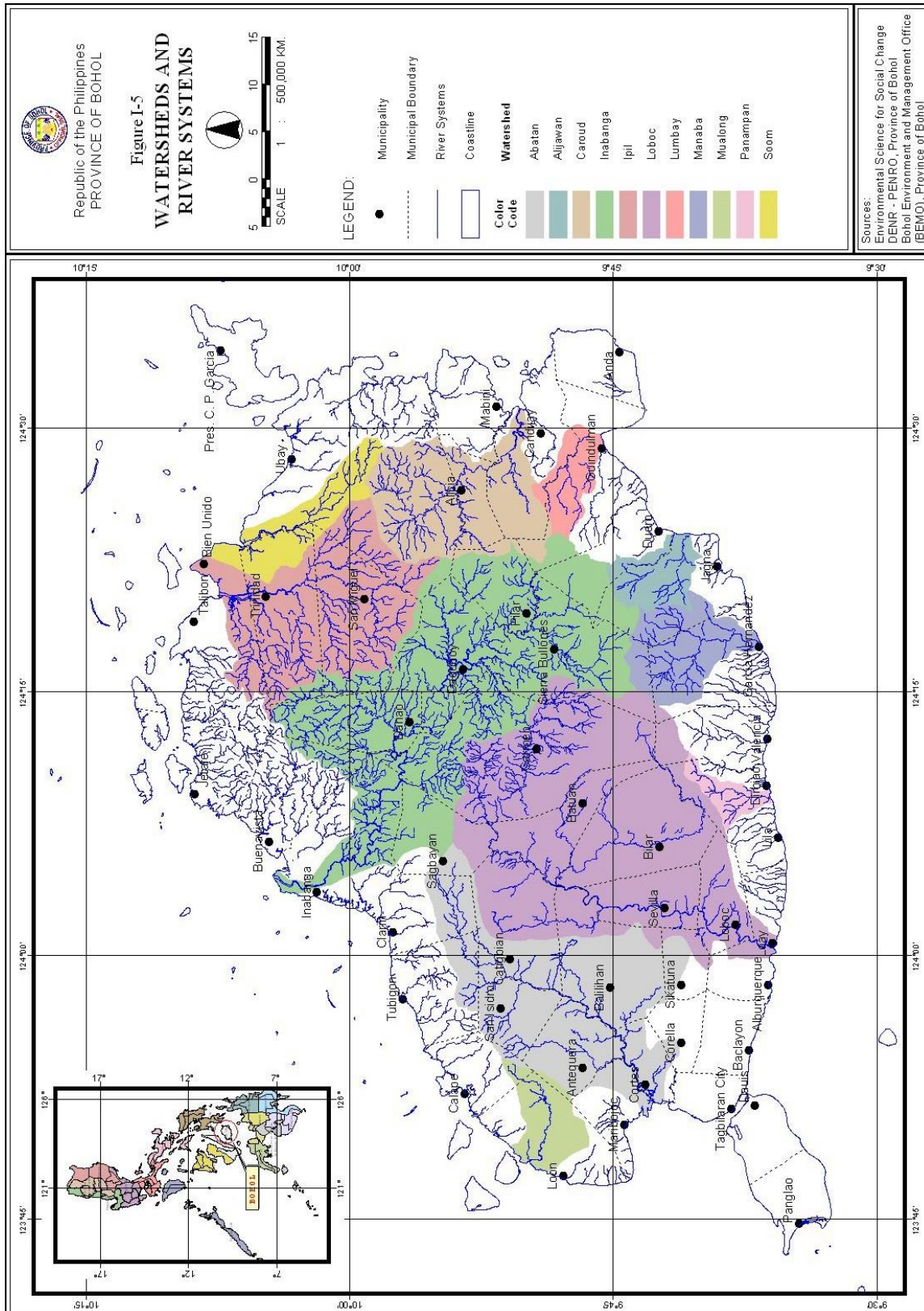
Big portion of Bohol's forestlands are set aside by the concerned national government agencies into multiple use zone to give opportunities for the community people living nearby forest and existing forest occupants to derive economic benefits thereat for their survival and, at the same time, share in 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.



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 Dipterocarpaceae, Leguminosae 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 Characteristics². 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 km² 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 km² (over 1% of the total coral reef area of the Philippines which is estimated at 27,000 km²). 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

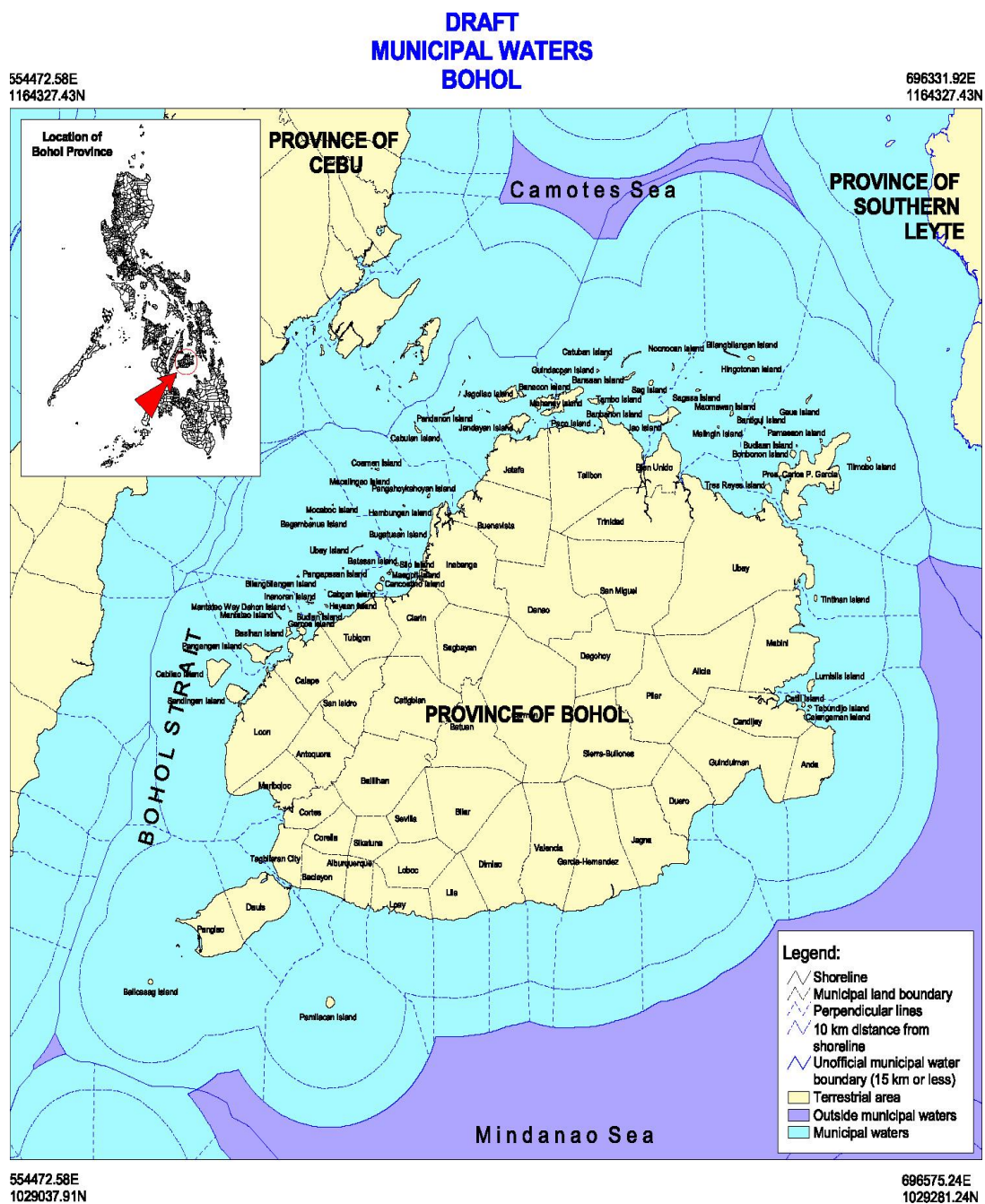
Bohol's inland water resources include 2,224 springs, 59 rivers, 200 creeks and river basins/watersheds which provide water for domestic and irrigation purposes. There are eleven (11) major rivers in Bohol fed by tributaries emanating from upland watersheds (refer [Figure I-5](#)). The river systems 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 m³ during the rainy season, which gradually decreases to 600,000 m³ 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 km² (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 km² 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.
 Banliad, Cebu City
 TeleFax: 032-231-6209
 March 2000

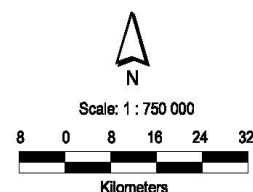


Table I-7. The Total Area of Different Fisheries Ecosystems Including Area Outside of Central Visayas, May 2005

Ecosystem	Coastline (km)	Total Ecosystem Area (km ²) (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.

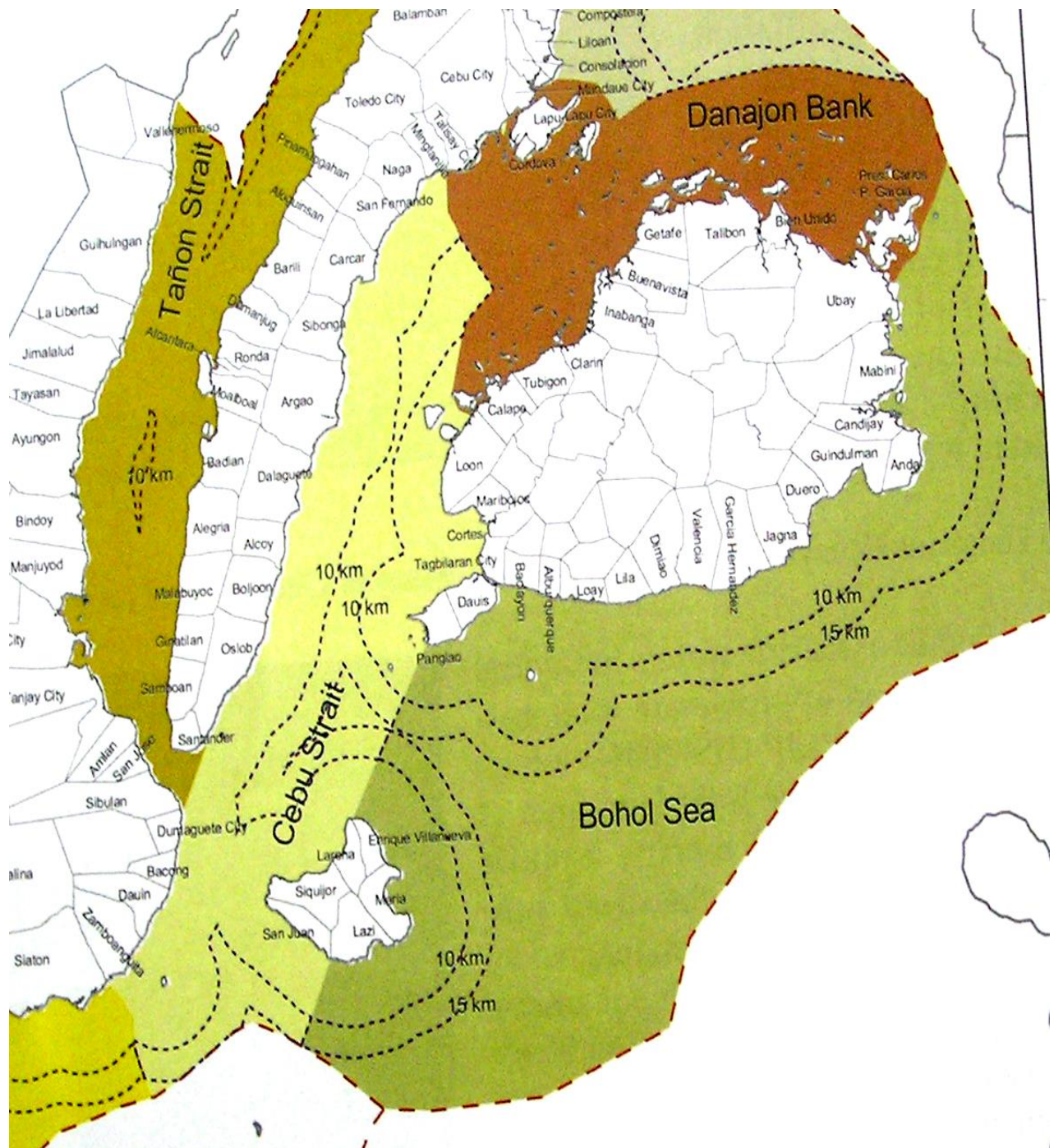
Cebu Strait, sometimes called as Bohol Strait, is the body of water separating the islands of Bohol and Cebu. The strait is relatively deep, with a maximum depth of about 306 m. It has a coastline of 342.4 km and a total area of 3,933 km². The strait has over 10.9 km² of mangrove cover dispersed along 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 diversified 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. Danaojon Bank in Northern Bohol, a documented double barrier reefs in the world, has a total area of 271.7 km² 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 Bocotol Prospect; 400 m. N of Bocotol, 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 Cabacnit Batuan Magaiga, Baucan Sur, Buyog, Datag, Saling & 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: 5 MT guano, 42 MT phosphate Tonnage: 3 MT 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, 600 MT phosphate Tonnage: 1 MT guano, 600 MT 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 Tonnage: 352 MT Tonnage: 70 MT
8. Phosphate	Dagnawan & San Roque (Sagbayan) Cabiawan Cave & Katiniog Cave, Basdio Guindulman	
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 provides 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-Hernandez, 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 km², followed by the municipalities of Dauis, Tubigon, Bien Unido and Baclayon ([Table I-11](#) and [Table I-A.11](#)). The least populated municipality is Balilihan with only 119 persons per km².

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

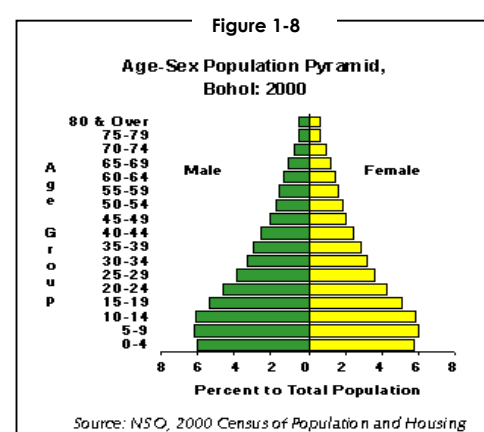
Table I-11. Top 10 Most Densely Populated Municipalities in Bohol Province, Year 2000

Municipality	Population Density (persons per square kilometer)
Bohol	300
Tagbilaran City	2,538
Davis	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

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.

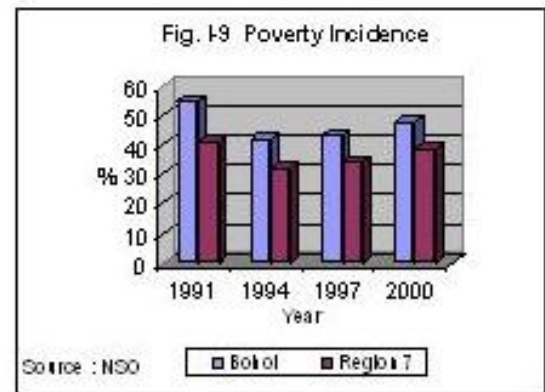
⁴ NSO-NSCB, 1995 Census-based National, Regional & Provincial Population Projections

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 Force⁷ 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

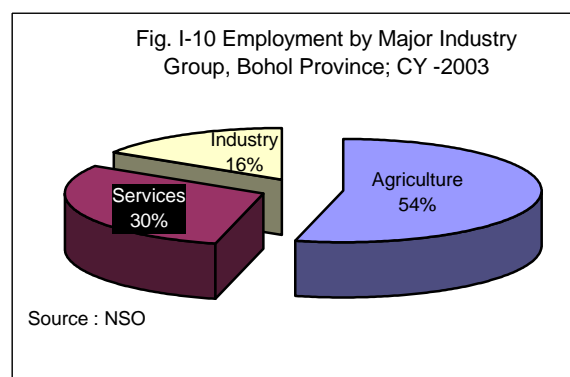
ITEM	CENSUS 2000		YEAR					
			2003	2004	2005	2010	2015	2020
Total Household Population 2000	1,134,733		1,210,481	1,236,094	1,262,339	1,403,639	1,563,472	1,744,492
Household population 15Years & Over 2002	716,000		771,364	785,540	800,053	877,990	965,773	1,064,766
			Projected Labor Force					
	2002	PR*	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
Unemployed	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).



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 1 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 3rd^h cause of death from year 1999 – 2003. The 9th cause of death is Septicemia and Diabetes ranked as the 10^h 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 ampalaya (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.

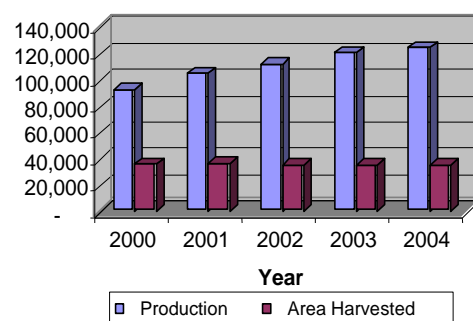
3.1.4 Coconut

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](#)).

Fig. I-11. Coconut Production and Area



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					Grand Total
		2001	2002	2003		2004	
		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 6 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

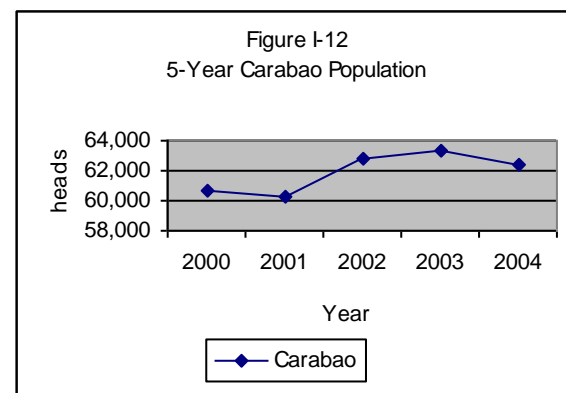
The ruminants are cattle, carabao, goats and sheep. Ruminant production is predominantly backyard and is usually done thru tethering and loose grazing under coconuts and open grasslands dominated by native growers like cogon and thimeda. Its population, based on the BAS data, increased by about 8% over 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](#)).

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.

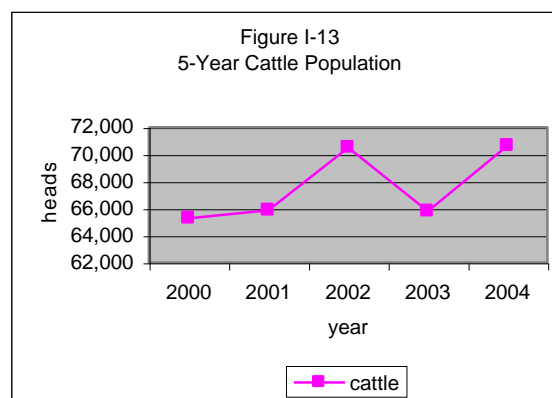


The inter-provincial movement of carabaos for the past 5 years posted an out-shipment of 11,132 heads with destinations to the provinces of Leyte and Cebu ([Table I-25](#)), while importation, which comes mostly from Negros Oriental, Cebu and Mindanao indicated a total of 6,707 heads. This importation 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							
I. Live	No. of heads						Origin
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.

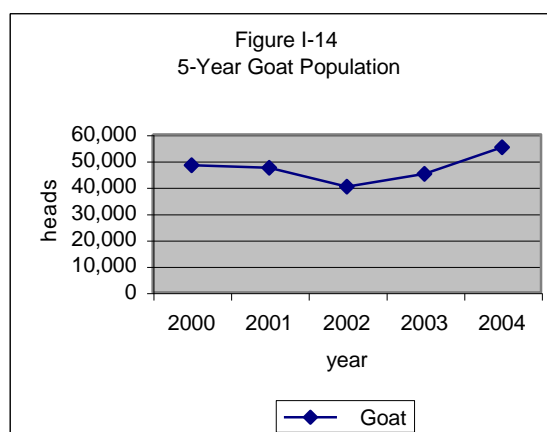
Table I-26. Total Livestock & Poultry Slaughtered by Type, Province of Bohol Years 2000-2004

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.



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

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.

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

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.

Figure I-15
5-Year Hog Population

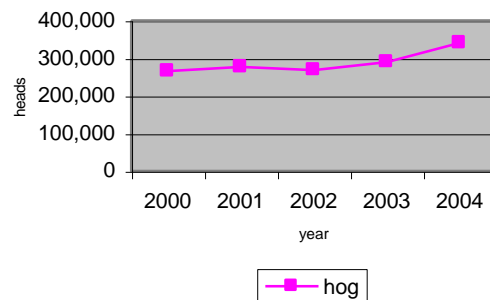


Figure I-16
Live Hogs and Pork shipped-out of Bohol

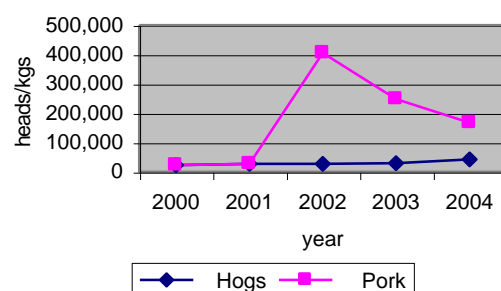
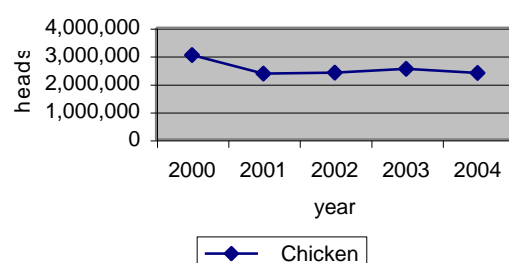


Figure I-17
5-Year Chicken Population



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	Davis
1	Lawag	1	2.70	1	Clarín
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	14	399.15	3	Tagbilaran
	Cargo	10	186.43	1	
	Drive-in-net	1	24.24	1	
8	Lawag	8	10.70	8	Tubigon
2	Lawag	2	5.38	2	Talibon
8	Ring net	1	25.50	1	Ubay
	Danish seine	7	23.49	4	
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.

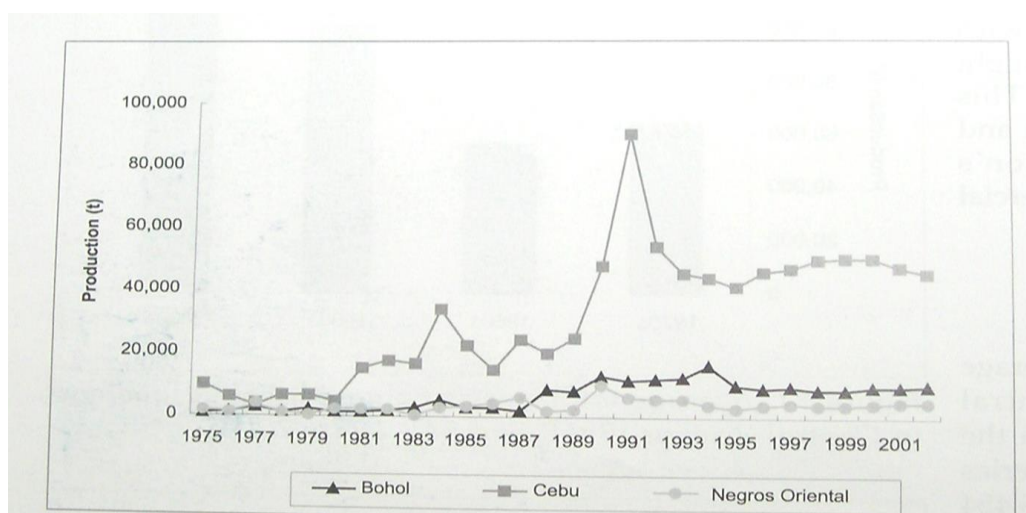


Figure I-18. Annual Commercial Fisheries Landings Trend, 1975-2002 (BFAR and BAS 1976-2002)

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. Since 1976, 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 Davis, 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, livestock 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 vacuum-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. Aumentado 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 complement 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 Tagbilaran.

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 157 POs – partners (OPV) (under LHB) People' Organization 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, Albuquerque 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 northern 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
Tagbilaran Bohol Enterprise Inc.	Tagbilaran City	25
Trinidad Ice Plant	Trinidad	15
Ubay Rock Steel Plant	Ubay	10
A & E Ice Plant	Talibon	5
Loring Ice Plant	Talibon	5
Poblacion Ice 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 (KALAH-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 KALAH! 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 Bullones 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 1,185 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, Davis, 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 through 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 Davis (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 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, leguminosaceae 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.

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.

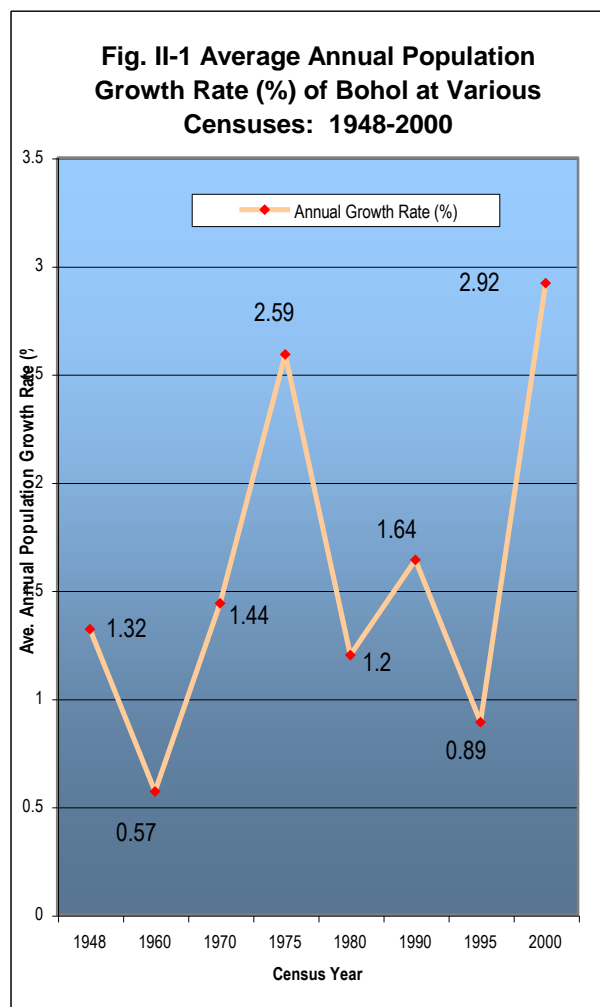


Table II-1. Population Increase Per Year, Bohol Province

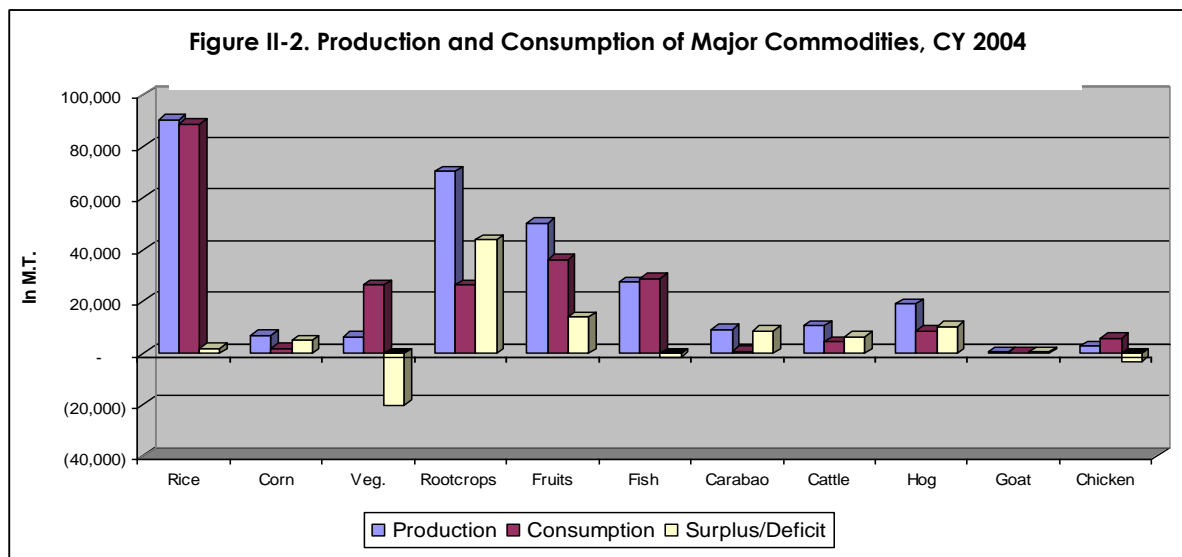
Censal Year	Interval Years	Population Difference	Population Increase Per Year
1903 – 1948	45	284,184	6,315
1960 – 1995	35	441,033	12,601
1996 – 2000	4	142,828	35,707

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 livestock, i.e., beef/carabao, pork and chevon.



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 SWEKO 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 m³/day. The current production is about 15,000 m³/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 m³/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 m³/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-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 m³/day) Based on Population, Urban and Rural, Province of Bohol; 1998-2010

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

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:

<u>Irrigation System/Project</u>	<u>Service Area (Ha)</u>	<u>% of Total</u>
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 pollinated 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 pollinated 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

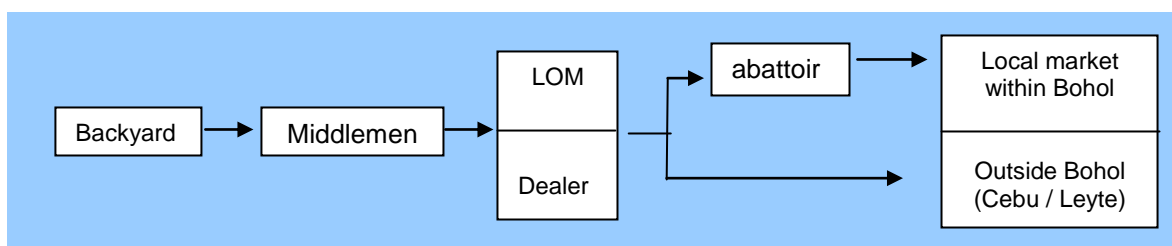
government and non-government organizations and the additional offspring production may have attributed the increase in the population in 2004.

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 “Okasyon” 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 care 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

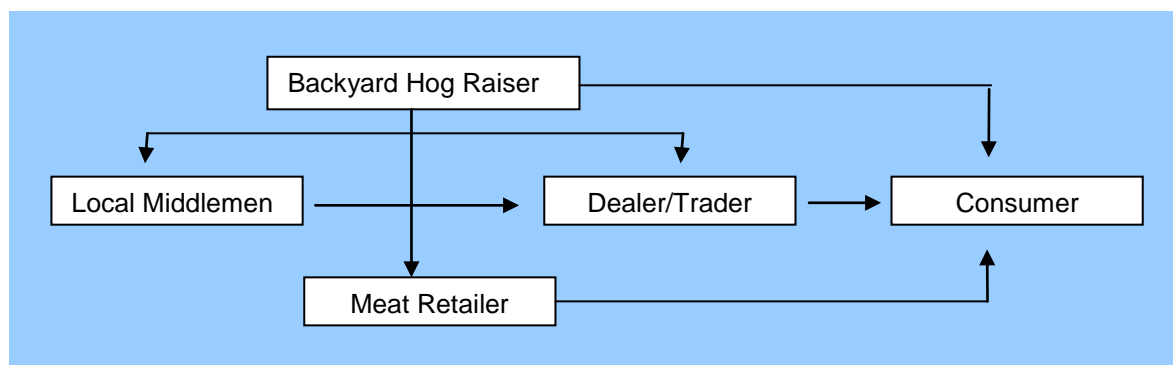
Importance. Swine raising is a very popular enterprise in Bohol. Almost every farmer household particularly in the rural areas raises swine more as fallback for cash during emergency than anything else. Very often, the farmer does not care much whether he earns from his project or not and seldom keeps 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 km² 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 km² and the Danajon Bank with 2,475.6 km², 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 livestock.

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 livestock, 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 CBFMA 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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: <ol style="list-style-type: none"> 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);

	<ol style="list-style-type: none"> 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	<ul style="list-style-type: none"> • 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 I 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.

PART III

PROGRAMS AND PROJECTS

1.0 INTRODUCTION

Responsive to the need for a proactive, directional and sustainable agriculture, the leadership of the Provincial Government of Bohol has initiated in partnership with Philippine Australia Human Resource Development Facility, through a technical assistance contract with OIDCI to provide leadership and guidance, the preparation of a 20-Year Bohol Agriculture Master Plan. The planning process involved a five-module training course over 60 days indoor and actual application sessions for the 15 technical staff from the Provincial Offices of Planning and Development (PPDO), Agriculture (OPA), Veterinary (OPV), Poverty Reduction Management (BPRMO) and Sangguniang Panlalawigan-Special Project Unit (SP-SPU). To ensure a sustainable agriculture productivity, its development integration with the natural resources must be adhered, hence, two (2) additional participants from the office of Environment and Management (BEMO) have to be accommodated in the Module 5 training session.

The twin purposes of the training for development planning are to (i) upgrade the skills and competencies of selected provincial technical personnel, and (ii) design and produce the Bohol Agriculture Master Plan, both designed to support the implementation of the priority agenda of the Provincial Government which is poverty reduction particularly in the rural production zone communities. This development initiative will contribute to attain the vision of the province towards **“a prime eco-cultural tourism destination and a strong agro-industrial province in the Visayas.”**

The training for agriculture master planning anchored on sound environmental principles as the foundation and insurance for the sustainable development and growth of the province. Primary consideration is the need to produce more food for an expanding population while simultaneously addressing the raw materials for agri-industrial development and the protection of the local environment. The agriculture master plan shall identify key production development interventions or a mix of priority programs and projects that shall be the basis for investment programming and promotion by the provincial government. At the municipal government level, the program shall provide direction for the succeeding detailed project implementation plan (PIP) preparation by their local technical working groups.

In the agriculture master plan preparation, the provincial training participants cum planning team has adopted a consultative approach through a four (4) step process, as follows:

Step 1: **Crafting the Resource Profile of Bohol.** This step provided the systematic understanding of the prevailing situation of the province by undertaking (i) inventory and assessment of available information, (ii) identification of data requirements and gaps, and (iii) gathering of data from secondary sources and from the PRRA surveys. These activities were facilitated under

Module 1- Principles and Area-based Development Planning and Assessment of Database training session.

- Step 2: **Resource Situation Analysis, Development Scenario and Strategies.** This involved the detailed analysis of the existing agricultural and natural resources situation as basis for defining the overall development context, the planning principles and strategies, and identification of the agricultural and natural resources development direction. Training Module 2 – Resource Scanning and Analysis, and Module 3 – New Technologies in Agriculture Enterprise Development facilitated the undertaking of these tasks by the planning team.
- Step 3: **Formulation of the Agriculture and Natural Resources Plan.** Based on the above steps and through Module 4 – Participatory Agricultural Development Master Plan Preparation sessions, the identification of potential programs and projects, i.e., high potential crops, poultry and livestock, fishes and marine species, forest trees and key resource/production zones, have been identified, distilled and prioritized. The optimum mix of priority programs and component projects have been described/defined, including the design of overall strategies to implement and finance the master plan.
- Step 4: **Consultation with the Stakeholders on the Agriculture Master Plan.** Under Module 5-Drafting and Marketing the Bohol Agricultural Development Master Plan, a series of consultation and validation workshops have been undertaken participated by the various stakeholders, i.e., City/Municipal Agriculturists and Chairperson of PAFC; City/Municipal Planning and Development Coordinators, selected NGAs and NGOs; City/Municipal Vice-Mayors and the SP/SB Members and Chairpersons of Committees on Agriculture, ENR and Budget/ Appropriations, City/Municipal Chief Executives and the Division Heads in OPA, OPV, BEMO and BPRMO; Provincial Chief Executive and the PDC-Executive Committee Officials; and Provincial Legislative/ Sangguniang Panlalawigan Officials. Each consultation event has been properly documented, and all relevant comments and suggestions of stakeholders have been incorporated into the final draft master plan.

2.0 PROJECT COMPONENTS

2.1 SUSTAINABLE INTEGRATED AGRIBUSINESS PROGRAM (SIAP)

2.1.1 Rationale

The assessment of the existing farming systems in representative wetland, dryland and highland areas of the province confirms that farmers are faced with technical, environmental and socio-economic constraints in improving the productivity of their farms (refer [Parts I and II reports and LPRAP document](#)). It appears that the poverty situation of the farmers, with fragmented and uneconomic farm size (ranging from 0.60 – 2.0 hectares) of landholdings limit the farming households' orientation to short-term production to meet basic food and cash needs. Crops production therefore remains at subsistence level.

In the dryland production zones, the physical constraints that farmers face are related to the physiography of the upland/hillyland, highly erodable/eroded soils in sloping areas as well as problems of excessive rainfall in the wet season and water deficit in the dry months. Against these constraints, the small farmers resort to continuous cropping of shallow-rooted seasonal crops thus exerting tremendous stress on their fragile land resource base. This is further compounded by weak implementation of pro-smallholder policies on credit, input-output pricing and technical support from relevant agencies.

The traditional approach of focusing on crop performance rather than on farming systems improvement accounts for the neglect of an environmental framework in both lowland and dryland agriculture. The same orientation has created a mind set among upland farmers that make them reluctant, if not apathetic, to adopt technologies based on soil and water conservation such as the SALT agroforestry schemes, organic farming through composting of farm wastes and crop-livestock integration, among others. In this context, the strategies for developing appropriate farming systems using environment-friendly and innovative technologies that would lead to agri-based enterprises over the long-term consider topographic variations and limitations, climatic factors, institutional limitations and the socio-economic aspects affecting farmers and/or their POs decisions on technology and investments.

2.1.2 Goals and Objectives

The SIAP shall be guided by the twin goals of poverty alleviation and agricultural resources enhancement. The conditions that will indicate the achievement of these goals are: (i) the sustained productivity and stability of the agricultural resource base; (ii) the positive changes in the socio-economic conditions of the farming households and their communities; and (iii) the productive engagement of POs and/or cooperatives/corporatives in viable agri-based enterprises.

Based on the timeframe of the project, the goals and objectives are disaggregated as follows:

<u>Longer – Term</u>	<u>Short to Medium Term</u>
<ul style="list-style-type: none"> Promote the sustainable use and management of agriculture resource base by the stakeholders and their communities; Increase the on-farm productivity and income of farmers; Optimize the productivity of areas suitable for agricultural development; Promote the development and growth of agri-based enterprises 	<ul style="list-style-type: none"> Establish a sound basis for specific resource-based agricultural interventions under the Bohol AMP; Develop and implement appropriate farming system models based on the agro-ecological attributes of the area and socio-economic potentials of farmers and their community; Support the POs on-farm improvements and livelihood project initiatives; Promote agrotourism projects anchored on strong partnership between the LGUs and the farming community and/or cluster POs;

Longer – Term

by POs and/or cooperatives/corporatives; and

- Institutionalize a pro-active support system from the LGUs, NGAs, LRIs and NGOs for the integrated development and management of the agricultural resource zone.

Short to Medium Term

- Provide or cause to provide the necessary support requirements of the agricultural development initiatives;
- Establish the management structure and operating systems for effective/collaborative planning, implementation and management of agricultural development activities;
- Improve the capacities of the lead and participating local units to undertake functions and responsibilities under the project; and
- Establish and nurture participatory mechanisms for the planning, implementation and management of the component projects.

2.1.3 Targets

As a major component of the Bohol AMP, the project's target for farming systems improvement will focus on the following:

- 57,700 lowland irrigated and rainfed palay farmers with farmholdings of 0.60 – 2.0 hectares;
- 23,100 upland farmers with small farmlots utilized in the production of corn, vegetables, ube and other root crops who accounts for 95% of the total farmers under this category;
- The Escaya tribe farmers and adjacent highland farmholders within Duero, Jagna, Sierra Bullones and Guindulman engaged in highland vegetables production;
- 10,500 coconut-based small farmholders who are members of the SCFOs and constitutes 25% of the total coconut producers for a target area of 15,000 hectares or 38% of the existing coconut lands; and
- 2,735 hectares of existing mango plantations and potential of 3,500 hectares small farmholdings (part of the OPV-white corn areas marginally suitable or unsuitable for corn) for the expanded mango-based farming systems development.

For the initial years, however, the backyard/homelot gardening schemes shall encompass the entire program coverage, with particular emphasis to poverty households and their communities, to effect improvements in nutritional levels of their food intake.

2.1.4 Operational Strategies

The following operational strategies have been identified to achieve the objectives of reducing rural poverty and improvement of farming systems and, over the longer-term, attain the development of agri-based enterprises by the farmers through their POs.

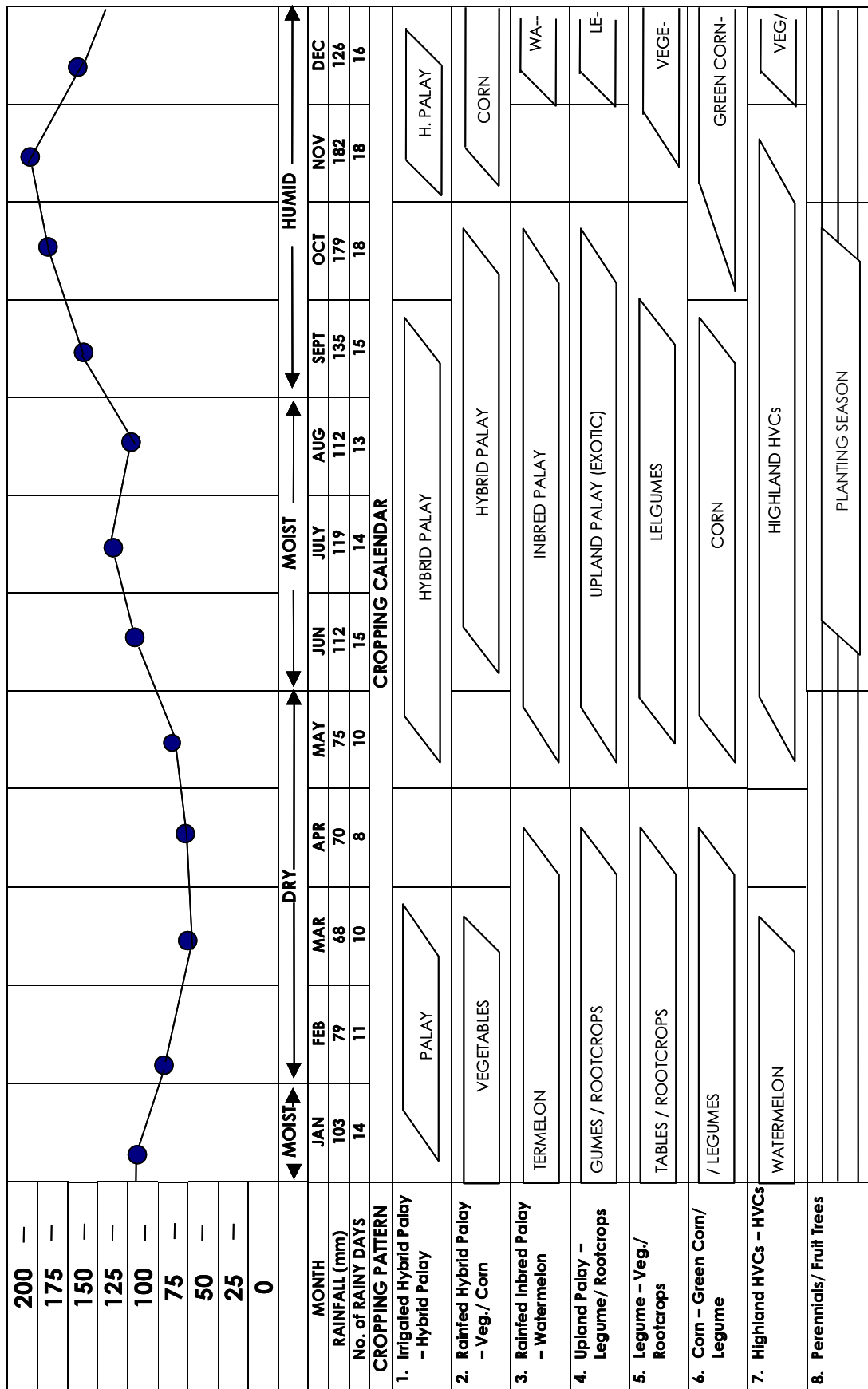
- 1) **Deliberate promotion of homelot vegetables gardening.** The homelot/backyard garden, which is not common in various landscapes of the province ranges from an elaborate production system of growing a variety of plants, including some flowering and evergreen ornamentals, to the simple raising of a few perennials/fruit trees next to the home. Backyard gardens are distinguished from other sedentary cropping because their location close to the home allows more intensive management. Fertility of the soils is generally much better than the farmlots because the small area (of about 20 sq.m. to 200 sq.m.) receives greater portion of organic wastes from the kitchen and livestock. Domestic water supplies often permit some watering of vegetable crops throughout the growing season. Its proximity to the home also permits more intense management of crops by better pest control, timely harvest and deterrence to pilfering.

Backyard biointensive gardens (BIG) will primarily provide stable supply of high nutrient vegetables for the family. There is also potential contribution to ensuring periodic income source, thus improving the cash flow position of rural households.

The promotion for backyard vegetables gardening shall form part of the CO/CD process (i.e., incorporation into the Barangay Development Plan and Community Action Projects), and will entail direct support under the SIAP component.

- 2) **Priority focus on farmlots devoted to cash crops and for diversified cropping systems later.** On the issue of farmers' subsistence cropping, the strategy will be to assist them achieve reasonable returns from cash crops first so that they can devote efforts on diversification cropping systems. For contiguous small/uneconomic farmholdings, the compact farming or farm clustering (refer [Table III-1](#)) will be promoted to establish cooperative type farming systems and enterprises.
- 3) **Microwatershed-based development in dryland zones for economies of scale and ecologically meaningful farming systems.** To address the issue on fragmented farms in the dryland resource zone (i.e., devoted to corn, ube, coconut, mango and other crops), the appropriate approach would be farm clustering or community farming to achieve economic production unit or volume for key crops which could be tied up to marketing and/or agri-based processing enterprise. A microwatershed, which is generally occupied by 10 to 25 farmers, can be most meaningful spatial unit because of its ecological significance.

Figure III-1 Recommended Cropping Calendar based on Mean Monthly Rainfall and Average Number of Rainy Days (Bohol Conditions)



- 4) Focused development of agri-based enterprises by POs and/or cooperatives/corporatives.** Under Bohol conditions and similar to most rural areas of the country, real profits from agriculture development is least in the farm production process as compared to profit margins derived from product marketing and post-production processing ventures. The promotion of rural agri-based enterprises will likewise ease too much pressure on the land resources due to intensive cultivation, and available labor can be channeled to non-farm activities. The cluster POs, through their cooperatives/corporatives will be encouraged to invest in viable second-generation enterprises which would assure farmer-members the market for their produce, thus eliminating their worries about subsistence requirements of the household.

The focused and directional strategies for the crops sub-sector development under the Bohol AMP is summarized in [Table III-1](#). Departing from the traditional agriculture development planning approach, it provides for both spatial and temporal direction of the agricultural production processes — from the present subsistence level to farming systems and, over the longer-term, its transformation into viable agri-business ventures. The strategy is anchored on the market and potential for local processing of selected crop commodities, the development time frame of the critical support services and facilities to be provided and, most important, the present capabilities of the farming household and their communities and their “guided growth and development” into matured and enterprising POs and/or cooperatives/corporatives.

Table III-1. Matrix of the Sustainable Integrated Agribusiness Program (SIAP) Strategies and Project Packages for Bohol

LEVEL	SHORT TERM (Years 1 to 5)	MEDIUM TO LONGER TERM (Years 6 to 20)
Program Development Agenda	<ul style="list-style-type: none"> Food security and better nutrition for the farming households Network demonstration/Promotion of farming systems and technologies that are environment friendly and high income-generating ventures Strengthening/Expansion of support services and facilities 	<ul style="list-style-type: none"> Increased farm labor employment and income Development/Expansion of sustainable agribusiness enterprises (lowland, upland & highland) Nurturing the participatory management of the agricultural development support systems Engagement of POs/ Cooperatives/Corporatives in agribusiness ventures
Project Packages	1. Enhanced Grain Crops Production <ul style="list-style-type: none"> Irrigated Palay Farming <ul style="list-style-type: none"> Hybrid Palay – Inbred Palay Rainfed Palay-based Farming System <ul style="list-style-type: none"> Inbred Palay – Vegetables Inbred Palay – Corn Demo on Year-round Organic Farming HVCs and Mushroom Production Corn-based Farming System <ul style="list-style-type: none"> Corn – Veg./ Rootcrops 	1. Intensive Grain Crops Farming System <ul style="list-style-type: none"> Intensive Palay-based Farming System <ul style="list-style-type: none"> Inbred Palay – Inbred Palay Semi-Organic Hybrid Palay – Hybrid Palay Inbred Palay – Fish FS ARC/IAs Palay Milling Enterprise Rainfed Palay – based Diversification <ul style="list-style-type: none"> Inbred Palay – Vegetable/ Watermelon/Mushroom Enterprise

LEVEL	SHORT TERM (Years 1 to 5)	MEDIUM TO LONGER TERM (Years 6 to 20)
	<ul style="list-style-type: none"> – Corn – Green Corn – Promotion of Upland Palay (Exotic variety) Production 	<ul style="list-style-type: none"> – Inbred Palay – Corn (Hybrid Yellow/OPV White) – Sheltered Organic HVCs Enterprises ▪ Corn-based (semi-organic) Farming System ▪ Development of Upland Palay (Exotic variety) – Legumes Farming Systems
	2. Highland Vegetables Farming System (Integration of Project into CADC Management Plan) <ul style="list-style-type: none"> ▪ Open Field Organic Vegetables <ul style="list-style-type: none"> – Baguio bean – Cabbage/ I. potato – Tomato – Lettuce/Carrot – Melon/Strawberry 	2. Diversified Highland HVCs Enterprise of Tribal Coops/ Corporatives <ul style="list-style-type: none"> ▪ Open Field Organic HVCs FS <ul style="list-style-type: none"> – Vegetable (Cabbage/ Carrot/ Irish Potato/ Baguio Bean/ Sitsaro/ White Bean) – Tomato/ Melon/ Strawberry – Contour Strip Trees (A. coffee/Mandarins) ▪ Sheltered and Organic HVCs Enterprise <ul style="list-style-type: none"> – Tomato/ Lettuce/ Cauliflower – Melon/ Strawberry – Cutflovers and condiments ▪ Integration of Ruminant Livestock
	3. Coconut-based Farming Systems <ul style="list-style-type: none"> ▪ Coconut Replanting and Intercropping ▪ Demonstration/Promotion of Multi-storey Cropping and Coco-Livestock Farming Systems ▪ Piloting Coconut Products/By-Products Processing and Utilization 	3. SCFOs Cluster Farms Coconut-based Enterprises <ul style="list-style-type: none"> ▪ Multistorey Farming Systems (banana/ pineapple/ legumes) ▪ Coco-Livestock & Forage Pastures ▪ Tuba-Bahalina/ Vinegar ▪ Coco coir/charcoal processing ▪ Coco-based handicrafts
	4. Expanded Mango-based Farming Systems <ul style="list-style-type: none"> ▪ Expansion of 'Carabao' Mango Plantations ▪ Demo/ Promotion of Mango – Livestock and Forage Pastures FS ▪ Pilot/ Demo on Mango Processing 	4. Mango-based (Cluster Farms) Enterprise Development <ul style="list-style-type: none"> ▪ Mango – Livestock/ Forage Pasture Cluster Farms Enterprise ▪ Cluster (Smallholders) Mango-based Processing Ventures <ul style="list-style-type: none"> – Mango puree/ juice/ confections
	5. Hillyland Resource Development <ul style="list-style-type: none"> ▪ Expanded SALT Agroforestry Development for Settlers ▪ Demo/ Trials on Selected Crops and Cropping Systems <ul style="list-style-type: none"> – Fiber Crops (Salago/ Maguey/Pineapple) – Mulberry for Silkworm Culture – Other indigenous/ introduced/potential crops and cropping systems 	5. Sustainable Hillyland Farming Systems <ul style="list-style-type: none"> ▪ Contour Strip Perennials/ Fruit Trees + Alley Cropping System <ul style="list-style-type: none"> – Upland Palay – Legumes – Ube ▪ Agro-Livestock Farming Systems ▪ Development of Cluster Farms/ POs Enterprises (based on the result of trials)

2.1.5 Component Description

A. Enhanced Grain Crops Farming Systems

1) Brief Situationer of the Resource Zone

The grain crops production zone in Bohol is estimated at 61,882 hectares, or approximately 33% of the total agricultural lands and 15% of the province' land area (refer [Table I-2 of Part I report](#)). Grain crops area comprise of the lowland irrigated palay with 15,732 hectares, rainfed palay-based in 30,855 hectares, upland palay in 925 hectares and 15,295 hectares corn-based areas. About 80,943 farming households are involved in grain crops farming. This represents 38% of the total households in the province and 71% of the total farming households.

In the lowland irrigated palay areas, the present yield of 3.89 metric tons per hectare per cropping is quite low although yield levels of hybrid palay obtained from pilot cum demonstration farmlots showed very encouraging results. For rainfed palay areas, low yield (1.81 metric tons per cropping) is attributed to lack of controlled irrigation water, which cannot be provided because of technical and economic reasons, and low production inputs. Low palay productivity may have brought about the planting of alternate crops after the regular rice crop, which basically translates to crop diversification strategy of farmers.

The open arable dryland zone (at 3-18% slopes) are utilized to corn and other crop types. Corn is planted as first crop while the alternate crops include vegetables (i.e., squash, legumes) and rootcrops such as cassava, ube, gabi, and camote. The yield of corn particularly the OPV-white type is very low because about 30% of the area is marginally suitable or unsuitable for corn production due to inherent resource limitations. In the central and northern parts of the province, the succeeding crops after corn are called "gamble crops" because of the greater risk posed by rainfall uncertainties. Some farmers simply leave their farmlots idle or under fallow period after the corn crop.

Upland palay is traditionally the first crop of forest settlers. It is planted after clearing of undergrowth and cutting/de-branching of remaining tree stands. With the passage of Bohol's Environment Code together with its implementing rules and regulations (IRR), the slash-and-burn farming in forestlands have been substantially reduced. At present, planting of upland palay is limited to small farmlots in various locations but its potential for development as sedentary farming system in highly suitable resource areas is quite high.

2) Objectives

The objectives of this component are to:

- (i) increase land productivity in terms of crop production and intensity of use;
- (ii) enhance the food supply capacity of highly suitable lands;
- (iii) improve grain crops farming systems;
- (iv) increase the income of farmers; and
- (v) promote grain crop-based agribusiness ventures of cluster POs and/or cooperatives.

3) Target Areas and Project Participants

- 21,682 palay farmers and their POs/Irrigators Associations in 15,732 hectares fully irrigated ricelands and 5,300 hectares potential irrigable areas of BIP Stage II;
- 36,098 rainfed palay farmers and their cluster POs in 30,855 hectares rainfed palay-based areas;
- 23,163 corn farmers in 15,295 hectares corn areas (1,319 hectares Hybrid corn and 13,974 hectares of OPV-white corn varieties);
- The upland palay farmers with about 925 hectares of upland farmlots.

4) Farming Systems Improvement

(1) Intensive Palay Farming Systems will be promoted in ricelands with dependable irrigation systems (refer [Table I-19 of Part I report](#)). These prime ricelands are currently irrigated by national irrigation systems (NIS) specifically Bohol Irrigation Project Stage I (Malinao Dam), Capayas Irrigation System and 215 communal irrigation systems (CIS). These areas are the prime palay production zone and accounts for 92% of the total irrigated palay areas of Bohol.

Most of the irrigated ricelands have been covered under the DAR-Comprehensive Agrarian Reform Program (CARP) and generally characterized as fragmented farmlots ranging from 0.6 to 2 hectares per farmer beneficiary. Farmers are members of the Agrarian Reform Beneficiaries Association (ARBA), a number of which have formed multipurpose cooperatives and are engaged in other income generating projects. On the other hand, farmers served by CIS have their Irrigators Association (IA) charged to operate, manage and maintain their own irrigation system.

Through these ARBAs and IAs, the project shall promote innovative and tested strategies to improve their members' subsistence palay production into viable farming systems. For contiguous small-size and uneconomic farmlots, the strategy will involve development of compact or cluster farm schemes and adoption of cropping system technologies both for inbred and hybrid palay production.

The evolving paradigm for irrigation water systems — **from support infrastructure to a management tool for mitigating rainfall imbalances affecting agricultural production**, would mean adjustment in cropping calendar and adoption of better cropping systems particularly in the irrigated ricelands (refer [Table III-1](#) and [Figure III-1](#)). Per the DA-El Niño Recovery Program, the hybrid palay-hybrid palay cropping pattern is possible for the lowland irrigated ricelands of the province.

Over the medium to longer-term period, the semi-organic hybrid palay-hybrid palay farming system is recommended to maximize productivity at lesser input costs. Based on the Bureau of Soils and Water Management

(BSWM) on-farm trials,¹ hybrid palay applied with adequate fertilizers (e.g., 6 bags urea and 2 bags complete) and proper management yielded 10 metric tons per hectare and, more surprisingly, retained at least 30% of nutrients in rice parts left in the field, i.e., roots, straw, leaves, chaffs. Field composting trials on rice wastes using beneficial micro-organisms/bioenzymes + lime and molasses resulted in fast decomposition within 17 to 23 days. The implication of these findings are (i) savings in commercial fertilizer inputs by 30% per succeeding croppings, (ii) at least two palay croppings per year, and (iii) high productivity can be sustained over time.

Palay farmers, through their ARBAs and IAs, will be encouraged to grow a single rice variety per cropping in their cluster farm so that they can engage in palay milling and marketing ventures. This scheme will enable their POs/cooperatives to produce quality whole grain rice that can compete with imported rice and/or reduce quality rice imports. This will, however, need more detailed studies to determine its viability.

On the assumption that the Bohol Irrigation Project – Stage II will be completed within the medium-term, the total palay areas with dependable irrigation water will increase to approximately 21,032 hectares. With two (2) cropping intensities, the recommended irrigated palay production schemes will be as follows:

- (a) Inbred palay – Inbred palay (Mapalad var.) cropping system in 12,932 hectares; and
- (b) Hybrid palay – hybrid palay (semi-organic) cropping system in 8,100 hectares or about 40% of the total irrigated ricelands.

The analysis provided in [Table III–2](#) show that the adoption of this irrigated palay production system will result as follows:

- i) The total palay production (excluding the rainfed palay-based production) will more than double in volume from the present 111,515 tons to about 245,647 tons, which translates to an increase in gross revenue from P917.38 million to about P2.06 billion (approximately P865.0 million in gross farm income for palay farmers).
- ii) The semi-organic production system for hybrid palay showed a high value/cost ratio at 2.63; about 65% increase from the present production system. On per hectare basis, the estimated net income is approximately P39,705 per cropping cycle or P79,410 per year at two cropping intensities.

¹ Personal communication with Dr. Rogelio Concepcion, Director of BSWM; Module II: Resources Scanning and Analysis Session, Bohol Tropics Resort Hotel, Tagbilaran City (April 18-22, 2005)

Table III- 2. Effect of the Proposed Intensive Palay Farming Systems on Annual Palay Production and Income, SIAP Component of Bohol AMP

Situation	Area (Ha)	Total Yield (mt)	Gross Revenue (P'000)	Production Cost (P'000)	Value/Cost Ratio
1. Present					
▪ In. Palay – In. Palay	15,582	110,320	907,933.6	676,788.6	1.34
▪ H. Palay – In. Palay	150				
>H. Palay		664	5,677.2	3,315.0	1.71
>In. Palay		531	4,370.1	3,257.5	1.34
2. Potential					
▪ In. Palay – In. Palay	12,932	124,147	1,021,729.8	545,730.4	1.87
▪ Semi-organic					
H. Palay – H. Palay	8,100	121,500	1,038,825.0	395,604.0	2.63
Assumptions used:					
Commodity/Situation	Yield/Ha. (mt)	Market Price (P/kg)	Production Cost/Ha. (P)		
1) Inbred Palay					
▪ Present	3.54	8.23	21,717		
▪ Potential	4.80	8.55	21,100		
2) Hybrid Palay					
▪ Present	4.43	8.55	22,008		
▪ Potential: Semi-organic Hybrid Palay	7.50	8.55	24,420		

(2) Rainfed Palay-based Diversification. For the rainfed palay areas, crops diversification will be the key strategy involving the highly suitable compact/cluster farms of farmer groups and/or their POs. Based on the rainfall normals (i.e., average monthly rainfall and number of rainy days) shown in [Figure III-1](#), a number of high value crops are possible for planting after the regular inbred rice crop. The recommended alternate crops include fruit vegetables such as squash, upo, eggplant, okra and tomato. Watermelon and green corn + pole/bush sitao are also viable alternate crops. Leafy vegetables, however, will not be encouraged because lowland grown vegetable types cannot compete in terms of quality with those grown in the cool highlands (refer [Section 3.1.5-B: Diversified Highland HVCs Enterprise component](#)).

Over the longer-term, the POs and/or cooperatives operating highly suitable and economic size rainfed cluster farms will be encouraged to invest in the development of greenhouses and tunnel-type shelters for year-round organic culture of selected HVCs including mushroom production. It is very likely that enterprising POs and/or cooperatives may eventually shift their farm ventures into year round HVCs farming systems in open field, which will generate better income level compared to rainfed palay.

Over the medium-term, approximately 5,300 hectares of rainfed areas will be provided with irrigation water under the Bohol Irrigation Project – Stage II. The proposed small water impounding projects (SWIP), concrete diversion dams (CDD) and small farm reservoir (SFR) structures also target about 1,200 hectares service area. Based on the past trends on shift in

land use, about 10% of the total rainfed resource is anticipated to be converted to other land uses. Hence, the net rainfed palay-based area of 21,000 hectares are proposed for the following production systems:

- (a) Inbred palay – Hybrid corn cropping system in 12,000 hectares;
- (b) Inbred palay – HVCs in 6,500 hectares suitable areas (i.e., 3,900 hectares mongo/legumes, 1,200 hectares each for squash and eggplant, and 400 hectares watermelon after the regular palay crop); and
- (c) Inbred palay – Fallow period allocation of 2,500 hectares yearly. This appreciates farm-level situation when farmers, for one reason or another, are unable to cultivate and plant their farmlots.

Table III-3 provides the analysis of production volume and income level that can be derived in the adoption of rainfed palay-based farming system models. A summary is given below:

- (i) The total rainfed palay production will increase from the present 55,832 metric tons to about 69,372 metric tons, or an increase in gross revenue from P477.36 million to P593.13 million (approximately P115.76 million in gross farm income).
- (ii) The total annual added income derived from selected crops included in the rainfed palay-based farming system models is approximately P665.20 million; about 52% or P345.6 million derived from the Hybrid yellow corn and P285.6 million from vegetables/legume and watermelon crops.
- (iii) The aggregated added income from rainfed palay-based farming systems is significantly improved from P499.8 million to approximately P1,258.3 million, or an increase of 152% (P758.5 million) in annual gross farm income.

Table III-3. Analysis of Production Volume and Income Level Resulting from Adoption of Rainfed Palay-based Farming System Models, SIAP Component of Bohol AMP

Situation	Area (Ha)	Total Yield (mt)	Gross Revenue ('000)	Production Cost (P'000)	Value/Cost Ratio
1. Present					
▪ Inbred Palay	28,860	52,236.6	446,617.80	468,542	0.95
▪ In. Palay – OPV Corn	1,458				
> Palay		2,624.4	22,438.62	23,671	9.47
> White corn		1,195.6	11,956.00	31,803	0.37
▪ Inbred Palay – Vegetable					
> Palay	537	972.0	8,310.60	8,718	0.95
> Eggplant	(488)	683.4	8,200.80	8,403	0.97
> Squash	(49)	303.8	2,430.40	1,206	2.01

Situation	Area (Ha)	Total Yield (mt)	Gross Revenue ('000)	Production Cost (P'000)	Value/Cost Ratio
2. Potential					
▪ In. Palay – HVCs	14,000				
> Palay		43,200.0	369,360.00	295,400	1.25
> Hybrid corn	(12,000)	38,400.0	345,600.00	321,600	1.07
> OPV white corn	(2,000)	3,400.0	34,000.00	48,400	0.70
▪ Inbred Palay – HVCs	5,800				
> Palay		20,880.0	178,524.00	122,380	1.46
> Mung bean	(3,000)	2,700.0	43,200.00	48,900	0.88
> Eggplant	(1,200)	7,200.0	86,400.00	26,400	3.27
> Squash	(1,200)	12,000.0	96,000.00	29,544	3.25
> Watermelon	(400)	6,000.0	60,000.00	11,120	5.39
▪ Inbred Palay - Tallow	1,470				
> Palay		5,292.0	45,246.60	31,017	1.46

Note: Refer Appendix III –1 for detailed assumptions.

(3) Corn-based Farming Systems. The importance of corn in the maintenance of food security in the rural communities of Bohol cannot be ignored being the staple food of 18% of the population. Yellow corn is the base ingredient of locally produced animal feeds and the current production level is way below the requirement. Based on the available production data and field observations, significant areas presently utilized for corn crops have undergone advanced stages of soil erosion and fertility depletion since the areas are marginal if not totally unsuitable, for corn grain production.

This production scheme provides three (3) key strategies in increasing the production levels, namely: (i) limiting corn production to the most suitable sites considering land elevation, slope gradient and soil attributes; (ii) increasing the cropping intensity as provided in [Figure III-1](#); and (iii) adoption of the rainfed palay – corn production system presented previously. The initial analysis of the climate particularly rainfall pattern in the target production zones showed at least two (2) cropping intensities are possible. From these, the corn-based production models are as follows:

- (a) Hybrid corn – Hybrid corn cropping system in 6,500 hectares;
- (b) OPV white – OPV white corn cropping system in 3,400 hectares; and
- (c) OPV white corn – alternate crops, i.e., mung bean, peanut, sweet potato and squash cropping systems in 3,100 hectares.

The initial analysis of production and income levels shown in [Table III-4](#) show that the adoption of the recommended corn-based farming systems will generate the following benefits:

- (i) The present corn areas of 15,293 hectares could be reduced by 15%, or about 13,000 hectares without any significant effect on the production and income levels. These retained areas are the suitable to highly suitable areas for corn production, with slopes of 3% to 18% only.

- (ii) Significant increase in production volume from 22,810.7 metric tons to 59,420 metric tons (excluding the production level of 41,800 metric tons under the rainfed palay-corn production scheme), or a considerable gain of approximately P330.27 million in gross farm incomes and in more sustainable farming locations for corn grain production. If the alternate crops will be considered, farmers would derive added gross income from legumes, sweet potato and squash of approximately P132 million annually.
- (iii) The value/cost ratio dramatically improved from the present 0.75 to a range of 0.90 to 2.14. Under the proposed corn-based farming system models, the total production cost is estimated at P378.52 million compared to the total gross revenue of about P684.6 million for a value/cost ratio of 1.8 and net revenue of P306.8 million for the corn farming communities.

Table III-4. Production Volume and Gross Income Level Derived from the adoption of Corn-based Farming System Models, SIAP Component of Bohol AMP

Situation	Area (Ha)	Total Yield (Mt)	Gross Revenue (P'000)	Prod'n Cost (P'000)	Value/Cost Ratio
1. The Present					
▪ Hybrid corn – H. Corn	1,319	5,777.2	51,994.80	35,344	1.47
▪ OPV white – OPV	6,750	11,070.0	110,700.00	147,238	0.75
▪ OPV white – Legumes	774	674.7	6,747.00	16,883	0.40
➢ White corn	384	226.6	3,625.60	4,781	0.76
➢ Mung bean	390	241.8	5,803.20	5,694	1.01
➢ Peanut	6,450	5,289.0	52,890.00	140,694	0.37
▪ OPV white – Fallow					
2. The Potential					
▪ Hybrid corn – H. corn	6,500	41,600.0	374,400.00	174,200	2.14
▪ OPV white – OPV	3,400	12,240.0	122,400.00	82,280	1.48
▪ OPV white – Alternative crops	3,100	5,580.0	55,800.00	61,620	0.90
➢ White corn	1,000	900.0	14,400.00	16,300	0.88
➢ Mung bean	1,500	3,300.0	79,200.00	31,200	2.53
➢ Peanut	300	1,800.0	14,400.00	5,535	2.60
➢ S. potato	300	3,000.0	24,000.00	7,386	3.24
➢ Squash					

Note: Refer Appendix III - 2 for detailed assumptions used.

B. Diversified Highland High Value Crops (HVC) Enterprise

The rapid expansion and increasing population in Bohol particularly Tagbilaran City, and the nearby Metro Cebu and urban growth centers in the Visayas, would definitely cause significant and sustained increases in the demand for organically produced, good quality and fresh vegetables. This increasing demand provides the opportunity for both lowland and highland vegetable growers to improve their on-farm production system.

Vegetable production in the province is gaining popularity. In rainfed areas, the present vegetable production are, in most cases, the second or alternate crops

after the regular corn or rainfed palay crops (refer [Section 3.1.5 \(A\) Enhanced Grain Crops Farming System](#) report). Vegetables grown in these areas are heavily applied with inorganic fertilizers and chemical sprays. Moreover, the greater volume of vegetable produced are squash, eggplant, upo and ampalaya which are bulky produce and prone to drastic price fluctuations in the local markets.

1) Diversified Organic HVCs Farming Systems

Based on the land resources suitability assessment, the cooler highlands offer the best environment for growing a wide variety of HVCs, especially the semi-temperate and high value crop types. The best location is the Escaya Tribe CADC area covering 3,172 hectares that straddle the municipalities of Duero, Guindulman, Jagna and Sierra Bullones. Consistent with the CADC Management Plan (if this is existing and approved, otherwise the Tribal folks must be assisted to prepare such plan incorporating this project component), approximately 950 hectares or 30% of the total CADC area would reasonably comprise the multiple use zone. There are also highland farms adjacent to or near the CADC area which are potential sites for HVCs production system. These highland agricultural zone, with elevation range of 500-750 meters above mean sea level, is a fragile ecosystem yet highly suitable for HVCs culture, provided appropriate soil and water conservation (SWC) schemes are provided.

For the high suitability areas within the CADC of Escaya tribe, the proposed farming system models are as follows:

- (a) HVCs – legumes cropping system in 250 hectares; and
- (b) HVCs – HVCs cropping system in 200 hectares including the present 4.0 hectares provided with rockwalls.

[Table III-5](#) presents the financial advantages obtainable from the adoption of the proposed production system. As shown, the farming models will generate very substantial increase in farm revenues of approximately P112.38 million annually; about 53% or P60.08 million from the HVCs – HVCs (i.e., bell pepper, carrot, Irish potato and tomato) and P52.30 million derived from the HVCs – Legumes succession cropping system.

The value/cost ratio is quite impressive at the range of 2.27 (for bell pepper) to 7.8 for Irish potato. These indicate very high eligibility for farm credit financing by existing programs handled by the LBP and/or rural banks.

Table III-5. Effect of the Proposed High Value Commercial Crop Models on the Yield and Revenue of the CADC Farming Community, SIAP Component of Bohol AMP

Situation	Area (Ha)	Total Yield (mt)	Gross Revenue ('000)	Production Cost (P'000)	Value/Cost Ratio
1. The Present					
▪ Cabbage-cabbage	14.0	33.6	470.40	288.96	1.63
▪ Chayote	ND	ND	ND	ND	ND
2. Potential	250.0				
▪ HVCs - Legumes		2,000.0	28,000.00	7,800	3.59
> Cabbage	(150)	450.0	9,000.00	3,366	2.67
> White bean	(100)	850.0	15,300.00	3,060	5.00
> Baguio bean	200.0				
▪ HVCs - HVCs	(100)	220.0	5,280.00	2,320	2.27
> Bell pepper	(100)	1,000.0	22,000.00	2,875	7.65
> Carrot	(100)	1,000.0	22,000.00	2,830	7.77
> I. potato	(100)	600.0	10,800.00	2,340	4.61
> Tomato					
Assumptions used:					
Commodity		Yield/Ha * (MT)	Market Price (P/Kg)	Prod'n Cost /Ha. (P)	
HVCs:	Bell pepper	2.20	24.00	23,200.00	
	Cabbage	8.00	14.00	31,200.00	
	Carrot	10.00	22.00	28,750.00	
	I. potato	10.00	22.00	28,300.00	
Legume:	Baguio bean	8.50	18.00	30,600.00	
	White bean	3.00	20.00	22,440.00	

2) The Highland Agroforestry Farming System

Because of the sloping terrain in the Escaya CADC area, the tribal folks had established soil and water conservation (SWC) structure in the form of rockwall in approximately 4.0 hectares utilized for vegetables growing. Given this SWC structure carried out with minimal government support, the tribal folks could easily adopt a modified and farmer-friendly SALT agroforestry scheme in the expansion highland farms.

- **The Contour Strip Fruit Trees.** Based on the experiences from several rural development projects in the country (USAID-RRDP, WB/NEDA CVRP, WB/DENR RRMP, EU/DA-CHARM Project), upland farmers mostly disagree and object on the commonly recommended contour hedgerow species (i.e., forage grasses, multipurpose tree species, fuelwood trees, vetiver grass or their combinations) for a number of reasons, namely: (i) it is very laborious to establish; (ii) entails additional labor for maintenance; (iii) impedes land preparation and other farm operations; (iv) serve as host of rats, snakes and plant pests; and (v) generate minimal cash income, or none at all. Moreover, farmers are not really appreciative in implementing the establishment of contour bunds, soil traps, rockwalls and related SWC structures.

Based on these realities, the proposed on-farm modification will involve the use of highland fruit trees ideally with upright growth habit for planting in the contour strips. The buffer strip, measuring 3.0 meters or more in width and from 10 meters to 20 meters apart, depending on the slope conditions, will be maintained free from tillage except for the fruit trees establishment/planting, periodic brushing, ring weeding and cultivation applied to the fruit tree crops.

The recommended fruit trees are Chinese mandarin and Arabica coffee. Every 3.0 meter wide buffer strip could allow one row of fruit trees set 3.0 meters apart at alternate or single specie planting system. The estimated fruit tree population per hectare would be 300 trees, or 150 trees each fruit tree specie in alternate planting scheme.

For the initial year, the best quality planting materials shall be sourced in Davao for Chinese mandarin, Sagada, Mt. Province for Arabica coffee, or in Bukidnon for both fruit tree species. With good mother stocks, rapid propagation could be done by trained members of their POs to supply the expansion phase over the medium to longer-term period.

- **The Alley Crops.** The interspaces of buffer strips (or the stabilized contour alleys) will be devoted to high value crops and legumes, and even for cutflowers production in areas with good water supply. The recommended alley crops include tomato, bell pepper, carrot, Irish potato, baguio bean, white bean, cabbage, lettuce, melon and strawberry. As climatic conditions allow, the off-season planting of HVCs will be encouraged to promote a steady vegetable supply and better cash returns.

On a per hectare basis, approximately 80% of the sloping highland farmland under this production system will be utilized to seasonal HVCs and legumes, with the remainder maintained as contour buffer strips planted to permanent fruit tree crops.

3) Highland Cut-flowers Enterprise

Cut-flower enterprise is considered as one of the important sources of potential revenues in the highland over the medium-term. It is also one of the agricultural enterprises which can be promoted in marginal lands even with steep slopes provided water is available and the climate is favorable (i.e., stable and cool temperatures, sufficient sunlight). In the Escaya CADC highlands, about 5.0 hectares is a reasonable target for cutflowers production with minimal problems on soil moisture availability and high temperature that cause serious moisture stress.

The initial species may include anthuriums, chrysanthemums and American roses. As experiences are gained over the medium-term, cut-flower production could include various orchids and new introductions evidently saleable in Tagbilaran City and Metro Cebu markets. Cut-flower entrepreneurs may expand over time and compete in the increasing export market.

For the initial 5.0 hectares, the gross revenue estimated to be generated from cut-flower enterprise is P9.60 million annually; an income level that can provide significant contribution to the economic improvement of the CADC community. A summary of the financial analysis is as follows:

* Initial Production Area	-	5.0 hectares
* Total Yield	-	30,000 dozens
* Gross Revenue	-	P 2.25 million
* Production Cost	-	P0.36 million
* Value/Cost Ratio	-	6.25

4) Sheltered and Organic HVCs Enterprise

Climatic factors particularly the distinct wet and dry seasons in the province limit the production of HVCs by, at most, two (2) cropping cycles per year. The Inter-Tropical Convergence Zone (ITCZ) phenomenon, for instance, brings prolonged rainfall lasting for 4-7 days of consecutive rain which destroy most vegetable crops in the open fields. On the other extreme, at least four (4) months of dry season prevails which subject crops to extreme moisture stress.

There are now technological advances that allow year-round production of HVCs. One involves the construction of green-houses and/or shelter tunnels where the growing environment of crops can be manipulated and/or controlled. This sheltered culturing of crops, along with the advances in hydroponics and organic farming, will be promoted over the medium-term. Decidedly, the target investors will be the cluster communities through their POs and/or cooperatives. These local organizations by then could have substantial income and savings derived from their farming system ventures which could be reinvested in technological innovations.

This production system shall be initially demonstrated and subject to detailed studies. Determination of its financial viability will form part of said study.

C. Mango Farming System

1) Brief Situationer

As of 2004, BAS records show 5,629 hectares planted to major fruit crops in the province. Of the total land area, 2,719 hectares are planted to banana, 2,735 to mango, 120 hectares to papaya, 32 hectares to pineapple and 23 hectares to calamansi.

The yield levels of fruit crops are generally low. Crops are commonly planted in backyard scale and given less care and management. Farms with contiguous area of two hectares and above are very limited. For mango, few plantations are found in the northeastern, northwestern and interior municipalities. Small holdings devoted to banana are located in the eastern and interior parts of the province.

Pineapple is extensively planted in Carmen, while papaya areas are widely scattered. However, a larger concentration is found in Duero where a village level production of papaya soap is flourishing. Production of the existing fruit

crops, together with citrus, pose great potential considering the growing population and the influx of tourists in the province. Initially, the “Carabao” mango expansion will be given priority as major export crop and for local processing ventures.

2) Objectives

The objectives of this component are to:

- (i) Expand production of fruit crops;
- (ii) Increase productivity level;
- (iii) Improve fruit crops farming systems;
- (iv) Increase income of farmers;
- (v) Develop agribusiness ventures of cluster farmers through their PO’s and/or cooperatives.

3) Farming Systems Improvement In Existing Mango Farms

(1) Replanting and Farming Systems Improvement in Existing “Carabao” Mango Farms. Small scale planting of “Carabao” mango is common in most of the municipalities of the province. Due to lack of technical know-how and capital, appropriate technologies and cultural practices are not well implemented by farmers. This is indicated by missing/dead hills of existing farms, uncontrolled branching, unproductive trees and inferior varieties of mangoes. There are some spaces in-between the mango trees that are not utilized, and are prone to soil erosion and degradation. Replanting of dead hills and establishment of leguminous cover crops will be done to preserve moisture, improve the soil conditions and provide sources of mulching materials.

Demonstration farms on the proper management of mango plantation will be conducted in strategic sites. The area should be easily seen by people with good road conditions, and the potential adopters show willingness to adopt new technologies. The initial demonstration farms will be established in Tubigon, Inabanga and Loboc. The Farmers Field School will also be conducted which will be attended by both technicians and farmers.

(2) Integration of Ruminant in Mango Farms. In the existing mango farms, there are spaces in-between trees that are not fully utilized. To reduce maintenance in weeding and improve the soil conditions, ruminants like goat and large animals will be integrated. Since the native pasture/grasses in-between mango trees are not sufficient, improved grasses and legumes will be introduced. Fencing materials shall include the use of kakawate or ipil-ipil to protect the area as well as establish an additional source of forage. Selected strategic areas will be identified for demonstration farms from the municipalities of Carmen, Catigbian and Candijay and in other existing farms ideal for animal integration.

Signal and humidicula grasses mixed with centrosema and arachis legumes will be planted in-between existing mango trees. The area will be

divided into paddocks. For plantations with younger age of mango trees, the farmer has the option to integrate ruminants by providing individual tree guards. A hectare of mango farm will have two heads of cattle or two modules of goats. One module is composed of 1 buck and 4 does with complete operations after 5 years onwards. Field days will be scheduled once in every year in each of the demo sites.

4) Expansion of “Carabao” Mango Plantations

The Philippine “carabao” mango is one of the best varieties in the world that thrives best in sandy loam soils with good drainage and with soil pH of 6-7. It is also ideally grown in slightly rolling terrain with elevations not higher than 400 meters above sea level.

Based on the soil attributes, “carabao” mango is best suited in the northeastern to the northwestern coastal municipalities of Ubay, Jetafe, Buenavista, Trinidad, Talibon and Bien Unido. These areas are sheltered by mountains from strong winds and typhoons, and with saline environment that prevents occurrence of pests and diseases. Initial expansion of “Carabao” mango will be planted in such areas. Neighboring farms will be clustered to establish compact areas of mango farms.

Aside from open areas, the existing corn areas with marginal suitability are also recommended for mango planting. Each municipality shall have an initial compact area of at least 2 hectares to be established for demonstration and promotion. In relatively flat areas, planting of cash crops like string beans and other legumes as intercrops are recommended for the first 3 to 5 years. Ruminants can be integrated to newly established mango plantations if individual tree guards are provided.

Analysis of the proposed mango-livestock production system shows the following impacts ([Table III- 6](#)):

- (i) The present yield of mango is estimated at 16,410 metric tons. Given the average yield of 6 metric tons per hectare, the present value is P295.38M. The net income from mango growers is estimated at P40,200 per hectare per year, and the net income from the livestock component in 5 years period is ₱31,118/ha.
- (ii) The long-term impact will be the production of export potential crop, production of livestock for draft and meat sources. In addition, the environmental impact of forestation aside from promoting the ecosystem balance of crop and animal relationship wherein animal by-products are utilized as soil conditioners.
- (iii) In terms of rural employment generation, the proposed mango-livestock farming system will generate approximately 202 man days; 80% or 162 md family labor and 40 md hired labor per hectare per year.

Table III-6. Yield and Income Contribution of the Proposed “Carabao” Mango Livestock Farming Systems

Situation	Area (Has.)	Total Yield (M.T.)	Gross Revenue (P'000)	Production Cost (P'000)	Value/Cost Ratio
1. Present <ul style="list-style-type: none">Monocrop Mango	3,498	16,410	295,380	211,979	1.39
2. Potential <ul style="list-style-type: none">Mango	1,250	15,165	272,970	75,750	3.60
Mango (has.)	Livestock *		Market Price (P'000)		
	Kind	No. of Heads			
50	Male Growers	1,900	4,750		
	Female Growers	1,300	2,600		
	Culled does	1,200	3,000		
	Culled bucks	100	300		
Total		4,500	P10,650.00		

Assumptions Used:

Commodity/Situation	Yield/Ha. (mt)	Market Price (P/kg)	Production Cost/Ha. (P)
Mango <ul style="list-style-type: none">PresentPotential	6.0	18	60,600
Livestock <ul style="list-style-type: none">2 modules of goat production at 1:4 buck-doe ratio with complete operation in 5 yearsAdditional cost for labor for care of animals @ 1 hr./day/ha.			

D. Coconut – based Farming Systems

1) Rationale

Coconut is one of the major crops raised in the province of Bohol and occupies an area of about 38,951 hectares which is about 21% of the total agricultural land area in both rainfed and upland zones.

As of 2004, the data from the Philippine Coconut Authority (PCA) show that there are 5,024,734 trees of which 93% are bearing. The average planting density is 129 trees per hectare (which appears very high as per field observations and data at the MAOs). Current production of coconut is low at 35 nuts per tree per year. An average of 4 nuts constitutes a kilogram of copra. The average production is 1.13 metric tons per hectare.

The coconut plantations were established either as follow-on permanent crop after clearing the original forest cover or as a complimentary crop planted to main staple food such as upland palay, corn and rootcrops. The minimal capitalization for the establishment, culture and maintenance of coconut plantation encouraged farmers to opt for this long-term crop. Also, versatility in terms of its products varied uses, from roots up to its leaf midrib, promoted coconut as the choice economic crop that farmers planted in their farm areas. Its primary product, copra or desiccated coconut meat, remained highly valued

in the world market for edible vegetable oil. Thus, coconut producers, regularly harvesting and processing nuts every 45 days, profitably earned cash income from copra sales to complement the income of staple foods derived from planting other crops.

With the combined effects of declining soil fertility and poor management practices aggravating the state of the province's coconut industry, low productivity comes as no surprise. Some small coconut farmers, heavily dependent on the crop for survival, feel reluctant to improve their cultural management practices. Farmers generally recognize the need to improve farming technology such as diversification through intercropping to increase productivity, farm labor employment and income.

2) Objectives

- improve coconut farming system;
- increase productivity level;
- promote coconut-based processing/industries; and
- increase farmer's income.

3) Multi storey Farming System: Coconut + Banana

This on-farm improvement model will cover approximately 5,000 hectares of coconut areas in the province. A demonstration farm of at least one hectare area will be conducted during the first five years in a cluster barangay in the selected municipalities as showcase to promote the rapid expansion of the scheme.

The proposed on-farm improvements will include establishing and intercropping of banana to improve the vegetation cover and diversify the income sources of the upland farming families. The planting system for banana will follow the existing 10m x 10m coconut spacing. Under this scheme, the plant densities per hectare are estimated at 100 coconut palms and 260 clumps of banana.

Listed below are some potential impacts to the farming communities and their farmlots (see [Table III-7](#)) as follows:

- (a) The adoption of multistorey cropping system will promote improved management of coconut palms and will result to increase yield at 60 nuts per tree/year.
- (b) The initial impact on the farmlots is the stabilization effect of the banana buffer crops in trapping the organic litter and topsoil particles usually washed down by erosion.
- (c) The banana intercrop will generate additional income of P45,900 per hectare starting on the third year after establishment, which is equivalent to about P140 million in gross revenues per year.
- (d) Under the multi-storey farming system, a total of 140 man-days per hectare will be employed yearly at full project development (68 man-days for coconut and 72 man-days for banana).

Table III-7. Estimated Financial Benefits from the Coconut Intercropping with Banana Production System

Situation	Area (has)	Total Yield (mt)	Gross Revenue (P'000)	Production Cost (P'000)	Value/Cost Ratio
The present: Coconut	5,000	5,650	67,800	35,050	1.93
The Potential Multistorey Cropping					
▪ coconut	5,000	7,500	90,000	35,050	2.56
▪ banana	5,000	40,000	140,000	65,225	2.14
Assumptions:					
Commodity	Yield/Ha (mt)	Market Price (P/kg)	Production Cost (P/ha)		
1. Coconut					
▪ present	1.13	P12.00	P 7,010.00		
▪ potential	1.50	P12.00	P 7,010.00		
2. Banana	8	P 3.50	P13,045.00		

4) Coconut – Livestock Farming System

Coconuts are not given intensive care by farmers due to technological and economic reasons. The target areas include coconut plantations with manageable slopes (<18% slope gradient) with moderate to high organic matter content. Planted mostly as monocrop, some farmers tether ruminants underneath the trees without improving the native pasture grasses. Ruminant livestock such as cattle and goats are feasible for integration under coconut though these will require larger investment outlay for establishment and maintenance.

Ruminants are commonly grazed in naturally growing vegetation along roadsides and river embankments, in open cogonal and fallow areas, or tethered to graze under coconut and recently harvested ricelands and corn areas. There is no established forage grass pasture for forage feedlot for the cut-and-carry system of raising ruminants.

The area maybe overgrazed without providing a balance source of protein forage pasture. To improve the productivity of both coconuts and livestock, proper management is therefore necessary.

A one hectare demonstration farm will be conducted for coconut-livestock integration for the first five years. It shall compose a number of neighboring farmers to constitute a compact area. Improved grasses like guinea grass that tolerates partial shading together with pasture legumes will be planted in between coconut trees. Five goats will be introduced in one hectare coconut area.

Table III-8 presents the potential impacts to the farming communities and their farmlots, as follows:

- (a) The adoption of livestock integration system will increase productivity of the coconut palms;

(b) The initial impact on the farmlots is the fertility effect of the soil from the waste of the livestock;

(c) Raising of livestock will generate an additional income of P20,810 per hectare/year.

Table III-8. Estimated Financial Benefits from the Coconut-Livestock Integration

Situation	Area/No. of Heads (has)	Total Yield (mt)	Gross Revenue P('000)	Production Cost P('000)	Value: Cost ratio
Present					
Coconut	500	565	6780	3,505	1.93
Potential Livestock Integration					
Coconut	500	750	9000	3,505	2.56
Goat	5	20 kids	63,900	43,090	1.5
Assumption:					
Coconut			Goats		
– present – 1.23			Kids per birth – 1.5		
Yield (mt/ha) – potential – 1.50			Market price – P 100/kg		
Market price – P 12.00/kg			– 25 kg for male		
Production cost/ha – P 7,010			Ave. live weight – 20 kg for female		

E. Hillyland Pilot Projects

1) Introduction

The sloping areas ranging from sloping to hilly, constitute about 48% of the total land area of Bohol. These areas have generally porous and well drained soils where many crops abound with minimal care given. Some of these are fiber crops like buri, salago, pandan, and maguey, among others.

Small industries on sinamay are existing in the southwestern municipalities of Buenavista, Calape and Tubigon which have already found opportunities in the world market. However, the supply of raw materials is very limited. Mat weaving using pandan is common in Maribojoc, Trinidad, and President Garcia but local initiatives for the development and expansion of areas for raw materials are also very minimal. Handicrafts made of maguey have also been developed in Lila and the industry is also constrained with the scarcity of raw materials.

Salago is endemic in the hillyland areas but its economic value is not yet well known in the province. Some native pineapple or “piña” is also growing in the wild in some parts of the province where its economic value is not also well appreciated.

Aside from the fiber crops, a variety of indigenous rootcrops, dubbed as “crisis” crops grow in the wild. These have saved lives of people during long droughts and occurrence of the El Niño phenomenon. These rootcrops are usually found in the hillylands under partial shade particularly in the second growth forests.

There is a rich potential for the fiber industry and the alternative food crops that thrive well under the existing physical and climatic conditions of the province. It is therefore necessary to conduct applied studies and piloting of the appropriate farming systems for the development and commercialization in the future.

2) Objectives

- To promote the development of the fiber industry;
- To showcase appropriate farming systems for fiber crops; and
- To explore the potentials of the indigenous ("crisis") crops.

3) Components

(1) Fiber Crops (Salago/Pineapple/Maguey)

Salago is an important fiber crop that is regarded as one of the excellent materials for the manufacture of paper bills, bank notes, stencils, art and high grade papers and documentary papers, among others. It is also used for handmade papers for art purposes, calligraphy papers and other paper materials where a certain degree of permanence, strength and durability is desired. Likewise for rope making, finishing lines and nets, clotheslines, sashes, strainers, wallets, colorful hats and other raw materials in making Japanese doors (shoji), kimono, and components for radio and micro computers.

The crop belongs to the family Thymelaecede, is a sturdy slow growing shrub in primary and secondary forests throughout the country at low and medium altitudes. It thrives well on any kind of soil in logged-over area, hills, mountain sides and along seashores. However, fertile lands with good drainage are best suited to salago production. Being sturdy, salago grows well even under varying climate conditions and can withstand long drought, rainy season and even typhoon.

Propagation by seeds had recently been proven to be the most effective where matured seeds are usually abundant during the month of May. Seedlings are ready for transplanting at 2-4 months from pricking ideally at 1m x 1 m distance done at the onset of the rainy season. Weeding is essential at the initial stage of plant growth, however, when plants exceed the growth of weeds, weeding is no longer necessary except when heavy vegetation covers the plants. A demonstration area will be conducted in the hillside of Batuan, Bohol where it can be integrated with jackfruit or other fruit trees with similar requirements of the crop.

Maguey is another fiber crop that has been proven to grow in marginal areas of the province. It is adapted to undulating or hilly areas and grows even in rocky soil and along the seashore. The crop is not difficult to cultivate since it suits even the rocky soil and along the seashore. Moreover, it endures diversified climatic conditions, does not require abundant or evenly distributed rainfall and with strong resistance to drought, pests and diseases. Bulbils and suckers are commonly used for propagation of maguey. It grows into a rosette of leaves which drops to a horizontal position when it matures.

In order to promote its development which could consequently led to commercial processing in the future, a demonstration project will be conducted in Dimiao, an adjacent municipality of Lila where the existing crops are popularly grown. This is to entice adopters for possible expansion and consolidation of raw materials in the future. The project will be implemented by an organization or cooperative where management and maintenance will be convenient.

Another potential fiber crops growing in the wild is the pineapple “piña” (Spanish red variety or native). It is a perennial plant that produces excellent fiber particularly the “native” variety that grows well on porous and well drained soil with pH of 4.5 - 5.5. Its ideal temperature requirement is mild (24°C), with rainfall between 100-150 cm. per year and relatively even distribution during the growing period.

A demonstration project will be established in Sierra Bullones. It has the ideal requirement for the “piña” culture. The place has available water supply ideal for development of a facility necessary for the processing of fiber and the potential area for expansion with improved cropping system.

An area of 1,000 square meters will be utilized for the demonstration project. It will be handled by a group of women preferably with previous experience on handicrafts making. The land and maintenance of the project will be the equity of the group.

Before establishment of the project, the leader of the group together with the Project Coordinators from the municipal and provincial LGUs will be exposed to a familiarization tour in Aklan where the source of planting materials will also be obtained.

(2) Mulberry for Pulp Fiber and Silkworm Culture

Another source of fiber with great potential is the mulberry tree for silkworm culture. The tree belongs to the Moraceae family which is hardy and fairly drought resistant. It grows into a height of several meters if not pruned.

Silk is considered as the strongest and lightest fiber, have great elasticity, resilience and warmth, making it an excellent textile material. The material is made into “Barong Tagalog”, gowns, shawls, handkerchief, linens, fashionable garments, men's and ladies' accessories, home furnishing, other novelty/gift item, and for other consumer and industrial applications. Cocoons are exported to Japan while silk fabrics are marketed to Japan, Hongkong and the United States.

Few mulberry trees have been growing in the municipality of Bilar where the temperature is mild but its use has been limited to instruction purposes. What is needed is to explore more about the crop and its industry. A demonstration project will be established to showcase its proper culture and management. It will be anchored at the CVSCAFT. Logistic support will be shouldered by the provincial government while management of the project will be the responsibility of the state college.

(3) Indigenous (“Crisis”) Rootcrops

Indigenous rootcrops which are tolerant to shading and drought abound in the hillyland areas particularly in second growth forests. Since there is yet no available source of data on how widespread and where the different species are particularly found, inventory of the estimated population and identification of the specific species endemic in the province will be conducted.

After the initial database will be established, a demonstration cum applied research project will be conducted to determine the most appropriate farming system of the crops. Site selection will be based on the physical and climatic requirements where the crops are most suitable, the potential number of prospective adoptors and the availability of water and other conditions that favor establishment of future facilities for the development of the crops.

F. Agriculture Support Services and Facilities

1) Capability Building and Organizing of Farmer Groups

The success of the Agriculture Master Plan and its SIAP component will depend as much on farmers making individual and collective decisions as on the strength and commitment of their organizations/POs that will evolve in the course of program implementation. This condition poses a challenge to the frontline development units to appreciate the CO for CD approach to alleviate rural poverty which minimizes the trading-off of longer-term sustainability for immediate socio-economic benefits. Because of such condition, the Plan identifies as a key component the reorientation and capability building of the farming sector and their POs.

In support to the SIAP component, the focus of capability building will include: the lowland and rainfed palay farmers, corn growers, upland farmers and mango orchard growers. The highland vegetable farmers especially the Escaya tribe farming within their CADC areas, and the adjacent highland farming communities will be given emphasis. These farmer groups shall be provided assistance to organize for collective action and resource mobilization.

The CO for CD strategy and process for capability building of farmer groups and organizational strengthening of their POs is discussed in sufficient detail under Section 3.5 of this report.

2) Training and Information, Communication and Education (ICE)

The broad objective of the training and ICE support is to contribute towards creating an institutional environment in Bohol that is fully supportive of the long-term goals of the Agriculture Master Plan and component projects, which emphasize the strengthening of local capacity to sustain agricultural resources productivity. It thus adopts the combination of training course and modular approach in training of the LGUs extensionists, NGOs demonstration/model farm cooperators and farmer groups. The training course will comprise of general training and the specialized training courses; the latter involving several modules

consisting of specific farming systems practices and appropriate technology packages.

Training and ICE will serve as the tools for capability building, generation of public awareness and support, promotion of environment-friendly technologies in the farm production systems, among others. The various training courses and modules identified to support the adoption of project packages and farming systems technologies under the SIAP component are detailed in Section 3.5 of this report.

3) Applied Research and Extension Services

Much of the failure in agricultural extension is the lack of effective message/venue for technology transfer. Many research results and technology advances cannot be adopted because of this limitation, which is more pronounced in the island setting of Bohol. Under the SIAP component, therefore, the combination of applied research and demonstration/model farm by farmer cooperators will be adopted to strengthen the regular extension delivery system.

Demonstration/Model Farms. Demonstration farm, as the term implies, is designed to showcase improved farming system and/or integrated farming systems, and to serve as model for farmers within a target influence area. Under the SIAP component, a number of demonstration farms on the proposed project packages will be developed and operated as a functional network of farming systems technologies. Ideally, this network should be linked with the demonstration sites of the other component projects, i.e., FRDM, LIFE and NRDM Projects.

Each demonstration farm will be strategically located (adjacent to good road, highly visible, simulates the typical farm in the locality, simulates the topography of adjacent farmsteads, etc). Its target area to influence will not be less than 500 hectares or approximately 700 farmers given the average farm size of less than 1.0 hectare/farmer.

Demonstration farms will be farmer-managed, hence, would need careful screening and selection of farmer cooperators. It will be fully supported in terms of farm inputs, basic farm tools and related logistics for a period of three (3) years, which is deemed sufficient to influence the target farmer group to adopt the farming system technologies in their own farmlots.

The farmer cooperators shall be the priority participants of the training programme. Moreover, he/she will be trained to become a local trainer and extensionist. His/Her demonstration farm will be the venue for farmers' exposure trips, farmers' field days and related activities.

Applied Research. This support activity is designed to test innovative farming systems, technology advances, improved crop varieties or introduced crop species and related on-farm trials. It will be farm-based and farmer-managed.

Ideally, the applied research site should be located adjacent to or within the vicinity of the demonstration farm. This will facilitate on-site visits, being the adjacent venue for farmers' exposure trips and field days.

In support to the SIAP component, the immediate concerns for on farm studies include:

- Combination of organic and inorganic fertilizer rates for different crops (coconut and fruit tree crops, seasonal crop types such as vegetables, legumes, rootcrops, rainfed and irrigated palay)
- Green manuring trials in vegetable, corn, rainfed palay
- Cropping systems trials (pole sitao after corn/green corn, rainfed palay-corn/legumes, upland palay-rootcrops/ube, etc.)
- Multistorey cropping trials of shade tolerant crops (ginger, coffee/cacao, black pepper, Spanish Red pineapple for piña fiber).
- Hillyland cropping system trials of hardy/less exacting fiber crops (salago, Spanish Red pineapple, maguey), mulberry for silkworm culturing, indigenous rootcrops
- Highland cropping trials of selected semi-temperate crops (lettuce, cauliflower, sitsaro, white bean, melon, etc.)

The applied research activity will be fully supported under the project. The results of every on-farm trial, whether successful or proven non-adoptable/failure, shall provide valuable information for the technologies extension delivery system.

Existing farmers association and/or POs that will evolve through the project shall serve as receiving mechanism for extension delivery under a farmer-based and adaptive extension system. Under this scheme, farmer cooperators and indigenous farmer leaders will be developed into local extensionists and given the function of disseminating new technologies after these have passed on-farm trial in the locality.

4) Farm Credit Support

Existing agricultural credit schemes tend to be too limiting in scope and, in most instances, disqualify the small farmers as not credit worthy. However, organized farmer groups and/or POs duly registered by the CDA, SEC, DOLE or other accrediting agencies have access to special credit programs of the Land Bank of the Philippines (LBP) and lending/relending schemes handled by rural banks and NGOs. It is important therefore that in the short term, the small farmers in the priority cluster production zones must be organized into viable farmers organizations to qualify under these programs.

The fact that there are multipurpose cooperatives and credit cooperatives in most municipalities of Bohol indicate that farmers, similar to other occupation groups like fishermen and livestock raisers, are not really averse to credit. For marginalized farmers who are not usually covered nor members of these rural cooperatives, special attention shall be given by the SIAP component that they are also provided the access to credit facilities. The lead implementing unit through the Field Teams should coordinate with the rural banks and NGOs that extend lending to farmers such that most of the farmer-participants are also covered by the lending facility.

Ideally, all the cluster production zone barangays should be covered by farm credit support programs but, in the short-term, what can be done is to prepare the target small farmers. In the social preparation and CO for CD component

(refer [Section 3.5 Local Social and Institutional Strengthening](#)) of Bohol Agriculture Master Plan, the farmers as well as the cluster community will be oriented towards how to avail of and properly make use of credit and other resources extended to them.

Farm credit support will contribute to wider adoption of the project packages and technologies by farmer groups in the priority cluster production zones. Based on the farm plan and budget (which shall be detailed in the Microwatershed/Farm Development Plan to be prepared by every farmer participant as precondition for support) of each crop and/or combination of commodities, the computed average farm credit financing per hectare is provided in [Table III-9](#). Farm credit and the farmers' equity comprise the indirect cost of the SIAP component cost estimates.

Table III-9. Total Production Cost, Credit Cost and Farmer Equity Cost Per Hectare of the Recommended Crops/Commodities Under the SIAP Component (With Project Situation)

Crop/Commodity	Estimated Cost (P) Per Hectare ^{1/}		
	Total Prod'n Cost	Credit Financing Cost	Farmer Equity Cost
1. Intensive Palay Farming Systems			
▪ Hybrid palay (semi-organic)	24,420.00	14,570.00	9,850.00
▪ Inbred palay	21,100.00	11,340.00	9,760.00
2. Rainfed Palay-based Diversification			
▪ Inbred palay	21,100.00	11,340.00	9,760.00
▪ Eggplant	22,000.00	11,200.00	10,800.00
▪ Watermelon	27,800.00	14,700.00	13,100.00
3. Corn-based Farming Systems			
▪ Hybrid yellow corn	26,800.00	14,100.00	12,700.00
▪ OPV white corn	24,200.00	13,420.00	10,780.00
▪ Mango	16,300.00	7,640.00	8,660.00
▪ Squash	24,620.00	11,200.00	13,420.00
▪ Peanut	24,200.00	8,880.00	15,320.00
4. Coconut-based Farming Systems			
▪ Coconut (bearing)	9,300.00	0	9,300.00
▪ 'Saba' banana	17,410.00	0	17,410.00
▪ Ube	26,700.00	14,600.00	12,100.00
5. Mango-based Farming Systems			
▪ Mango (full bearing)	32,600.00	0	32,600.00
▪ Livestock (2 modules, Goat)	28,800.00	12,500.00	16,300.00
6. Highland HVCs Farming Systems			
▪ Alley Crops			
o Cabbage	28,120.00	14,410.00	13,710.00
o White bean	24,600.00	14,410.00	10,190.00
o Melon	27,500.00	14,700.00	12,800.00
▪ Strip Crops			
o Chinese mandarin	8,710.00	0	8,710.00
o Arabica coffee	8,710.00	0	8,710.00

^{1/}At medium level technology, generally semi-organic to organic farming and using IPM System.

5) Support Facilities

Improvement of Plant Nurseries. Existing plant nurseries located in Macaas, Tubigon and Gabi, Ubay are producing some high value crops like grafted mango seedlings and other fruit trees. From these nurseries, interested farmers and clients avail of the planting materials at a lower cost. While these farmers and clients intensely showed a zest to make use of their idle lands to plant fruit trees especially mango, the demand for planting materials are getting higher. Aside from fruit trees, the cutflower industry in Bohol showed a great potential where market demand is also high. Dispersal projects of cutflowers are continuously offered to cutflower growers.

To support these needs, the improvement of the plant nurseries' facilities, including support for the recurring supplies and materials, are essential to sustain its objective of helping farmers increase farm productivity and income. A government facility like plant nurseries must always produce good qualities of planting materials, certified as good stocks of either sexually or asexually propagated. For each year, the plant nurseries shall intensify production of different varieties of fruit trees and cutflowers. The facilities shall be manned by the Provincial Agriculture Office.

Improvement of Laboratory (Soils, Tissue Culture) Facilities. Most farmers are traditionally faced with constraints especially in improving the productivity of their farms. Technologies to be adopted must be based on the adaptability of the crop to the types of soil, aside from other considerations. Soils vary widely from place to place. Many factors determine the chemical composition and physical properties of the soil at any given location.

The only soils laboratory in the province is located at the DA-Bohol Agricultural Promotion Center, Tagbilaran City. The facility has the basic equipments in analyzing the soils coming from the different municipalities. The farmers normally submit their soil samples for analysis and pay only a minimal amount. The resulting analysis also provides fertilizer recommendation in terms of the rate and type of fertilizer to use. The soils laboratory facility must be improved in terms of equipments, recurring supplies and materials to cater to the needs of farmers. Additional operating budget will be necessary so that it can respond more effectively to the demands of client farmers.

The other facility is the tissue culture laboratory in Gabi, Ubay producing plantlets of "bungolan" and "lakatan" banana varieties for dispersal to growers who intend to increase their produce through expansion of their banana plantations. In answer to the projected increase in demand for planting materials, the tissue culture laboratory will be improved in terms of its facility and equipment. Other than banana, the facility shall also include tissue culture of ube since growers are also seeking for good planting materials in order to expand production.

Facilities to be provided by SIA Program is outlined in [Table III-A.1](#) of the Annex report.

Development and Operation of Seedbank at CVSCAFT. The emergence of different varieties of crops have continuously evolved, and these are borne out of

research and development generated by scientists and known plant breeders. Some Boholano farmer-scientists have also developed new breeds from its on-farm trials. To capture all these efforts, a seedbank will be established to serve as a station for learning and further researches, housing the available varieties of crops especially cereals that thrive in Bohol. Its venue must be a learning institution, the CVSCAFT of Bilar. The state college shall maintain and operate the seedbank. The seedbank will also serve as venue for cross-visits or “lakbay aral”, exposure trips and other related trainings of farmers. The facility can offer actual learnings and new information on breeding crops best suited to Bohol conditions.

Development of SWIP/SFR. Soil and Water Impounding Projects (SWIP) and Small Farm Reservoirs (SFR) are proven practical and effective in the province. Several facilities were constructed way back in the 1980s to middle 1990s, purposely to impound water to irrigate the land when rainfall becomes erratic and soil moisture is limiting. For the SWIP, about 30 sites of at least one-hectare per site can be developed in the potential sites at Bilar, Candijay, Guindulman, Duero, Carmen, Alicia, Loay and Pilar. The existing facilities are also located in these municipalities although some units need rehabilitation.

The Small Farm Reservoirs constructed in the province are about 469 units, all funded by the DA. Its total service area/capacity is 825.55 hectares, and potential expansion area is 2,500 hectares.

Post Production and Marketing. Boholano farmers have started to realize the importance of consolidating products in order to be able to match with a good market. Likewise, they have also realized that post harvest handling and management as well as good packaging are very important factors that affect the quality of products that are favored by buyers.

In support to the marketing needs that would give advantage to both producers and buyers, packing centers will be established in Duero, Jagna, Sierra Bullones, Calape and Danao where HVCs are concentrated. Bagsakan centers will be established in Jagna and Tubigon with the availability of regular trips to Mindanao and Cebu. Another center will be established in Carmen, the central most part of Bohol where products from different municipalities are conveniently gathered. It is approximately an hour ride away from Tubigon, Talibon, Ubay and Tagbilaran City where trading centers are located and regular sea trips to Cebu and other provinces are also available.

2.1.6 Implementation Plan

1) Implementation Arrangement

As outlined in **Chapter 3.0 Organization and Management** of this report, the SIAP component will be lodged at the Office of the Provincial Agriculturist (OPA), as the lead implementing unit, in line with the premise of utilizing the existing structure of the provincial government for the implementation management and coordination of the development program. This strategy is also consistent with the institutional strengthening agenda promoted under the Bohol AMP.

Following is the proposed implementation arrangement for the SIAP component.

(1) The Productivity Division cum SIAP Management Unit

The Productivity Division of OPA will be the executing unit and shall be formally mandated by the Provincial Governor, upon the recommendation of the Provincial Agriculturist, as the lead implementing unit (LIU) for the SIAP component. The organizational structure of the OPA – Productivity Division, which integrates the SIAP Management Unit is provided in [Figure III-2](#). The staffing plan for SIAP Management Unit is detailed in [Table III-A.2](#) in Annex report.

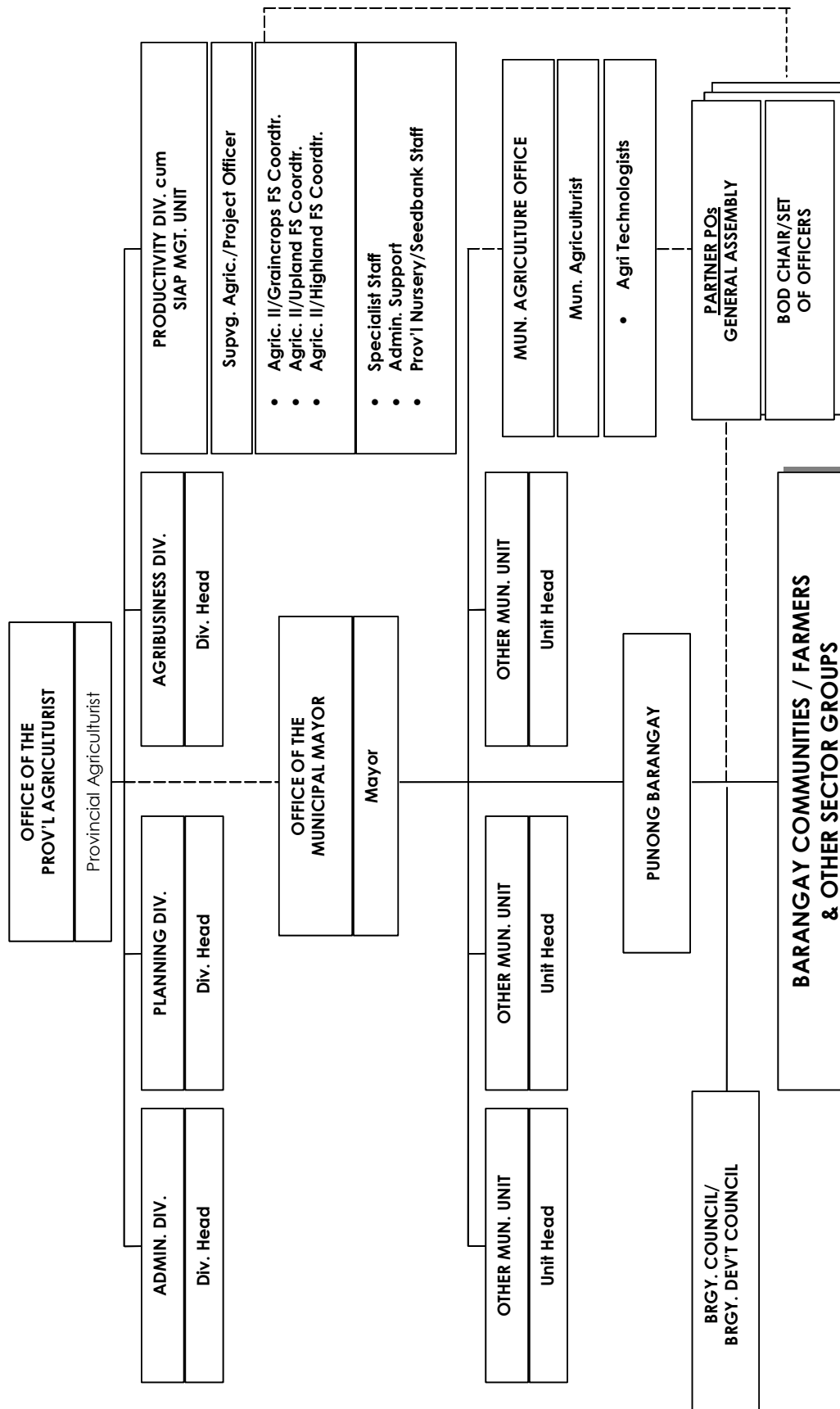
The SIAP Management Unit will have the Supervising Agriculturist/Division Head designated as Project Officer on concurrent capacity. The Project Officer shall be assisted by three regular technical staff designated to occupy key positions, namely: (i) Agriculturist II cum Grain Crops Farming Systems Coordinator; (ii) Agriculturist II cum Upland Farming Systems Coordinator; and (iii) Agriculturist II cum Highland High Value Crops Farming Systems Coordinator. A modest number of specialist staff, specifically for expertise/specialization deficiencies in OPA and very necessary for the project scope, shall be hired on contractual basis to support in project implementation.

The SIAP Management Unit shall primarily perform coordination and monitoring functions. Its responsibilities will include the following:

- Preparation of the annual/quarter work and financial plan for submission to and approval by higher management;
- Coordination with the MAOs of participating MLGUs for the component projects planning and implementation including training and CO for CD activities;
- Coordination with the BC/BDCs, the cluster production technicians and the cluster POs concerning the implementation of component projects;
- Coordinate the establishment, operation and maintenance of demo/model farms and applied research/on-farm trials by cooperators;
- Coordinate the operation of the Provincial Nursery & Seedfarm, the Soils & Tissue laboratories and pilot projects being supported by the project;
- Coordination for technical assistance and resource inputs of the LGUs, NGAs, NGOs and LRIs, and facilitate their delivery to POs and project participants;
- Monitoring of the progress/accomplishment of project activities and preparation of regular status & special reports for submission to higher management; and
- Collaborate with the TAG and MLGUs on the redesign/packaging of certain project components for consideration by potential Donor Agencies.

The SIAP unit shall be provided with technical backstopping support by the regular technical staff of other Divisions in OPA on need and call basis.

Figure III-2. Proposed Organizational Structure of the SIA Protect Unit Within the Productivity Division of the OPA (Bohol Agriculture Master Plan)



(2) The Municipal Agriculture Offices of Participating MLGUs

As discussed in **Section 2.5 Approaches and/or Strategies in Part II** report, the participating MGLUs, through their existing Technical Working Groups (TWG), shall undertake preparation of Project Implementation Plan (PIP) for their priority project or package of projects, i.e., crops farming systems, livestock and poultry production systems, fisheries, natural resources development and/or its combination.

For the MLGU's programs under the SIAP component, the Municipal Agriculture Office (MAO) shall be mandated as executing unit with the Municipal Agriculturist designated as Project Coordinator (MA/PC) on concurrent capacity. The MA/PC shall either mobilize all existing regular staff of MAO or designate selected agri-technologists staff to the project on full-time basis.

Two (2) agri-technologists shall team up with the CO/CD Officer of BPRMO (refer [Section 3.5 Local Social and Institutional Strengthening](#) component for detailed discussion) and shall cover the priority cluster communities within the Cluster Production Zones. This Field Team shall work with the BC/BDC Officials, the POs Officers, farmer-participants and other sectors of the cluster community. Their major responsibilities include the following:

- Serve as frontline unit to oversee and coordinate all project activities in the cluster area;
- Supervise the MWS farm planning, development and maintenance of on-farm improvements;
- Provide technologies/extension services to farmers and/or POs for the sustainable development and management of their farmlots or cluster farmsteads;
- Provide trainings to farmer cooperators and participants on various aspects of farming systems and/or farm enterprises; and
- Monitoring of farm improvement works by farmers and/or POs.

The Field Term shall also oversee the development of backyard bio-intensive gardens (BIG) as outlined in [Section 3.5](#) of this report, and facilitate the planning of rural enterprise projects by the POs. They will provide or cause to provide necessary trainings for skills enhancement of POs members in order to prepare them for the implementation and management of their rural enterprise projects.

(3) The Partner POs and Farmer – Participants

The farming communities through their POs, which shall be managing the implementation of the component activities, will be led by the POs Federation organized in the cluster community level. Each PO shall be registered with the CDA, DOLE, SEC or with any registering/accrediting agency. It is proposed that the POs be federated at cluster community level initially, and at the municipal or Cluster Production Zone level on the later stage as they become more cohesive and mature, and registered accordingly.

The POs Federation will necessarily have a Board of Directors (BOD) and a set of officers who shall be responsible to the General Assembly composed of the farmers and community sector groups. The BOD shall assign/designate Team

Coordinators from among the officers and members for the key project activities, i.e., farming systems development, on-farm trials/applied research, demonstration/model farm development and operation, trainings and field days, rural enterprise, etc. The Team Coordinators shall provide leadership and exercise supervision over the implementation of every component activities. The BOD shall likewise oversee the activities of its standing committees in support to specific project implementation.

The Partner POs shall regularly consult and coordinate with the BC/BDC officials, the Field Team and Barangay Agriculture and Fisheries Council (BAFC). The POs management plans and subprojects for the communities' resource zones should form part of the Barangay Development Plan (BDP), and appropriate policies support should be enacted/provided by the Barangay Council.

2) Implementation Activities and Schedule

(1) Pre-Implementation Activities

Before the implementation of the SIAP component, the Productivity Division through the OPA will need to accomplish some pre-requisite activities. These are as follows:

- i) The organization and mobilization of the Productivity Division cum SIAP Unit. This will entail the issuance of the designation and Terms of Reference of the Productivity Division Head/Supervising Agriculturist and the regular technical staff who will be assigned to the SIAP Unit, the provision of office space and basic facilities, and thorough orientation of all assigned and direct-hired personnel on the project and components.
- ii) The dissemination of information about the project to the MLGUs, and generation of their commitment to participate and to implement component projects. The OPA may consider the preparation of a briefing document outlining the major features of the SIAP components so that misinformation can be avoided.

The participating MLGUs should mandate and mobilize their existing Technical Working Group (TWG) to prepare the necessary data, maps and related documents for project preparation.

- iii) Preparation of the Project Implementation Plan (PIP). As outlined in [Section 2.5 of Part II of the report](#), the TWG of each participating MLGU shall participate in a training practicum on PIP preparation. This will be conducted by the Provincial Program Planning Team (PPT) with its trained members serving as resource persons and providing hands-on assistance to the TWG participants. The outputs of this 5-days live-in training practicum shall be the complete PIP document of each participating MLGU.

(2) Implementation Activities/Schedule

The SIAP components will be implemented over twenty (20) years. A summary of implementation schedule for the project components and activities is provided in [Table III-10](#).

Table III-10. Summary of Implementation Schedule, Sustainable Integrated Agribusiness Project – Bohol Agriculture Master Plan

Component Activity	Activity Schedule											
	Yr 0	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6-10	Yr 11-20				
I. Pre-implementation												
1. Screening & Selection of Staff												
2. Organization of PD cum SIAP Unit												
3. Generation of MLGUs Commitment & Training of TWGs on PIP Prep.												
II. Construction of Facilities												
1. SFR & SWIP/CDD												
2. Farm Access Graded Trails												
3. Prov'l Nursery & Seedfarm Facilities												
4. Tissue Lab Improvements												
5. PGR Facility at CVSCAF												
6. Sheltered HVCs Module/Greenhouses												
7. Post-Production Facilities												
III. Purchase of Equipment Commodities												
1. Transport												
2. Office Equipment & Furniture												
3. Prov'l Nursery & Seedfarm Equip't												
4. Applied Research & Demo Farm Equipment												
IV. Establishment & Operation of Demonstration/Model Farms												
V. Applied Research/Field Trials (including Agro-Climatological Stations)												
VI. Operation of Prov'l Nursery & Seedfarm												
VII. Operation of Lab Facilities												
VIII Component Projects Dev't & Operation												
1. Enhanced Grain Crops Farming Systems												
9 Intensive Palay Farming System												
9 Rainfed Palay-based Diversification												
9 Corn-based Farming Systems												
2. Upland Farming Systems												
9 Corn-based Farming Systems												
9 Mango-based Farming Systems												
3. Diversified Highland HVCs Enterprise												
9 Diversified Organic HVCs Farming System												
9 Highland Cutflowers Enterprise												
9 Sheltered & Organic HVCs Enterprise												
4. Hillyland Pilot Projects												
9 Fiber Crops (Salago, Pineapple, Maguey)												
9 Mulberry for Pulp Fiber & Silkworm												
9 Indigenous root Crops (Crisis Crops)												

2.1.7 Financial Plan

1) Summary of Project Cost

The total direct cost for the implementation of the Sustainable Integrated Agribusiness Project (SIAP) components is estimated at P49,632 million over ten years (see [Table III-11](#) for detailed breakdown). A summary of the cost estimate is as follows:

Item/Component	10-Year Cost (P'000)	% to Total
1. Civil Works	14,945	33.12
2. Transport & Equipment	4,984	11.05
3. Adaptive Research, Demo/Model Farms & Components Dev't	4,375	9.70
4. Project Promotions	1,470	3.25
5. Trainings	5,120	11.35
6. Incremental Administration	14,226	31.53
Sub-Total –	45,120	100.00
7. Unallocated Contingency (10% of Sub-Total)	4,512	–
Total Cost –	49,632	–

Table III –11. Summary of Cost Estimates (P'000), SIAP Component of Bohol AMP

Item/Component	Estimated Costs			% to Total
	Year 1 – 5	Year 6 – 10	Total	
Direct Cost				
1) Civil Works	5,385	9,560	14,945	33.12
2) Transport & Equipment	2,587	2,397	4,984	11.05
3) Adaptive Research, Demo/ Model Farms & Component Projects Dev't	1,945	2,430	4,375	9.70
4) Project Promotions	620	850	1,470	3.25
5) Trainings	3,120	2,000	5,120	11.35
6) Incremental Admin.				
Sub-Total	7,118	7,108	14,226	31.53
7) Unallocated Contingency (10% of Sub-Total)	20,775	24,345	45,120	100.00
	2,078	2,434	4,512	–
Total Direct Cost	22,853	26,779	49,632	–
Indirect Cost				
1) Credit Financing Support	TBD	TBD	TBD	–
2) Project Pax Equity	TBD	TBD	TBD	

Note: TBD – To be determined. This will be firmed up during the detailed Project Implementation Plan (PIP) preparation by participating MLGUs.

Refer Tables III-10 to 13 for detailed breakdown by component and by year.

2) Financing Scheme

The combination of financing options is proposed to respond to the magnitude of investment requirements for the SIAP components. The narrow range of economic activities existing in the LGUs (i.e., provincial, city/municipal and barangay) place a severe limit in the income that can be generated internally thus requiring consideration of external sources in the form of development assistance, grants and/or co-financing ventures with donor institutions. Moreover, purposive lobbying to access the annual Congressional Initiative Allocation (CIA) due the Honorable Congressmen of the 1st, 2nd and 3rd Districts of Bohol and national leaders known supportive and sympathetic to the Bohol development initiatives shall be pursued.

3) Financing the Components Implementation

The appropriate financing scheme to implement the priority projects under the SIAP component shall be decided by the participating MLGUs during the preparation of detailed Project Implementation Plan (PIP) by their municipal Technical Working Groups (TWG) under the sponsorship of the Bohol AMP. Generally, it will be anchored on the project's financial requirement, the typology of financing to be obtained, the specific sources and the terms/conditions for each type of financing. These parameters shall be carefully considered in the PIP preparation, including a thorough assessment of the MLGUs capability to provide equity and service for borrowings, the resource availability and accessibility from capital markets and other financing sources.

Initial scanning indicates that significant sources of financing (the Indirect Cost) can be accessed from the development programs of international institutions and national government channeled through the banking institutions such as the LBP and DBP, and accredited lending/relending rural banks and NGOs. These could substantially respond to the on-farm improvements/farming systems development and rural enterprise credit requirements of project participants and their POs or cooperatives. Financing for infrastructures, equipment commodities, adaptive research and demonstration farms establishment, trainings and institutional strengthening will be quite difficult to address since the typology for this financing is generally governed by standards set by the capital markets. The investments for these, therefore, shall come from the coffers of the provincial and municipal LGUs.

In conclusion, the financing strategy for the SIAP components places the local leadership right at the scene of the financial investment transactions vis-à-vis marketing for the project packages, advocacy and support to the POs and NGOs participation, catalyzing the expansion of economic opportunities and financing infusion by donor institutions, and most important, **the setting of investment direction for the enhancement of the rural production zones as the key to eradicate poverty and ensure sustainable development of Bohol.**

2.2 LIVESTOCK INTEGRATION FOR FOOD AND ENTERPRISE (LIFE) PROGRAM

2.2.1 Rationale

Bohol is predominantly an agricultural province. Out of its total land area of 411,370 has. approximately 248,000 has. or 60% is devoted to varied agricultural uses. Present survey indicates that roughly 54% of the total households in the province are dependent in agriculture for food and income to support their needs like education, clothing and other basics in life.

Gauging upon the present scenario, farming is getting less profitable in the province. Productivity and sustainability is greatly affected by several factors such as adverse climatic condition, declining soil fertility, high cost of farm inputs, and limited area with increasing number of farming households, unfair market practices and lack of capitalization. These major obstacles have to be addressed if only to save farm families from extreme poverty even depriving them of food for the table.

Urgency for more practical interventions has to be introduced to reverse the existing trend. Cognizant to this fact, our government has to review its existing programs in line with agricultural development. This is for the reason that it has not succeeded in uplifting the sector till the present. It is imperative that something has to be done anew to mitigate some of the problems enumerated above. In so doing, a master plan has to be formulated integrating various systems in every farming endeavor taking into consideration vital factors such as space utilization and sustained farm cash flow.

Livestock and poultry integration to existing farming systems are but viable options to the problem. Integration of which in crop production serves mutually complimentary to both production means. In fact, both have intertwined relationship, as one needs the other. Animals can serve both as source of draft power for farm operations and as a good source of organic fertilizer. On the other hand, crops and its by-products can provide the animal its feed requirement. Aside from such advantage, livestock raising generates income regardless of seasons unlike crops which can be harvested at certain times of the year. It can also maximize space utilization as areas not suited for crops can be used for pasture or range areas.

The extent to which livestock integration can benefit the farm families is unlimited. It does not only provide immediate source of nutritive food for the family and the community but is a source of cash especially in times of emergencies as it is easily saleable. When properly managed, livestock and poultry can also provide capital for future family-based enterprise with which to employ other members of the family. Henceforth, the system can serve as a springboard for families to graduate into higher entrepreneurial endeavors.

2.2.2 Goals/Objectives

1) Goal

Achieve food sufficiency at household level and foster a strong complimentary growth in agri-livestock based economic enterprises.

2) Objectives

1. Provision of livelihood opportunities to farming families;
2. Provision of sustainable cash flow to farm households;
3. Maximum utilization of farm resources, area, manpower and farm products and by products;
4. Production of competitive livestock and poultry products and by products;
5. Supply the domestic and export requirements of livestock and livestock products; and
6. Increase opportunities for family entrepreneurship.

2.2.3 Operational Strategies

1. Promotion of diversified livestock and poultry raising at the household level;
2. Development of modified livestock and poultry loan schemes for POs/Coops and Corporative;
3. Strengthening selection and upgrading program to improve production performance of livestock and poultry;
4. Stabilize and expand breeder-base through genetic resource management;
5. Promotion of contract farming operation for poultry and swine for medium to large scale production; forage and pasture development of idle lands;
6. Establishing joint venture partnerships for exotic farming to support agri-tourism;
7. Development of agri-support credit assistance for livestock-based enterprise through Peoples' Organizations/Coops, thus transforming from a mere household raising into an enterprise level;
8. Promotion of livestock-based enterprise through establishment of pilot and model farmers; and
9. Deliberate development of forage and pasture lot as a precondition for participation of POs for ruminant production using idle land or individual farm lots.

2.2.4 Component Description

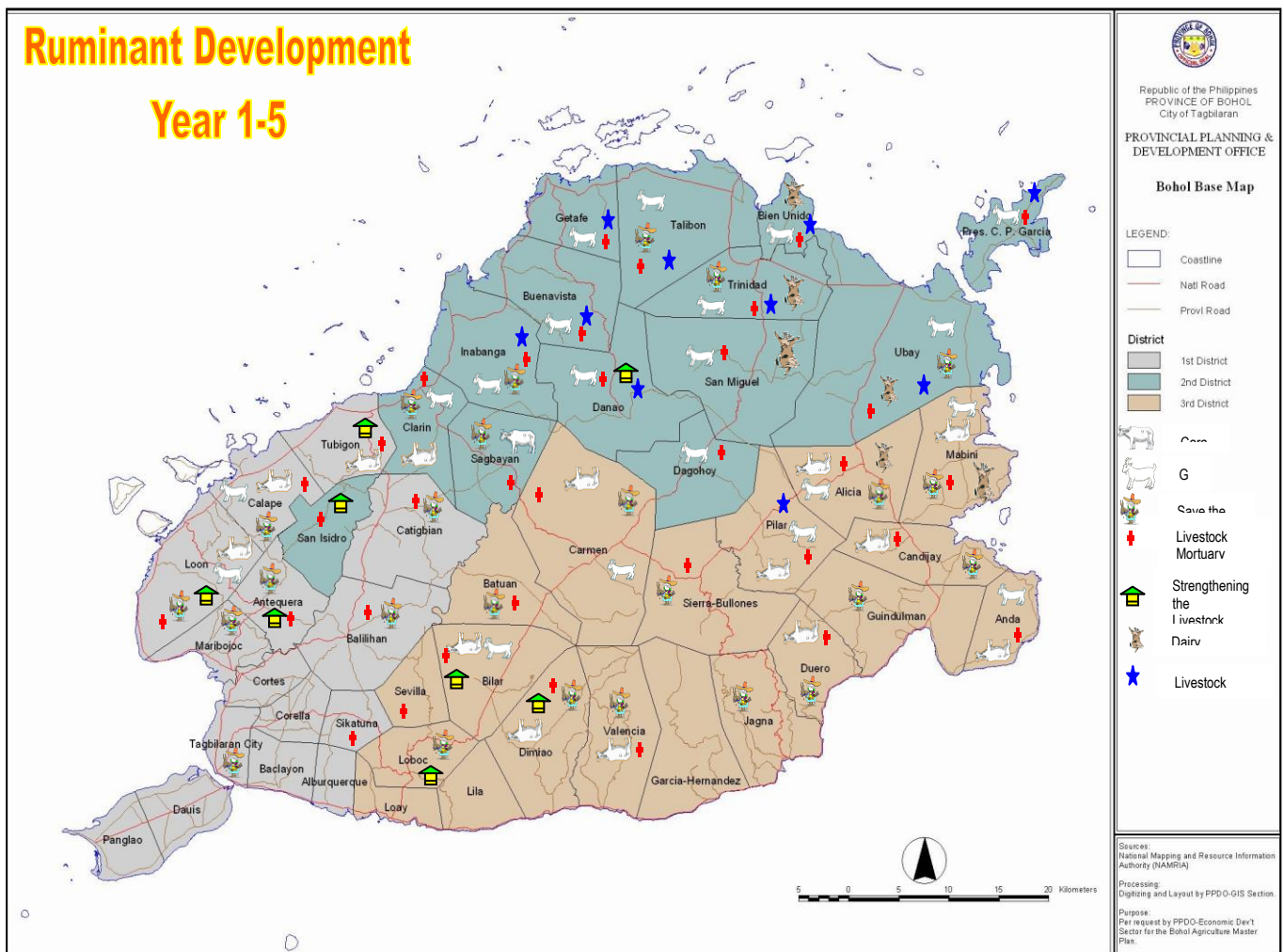
1) Ruminant Development

Ruminant production for the past 5 years has not significantly changed except for a slight increase brought about by the importation of breeders for dispersal program purposes. Reports on Livestock Auction Market transaction as well as records of slaughter and outside shipment showed an increasing extraction trend as against production.

Among the limiting factors to this quantitative growth are the long gestation period of cattle and carabaos, the socio-economic importance as draft animals in case of carabaos, and the decreasing pasture areas. Past experiences on small ruminant production were not sustained because of high losses due to diseases and parasites. Even past dispersal programs failed because of the inappropriate and inadequate care and management given the animals. Also, the lack of understanding on the characteristics of ruminants contributed to low production especially among beginners.

Development approaches for these commodities for the next couple of years will therefore be focused on improving reproductivity. Initial efforts to motivate farmers to raise ruminants must be pursued. Farmers and raisers must be able to understand and appreciate the potentials of ruminants as an enterprise and encourage them to engage in breeding, fattening and even product and by-product processing. The five (5) year ruminant development in Bohol is shown in [Figure III-3](#).

Figure III-3. Ruminant Development, Year 1-5



- (1) Livestock Loan.** A modified livestock loan scheme of a 10-female module per PO shall be put in place to increase ruminant breeder base for both cattle and carabaos. For goats, dual type of breeds per PO will be distributed in identified production areas under crop-livestock integration. In this type of intervention, a 1-buck and 4 does per module will be introduced. Module I will be a complete confinement method that is more applicable to farmer entrepreneurs that have limited space. Another option is Module II that will be a semi-confinement method where animals will be pastured for limited hours in a day.

Under an agreement, distribution of animals shall be through qualified Peoples' Organizations within the cluster zones. Implementation conditions of this type of loan scheme shall involve social preparations to include trainings, completion of pre-distribution requirements and the repayment by the project participant of 2 offsprings per animal received. The first offspring repayment goes back to the project for distribution to other project cooperators while the second one shall be given to the organization to form part of its organizational assets. Periodic monitoring will be conducted to assess health status of animals as well as evaluate the capability of raisers to manage their projects.

- (2) Save the Herd.** Local stocks with excellent prolificacy, adaptability and disease tolerance characteristics shall be preserved. Pregnant animals and good quality bulls that are still serviceable including offsprings produced thru artificial insemination that otherwise should have been slaughtered or shipped out shall be saved.

The buy-back and chattel mortgage is envisioned to minimize if not stop this situation. Initially, a buy-back fund in the amount of P5 M pesos shall be allocated for this purpose. Pregnancy diagnosis through palpation or evaluation of the animal as to its quality as breeder is pre-requisite to slaughter, sale or out-shipment. To accommodate procured animals, a propagation center shall also be made available. The Provincial Livestock and Poultry Raisers Association, Inc. or Federation of POs shall handle project operation while the municipal LGUs shall also be encouraged to put up their own fund.

There shall be options in the buy-back system;

- First - Animals that are sold for slaughter found to be pregnant at slaughterhouses during ante-mortem inspection should be bought and either pooled at the Provincial Production Center or dispersed to pre-identified qualified project partners under prescribed terms and conditions on management and repayments.
- Second - Good quality females especially pregnant ones that are intended for disposal by owners due to family exigencies can also be covered by way of chattel mortgage or directly purchased for dispersal purposes.
- Third – Local carabulls with superior breeding potentials can also be covered to maintain the draft chart of our native carabaos.

(3) PO-based Livestock Mortuary Assistance System. In instances that animals die especially cattle and carabaos, it would mean a big loss to the farmer considering its contribution to his economic activities, the value and the time spent in rearing. In this case, farmers or livestock owners need to have replacement stocks. A PO-based Livestock Mortuary Assistance System (LiMAS) therefore would respond to this kind of situation. This system is now operating with the LETS HELP Bohol Program that covers 157 POs in the 19 partner municipalities of the province and can still be expanded and improved to cover the whole of Bohol.

The implementation of LiMAS shall be focused to the members of registered Peoples' Organizations or Raisers Associations, which shall be organized into an umbrella organization. This would entail the concerted efforts of livestock owners to voluntary membership and payment of agreed amount to cover losses of animals. Policy guidelines shall be formulated and incorporated in an Operations Manual while operation in the first 2 years shall be under the supervision of the Office of the Provincial Veterinarian. Eventually, when the umbrella organization shall have been actively functioning and independent, operation of the LiMAS shall be turned-over in the next succeeding years.

A buffer fund, which is equivalent to at least one half the amount of the PO contributions, is therefore needed. Initially, the Provincial Government may provide this amount while other sources can also be tapped.

(4) Strengthening the Livestock Breeding Services. A 2-pronged breeding approach shall be adopted that will be suited for draft type carabaos and meat and milk for both cattle and carabao. These shall be done through AI and breeder loan.

In areas where large population of breeder animals is present, the LGUs are encouraged to put up AI Centers. To fully operate the center, this should be manned by properly trained and adequately equipped technicians following the selection criteria set by Unified Artificial Insemination Program (UNAIP) of the Department of Agriculture and the Localized AI Program of the Provincial Government.

One strategy that shall be adopted is the selection of pilot barangays where services on social preparation, animal health care and management as well as forage development shall be emphasized. This will ensure better coordination among technicians and animal owners in the conduct of artificial insemination services as well as improve the reproductivity of the animals.

Related modular and short courses shall be tailored to fit the need of the community that shall be done periodically through the "purok" system. Breeding or heat calendars are to be established within the "purok" or at the barangay hall to facilitate the relay of information to the AI technicians and animal owners.

Nothing is new for AI in goats as this has been successfully done at the National Rural Life Center in Dasmariñas, Cavite and was also tried in other areas. Considering the high cost of acquiring pure breed bucks, which entail a lot of capital investment, it is imperative therefore to shift from natural breeding to artificial insemination especially among medium and commercial goat projects. In the next couple of years with the proposed plans for the establishment of semen processing and liquid nitrogen plant in the province, frozen goat semen will be available thus enabling goat raisers to utilize good quality germplasms. The first 5 years of implementation shall be done thru piloting in strategic areas to ensure close monitoring and supervision.

A second option for livestock upgrading that is presently operational in the province should be maintained and expanded. Its implementation is intended for individual livestock raisers / farmers or Peoples' Organizations owning at least 10 heads female carabaos or cattle who are interested to avail breeder males for upgrading purposes. The carabull loan scheme of the Philippine Carabao Center in Ubay shall therefore be adopted for this purpose for both carabaos and cattle. Improved breeds of bucks from dual type with at least 25% to 50% foreign blood will be loaned out within a prescribed period of 6 months to 1 year.

Implementation conditions shall involve social preparations to include trainings, completion of pre-distribution requirements like housing, feeds, drugs and biologics and a livestock mortuary to ensure continuity of the project and replacement of the animal in case of loss.

(5) Dairy Development. Dairy development will answer the nutritional deficiency of Boholanos. It can be incorporated or complemented with other farming systems both upland and lowland.

Dairying for cattle and carabaos has been practiced in Ubay through Ubay Stock Farm and the Philippine Carabao Center. Considering the availability of technology, existing dairy stocks and dairying equipments, a dairy shed shall be organized around this area. It shall be composed of 5 clusters of municipalities to facilitate monitoring, collection and processing of milk in one Center that will be at the PCC. Procurement of additional dairy animals may be necessary to initially augment breeder stocks in these municipalities.

Aside from milk production, cooperators can also be encouraged to produce offsprings to supply the breeder requirements of the neighboring provinces assisted by the National Dairy Authority (NDA). Dairy offspring command better price compared to draft or meat type. Artificial insemination will play a great role in upgrading / purifying island born dairy animals.

Dairying in goats would entail the distribution of dual type of pure breeds thru POs in areas identified for goat production under crop-livestock integration. Each packet will consist of 1 male and 4 female goat that will be distributed to each farmer-cooperator within the organization. In this

type of intervention, two modules will be introduced; module I will be a complete confinement method applicable to farmer entrepreneurs that have only limited space for grazing. Feeding of animals is done by cut and carry system. The farmer has an option to adopt module II or the second method that is semi-confinement that allows the animals to graze freely in the pasture area for a limited number of hours in a day.

Forage and pasture establishment will be compulsory to individuals and POs that will be participating in the project. In as much as land resources is limited, maximum utilization of land will be encouraged thru planting of fodder trees along land boundaries and in hilly and sloping areas not planted with fruit trees. It will be used as contour strips to prevent soil erosion at the same time source of feed for the animals.

Crop-livestock integration projects are proposed under coconut plantations and orchard like mangoes. Considering the limited piece of land, planting of improved grasses and cover crops will be done to improve nutritive value of forage feeds as well as enhance fertility of soil. Assistance will be given to individual and PO partners for acquisition of planting materials that will be used in the establishment of pasture areas.

The Provincial Associations for Small Ruminants, Carabao and Cattle Raisers that have been organized will be the conduit in developing the dairy enterprise in the province. Qualified and interested association members will undergo trainings not only on new technologies for production but also on entrepreneurial skills and processing of products derived from dairy. The association will facilitate sourcing of funds for the operation of the dairy project and at the same time establish linkages to prospective market outlets.

Advocacy shall be conducted in coordination with the academe and probably the barangay councils with kids and school children as participants. Feeding or milk drinking promotions shall be conducted as part of these advocacy efforts.

(6)Livestock Fattening. Cattle fattening is nothing new in the province as a number of raisers were into this venture years back. However, the enterprise has not been sustained. Among the primary reasons probably are the lack of promotional strategies down to the farmer's level and the absence of proper meat grading system at the local market.

Feedlot fattening does not require complicated techniques and can go hand in hand with other farming systems. It provides the farmer with extra income and allows the use of cheap, plentiful farm by-products, which might otherwise be wasted.

However, carabao fattening is something new and promising. Based on interviews, carabeef from fattened carabaos is equally palatable and also command a good price.

Modeling and joint venture system shall be adopted in the first 3 years of operation. Selection of participating farmers and organizations shall be based on the established criteria that shall be set by the implementing agency. A 2-head module per farmer or a 5-head module for organizations shall be introduced. Initial stocks for this purpose may be provided under a loan scheme or the cooperator can avail from any financing programs offered by banks and other financing institutions.

Similar to the implementation conditions of other ruminant projects, this type of enterprise shall involve social preparations to include trainings, completion of requirements like housing, forage and pasture development and a livestock mortuary to ensure continuity of the project.

2) Poultry Development

Based on records, the chicken population has decreased in the past five years. This is one indication of increasing demand for poultry products in the local market for native and commercial chickens. With the per capita consumption of 4.68 kg requirement of poultry products like meat and egg is still high versus the present supply of these products in the local market.

The industry has already private led undertakings thru the contract-farming scheme of operations. But the gap between supply and demand has remained wide. Therefore, it is indeed necessary to further strengthen and stabilize poultry production in order to meet the increasing demand.

Development programs and projects will be geared towards making available sufficient poultry products not only for the local market but also for rural families where malnutrition is a common problem. The program also intends to develop native chickens, which has a competitive advantage with its superior organoleptic quality compared to the commercial chicken.

In the early 1980s, duck raising has been introduced in the province as a means of biological control against golden snail that has infested lowland rice areas. At present, only few farmers remained with this type of fowl. The reason probably is the lack of efforts to promote duck as food commodity. In the local market trading, balut consumption has soared to as high as 50,000 eggs a week. In nearby Metro Cebu, the consumption is about 400,000 pieces a week. The bulk of the supply is coming from Luzon and Mindanao. This consumption volume provides a big opportunity for Bohol to venture into big scale duck-egg production considering the presence of inland bodies of water and big lowland areas where natural food for the ducks abound. Other products that are picking up in demand are duck salted eggs and some specialties as "patoten", ham and "caldereta". [Figure III-4](#) is a map showing poultry development in Bohol in the span of five (5) years.

Establishment of contract growing for native chicken will be initially done through modeling for the first 2 years. A 50-chick module can be granted through qualified POs under a “friendly loan scheme”. Initial stocks can be provided by the Provincial Production Center while housing and a free-range area shall be the equity of the farmer. Part of this loan package is the provision of technical assistance and the market linkage that will be established. As a pre-requisite, the project cooperator shall undergo social preparations like technical training and value formation and the preparation of the area.

(3) Duck Production cum Demonstration. Establishment of duck development projects cum demonstration areas will be focused on the 6 identified production zones for the first 2 years of project implementation. The potential sites are those areas particularly with sufficient source of water, e.g. irrigated rice areas and swamps where supply of fresh water snails are abundant as these are good duck food.

The rice-duck culture cropping system is one option that can be adopted by lowland rice farmers to complement with the cropping pattern of rice. This is to minimize feed inputs at the same time serve as a control measure for golden snail.

The project will provide quality breeds of ducks to be distributed through Peoples' Organizations in the cluster zones for 2 years. The partner POs in the target communities will serve as conduit for most of the project support inputs and services. Duck pullets will be purchased from accredited suppliers in Mindanao region, which is more adjacent to Bohol, to avoid stress. These birds will be distributed to the partner POs who will be responsible for its distribution to farmer-members in their organization.

Locally available materials will be used in the construction of duck houses as equity of the cooperator. Part of the feed requirement will be co-shared by the implementing agency for the first 6-months of operation to augment feed resource of the cooperator.

Capability building will be intensified thru trainings and field exposure trips to strengthen POs in the targeted areas. Technology promotion and entrepreneurial activities will be incorporated for effective management systems. Although ducks are sturdy and more resistant compared to chickens, health programs will still be instituted to prevent and control the occurrence of pests and diseases.

As a repayment scheme, the farmer- cooperator has to pay 2 heads of duck, 5-6 months old of similar sex, for every head received. These repayment ducks will then be distributed to other interested POs in the cluster zones.

3) Swine Development

In the promotion of agricultural development, the government has been implementing various programs to include the livestock sector, which are focused on genetic upgrading of local stocks to support production particularly on swine. Over the years, swine raising has been considered an integral part of livelihood programs towards countryside development. It is a very popular enterprise in Bohol such that almost every farming household in the rural areas raises swine.

Based on data, swine population in the province showed a slight increase of 9% from year 2000, which is equivalent to 24,363 heads. Pork production in the year 2004 has reached up to 7,736 metric tons. At present, swine industry is moving towards self-sufficiency in pork production. Considering the high demand for pork as the major source of protein for Boholanos, the enthusiasm for the swine industry lives on. Although the private sector takes the lead in the development, the government still has to take the share of responsibilities towards helping the farmers for a more profitable farming enterprise.

With the present situation in Region 7, data reveals that the region is importing 74,000 heads of swine for processing. This indicates that there is still a great potential for the swine industry to meet the local demand of pork as raw material for processing.

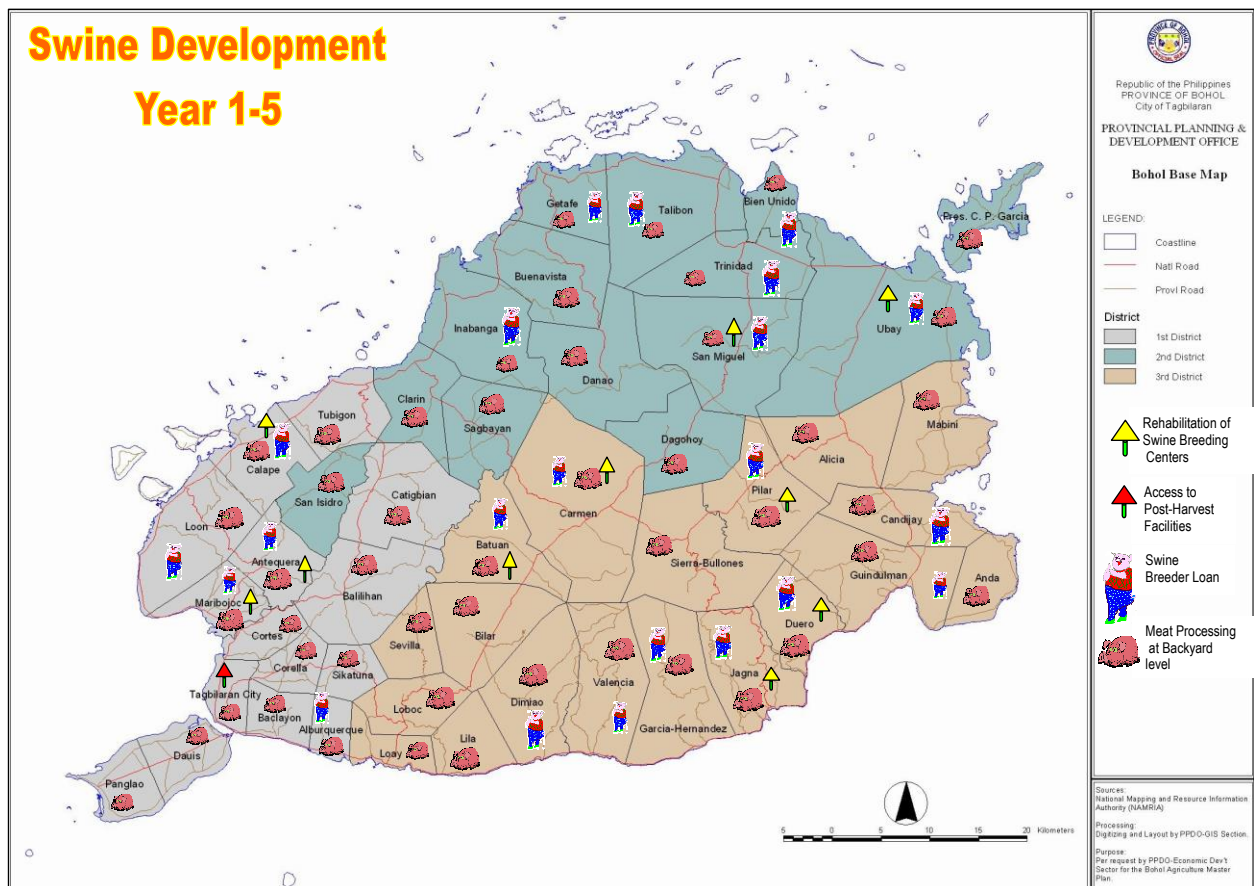
With swine gaining a competitive edge over other commodities, there is a dire need for the industry to be sustained in the years to come. Other aspects, which contribute to the growth of the industry, include available production technology, utilization of local feed ingredients and maximum utilization of family labor. [Figure III-5](#) shows swine production in Bohol in the next five (5) years.

(1) Establishment and Rehabilitation of Swine Breeding Centers. Since the industry is already well developed with the private sector on the lead, development efforts would be centered on strengthening breeding programs through proper selection of breeder stocks coupled with good breeding management and system. The existing centers operating at present need to be rehabilitated and upgraded to cater to expanded areas of service and to meet production standards. While additional new centers need to be established in strategic expansion municipalities, replacement of breeder boars must be programmed to avoid inbreeding. Re-stocking of Centers can be done by the concerned LGU to ensure maintenance of good breeding quality of breeders.

Project establishment and operation may be LGU-managed, by registered BALA Organization or a Swine Raisers Association. Funding support may come from LGUs, funding agencies, NGOs, donors, grants or in case of associations, from lending or credit facilities that offer "soft term" loans.

(2) Access to Post-Harvest Facilities. To ensure fair market price of swine and give opportunity to maximize profit out of the farming enterprise, raisers should be encouraged to participate in the post-harvest activities of the existing facilities like VILFC and LOMs in marketing live animals.

Figure III-5. Swine Development, Year 1-5



(3) Swine Breeder Loan. Based on the records of the Office of the Provincial Veterinarian, boar for hire operators exist in the different parts of the province. Even with the operation of AI in swine, some backyard raisers still welcome the system. To improve this system, these operators shall be allowed to avail boars thru livestock loan and backyard raisers also may avail breeder females under certain conditions, to replace and upgrade their existing stocks.

This would entail production of pigs at the Provincial Production Center for this purpose. Breeders can also be availed through private feed companies undergoing promotional programs or from recognized breeder farms. In this manner, the operators and the raisers are provided with the assurance of good quality breeders and prevent possible in-breeding, close monitoring and extension of technical services.

(4) Meat Processing at the Backyard Level. With the sufficient pork production in the province, there is a potential for meat processing at the backyard level. This is a way of value adding to the product and, at the same time, utilizing family labor particularly the housewives. Moreover, processed meat products have gained acceptance in the local market.

4) Exotic Farming

(1) Crocodile Farming. Although capital intensive and a long-term industry, crocodile farming or ranching is as demanding as any other agricultural industry that requires hard work and an eye for export-oriented markets. The demand for the primary croc product like the “green skin” corresponds to the trend for quality leather products in the world market.

A pioneering enterprise in the province, croc farming can complement agri-tourism. The secondary product like croc's meat, although dependent on the demand for skin, can be a unique cuisine to domestic and foreign tourists in the province. In all levels, crocs can also be interesting objects for educational purposes and researches.

As there is no standard method for rearing crocs and excessive land area is not a requirement, production systems can be done in a manner that suits a particular establishment and situation.

For the first 5 years of project implementation, production system can be done through the establishment of pilot production demo. This scheme calls for interested investors or project cooperators whether private individuals or corporations to venture on the project. There is no specific production area requirement for as long as it qualifies the standards focused on human safety and possible environmental hazards.

Corresponding provincial legislations that would define the conditions for its operation shall be formulated and strictly enforced in consonance with the policies provided for in the Animal Welfare Act and the DENR.

Intensive trainings and exposure or internship are pre-requisites to its project operation. The Provincial Government, particularly the concerned agencies, shall play a significant role in extending technical advisory, monitoring of operation and compliance to established policies and the establishment and operation of support facilities like laboratories and hatcheries.

The next succeeding years would entail adoption of the project through joint venture partnership by investors and exporters or foreign investors. It is envisioned that during this times, processing of the “green skin” shall be done locally within world market standards. To encourage integration in selected farming systems like livestock and allow an avenue to increasing the industry's number, contract growing can also be done.

(2) Ostrich Farming. Much like other branches of farming, ostrich farming is not new as farms are now established in some parts of the country like Luzon and Mindanao. Ostrich production can very well complement agri-tourism. The popularity of ostrich meat due to its nutritive value can be an interesting cuisine to the health conscious people and to domestic and foreign tourists. In addition, the leather, which is extremely durable with unique markings and decorative products like feathers and eggs, can also provide attraction and opportunities for export-oriented markets.

Modeling shall be adopted during the first 5 years of project implementation, which shall be done through interested investors and corporations. A significant role of the Provincial Government comes in form of technical advisory, project monitoring, support facilities like hatcheries and laboratories and policies defining project implementation inclusive of human and environmental safety standards. Later in the next succeeding years, contract growing at the farm level through organized Peoples' Organization or corporative can be opted for expanding the industry.

- (3) Bee Farming.** The existence of a rich green environment of the province makes beekeeping a promising enterprise. Apiculture (beekeeping) does not require complicated technologies but only need the available wide variety of floral species and an apiary site and does not compete utilization of croplands and other farming systems.

Bees farming can be an attraction and therefore very well complements with agri-tourism. It can be an interesting objects for educational and research purposes. Products like honey, pollen, royal jelly, propolis and beeswax provides an alternative source of income aside from the enhancing effect to productivity of farm crops brought about by the pollinating characteristics of the bees. Apiculture-crop integration is something that has to be given consideration.

There is nothing new of this type of endeavor as evidenced by existence of a number of beekeepers in the different parts of the province. Thus, development of the industry would be focused on the following;

- **Queen Bee Production.** Pilot farmers or private entrepreneurs will be selected to specialize the production and rearing of queen bees. The LGU assistance comes in form of technical advisory as well as the provision of a 5-colony apiary starter stock in an interest-free loan scheme. Selection of queen bee producers shall be based on the following:
 - Interest on beekeeping;
 - Must own a farmlot that is located in areas planted to nectar-bearing flora like coconut, citrus, corn, coffee, mango and near water bodies with continuous supply of water;
 - Must actively participate in all trainings to be conducted;
 - Must be an active member of good standing in any organized farmers group (POs, Cooperative, Associations);
 - Must be able to provide counterpart equity in the form of labor, tools/equipment required by the project.

A corresponding memorandum of agreement defining the conditions of the assistance shall be forged between the PO and its project cooperator with the LGU.

- **Trainings.** Beekeeping Courses shall be conducted covering 3 modular sessions to include field exposures and practicum, namely: (1) Basic Beekeeping, (2) Advance Beekeeping to include Queen

Bee Rearing/Production and Royal Jelly Production, and (3) Product Development and Processing to include wax, soap, candles and other products from beekeeping. A 2-colony apiary shall be loaned out as starter stock to every successful participant. Selection of project participants shall be based on the same criteria established for queen bee producers.

- **Strengthening of Beekeepers Association.** All beekeepers shall be obliged membership to the Provincial Beekeepers Association. This will provide them the avenue for technology updating, technical advisory, product development as well as market linkages. To give importance of the industry and its contribution to the environment, a sort of a promotional strategy shall be scheduled annually where display of products, recognitions as well as contests shall be held with the Beekeepers' Association on the lead.
- **Conservation of Native Bees (Apis cerana) or the Giant Wild Honeybee “Putyukan”.** This type of bees prefer to stay in open areas where there are trees for nesting and most often they are not exempted from abusive honeybee hunters who destroy their hives during harvest. Stopping this practice is quite remote. Rather, it would be appropriate to conduct an advocacy in all levels, which will be tied up with the academe. Trainings will also be conducted particularly with the participation of honeybee hunters who will later on be organized and deputized to save this species.

(4) Butterfly Ranching. Butterfly farming is an alternative and progressive endeavor with respect to impact on the immediate surroundings. This will encourage planting a number of native plants in and around the farm aside from the employment and cash income for people who live in rural villages, in a way that does not disrupt traditional village lifestyles. This industry therefore can very well complement agri-tourism and generate revenues.

In the province, only a few butterfly enthusiasts have been into this venture probably because of the lack of promotional strategies and the promotion of butterflies as an enterprise. Thus, developing the industry will give focus on areas of production, product development and marketing. This would entail modeling either at farmer's level particularly encouraging the participation of housewives and children or through interested corporations that are into tourism business. Assistance may come in form of linkages to market outlets, technical assistance to producers' level, trainings and technology updating as well as providing a venue for local and foreign tourists.

(5) Quail Farming. Commercial quail production in the province progressed only for a short period of time. Presently, the available quail products like eggs sold in the local market are mostly coming from sources outside Bohol. Among the reasons of the declining interests of producers are marketing and production problems.

Producing quails can be an alternative enterprise for many farming operations. During this present critical period of malnutrition and price increase, quails can respond to the consumers' need for cheap eggs and meat. Quails can be a good food source both for home and in many dining establishments.

Raising this type of birds does not require complicated technologies such that they can be raised in any suitable and comfortable place in the house and may be undertaken with the participation of housewives and children.

Promotion of quail production shall take off with a piloting strategy through establishing a demonstration project within the level of the local government unit. This will showcase production technologies at the same time generating revenue and employment. The next step would entail production at farmer's level, through women's group or with out-of-school youths, which shall be coordinated with the OPSWD. Assistance may come in form of linkages to market outlets, technical assistance at producers' level, and trainings both on the aspects of production and product development.

Promotional campaign shall be done through egg feeding of school children in identified schools or areas with high malnutrition cases. Other strategies shall be conducted as part of advocacy efforts on local quail production and marketing promotions.

(6) Rabbit Farming. Rabbits are very well known as pets and have not been popularized in the province as an enterprise. Although, rabbitry is not a "get rich quick" venture, it requires attention and sacrifices. There are many potential benefits that may be realized from backyard raising.

Primarily, with the soaring prices of meat, people can turn to rabbit as a cheap source of animal protein. Rabbits produce "white meat" that is fine-grained, high in protein, low in fat, highly palatable, low in cholesterol and that can be substituted for poultry in most recipes (Randy Sell, Dept. of Agricultural Economics, NDSU). Other benefits include: (i) educational opportunities for children, (ii) an enjoyable and family-focused activity, (iii) compliments the efforts of serious gardener as manure makes excellent fertilizer, and (iv) skins and pelts can be used as fur and for a variety of toys (Lukefahr, Paschal and Ford).

Integrating this type of livestock in the farm can provide supplemental income and help farmers make use of some underutilized resources like labor and buildings. This undertaking can be easily handled with the participation of children and housewives, at the same time teaching them the responsibility and acceptance of livestock as a source of food and income.

Piloting shall be adopted during the first 2 years of project implementation. This would entail putting-up of a demonstration area within the LGU level, which shall focus on production, product development and marketing

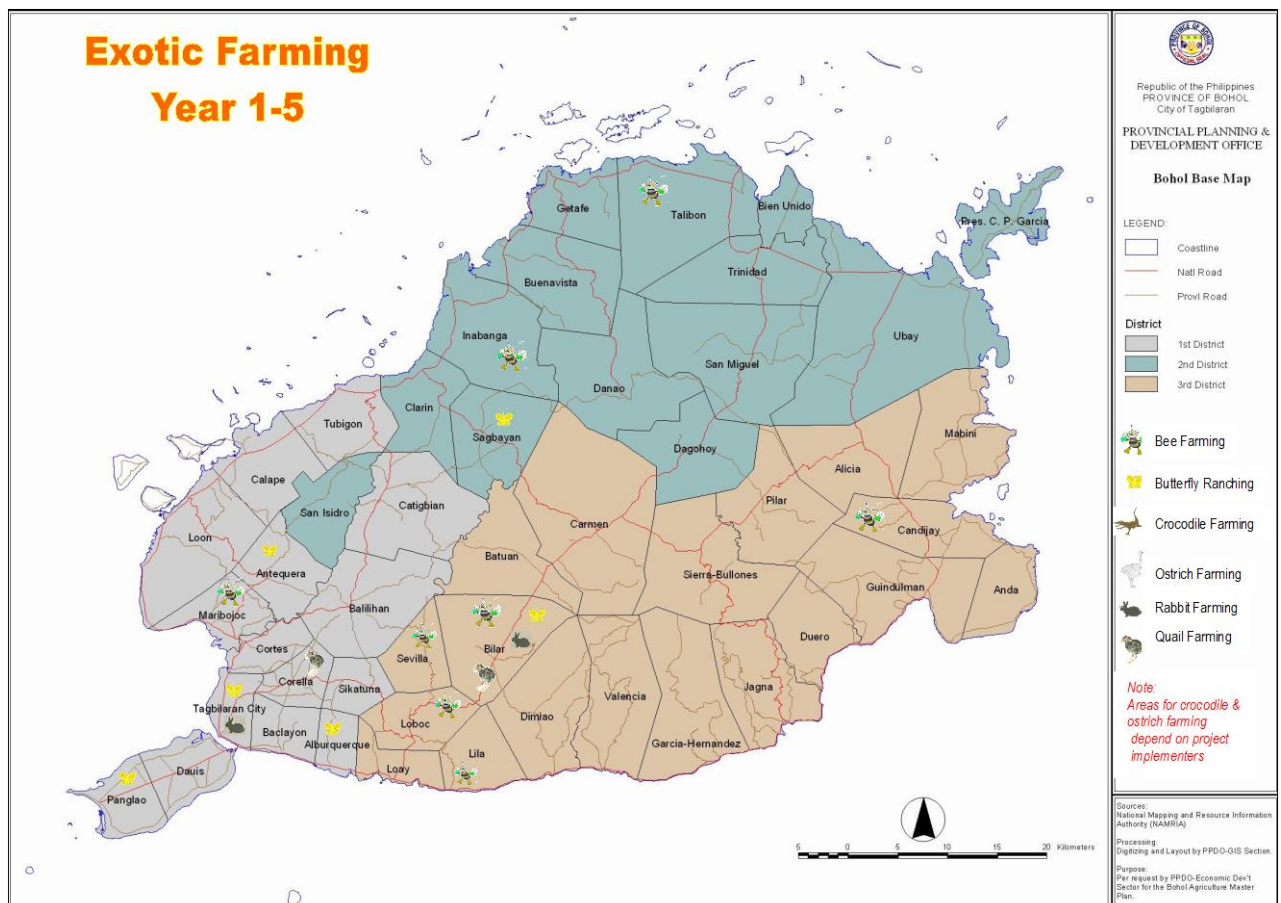
strategies. Promotional campaign shall be done through taster's test or cooking demo with groups of women's, culinary enthusiasts, or with dining establishments. Rabbit's meat can be an interesting cuisine to the health conscious people and to local and foreign tourists.

As product acceptance progresses, rabbitry can be done through cooperators or producers which shall be given the necessary assistance through a "friendly loan scheme" during the first production phase. These producers can be farmers, PO particularly women's association, out-of-school youths or school children who are matured enough to undergo the enterprise.

Assistance may come in form of linkages to market outlets, technical assistance at producers' level, and trainings both on the aspects of production and product development.

Figure III-6 shows the development of Exotic Farms in Bohol in the span of five (5) years.

Figure III-6. Exotic Farming, Year 1-5



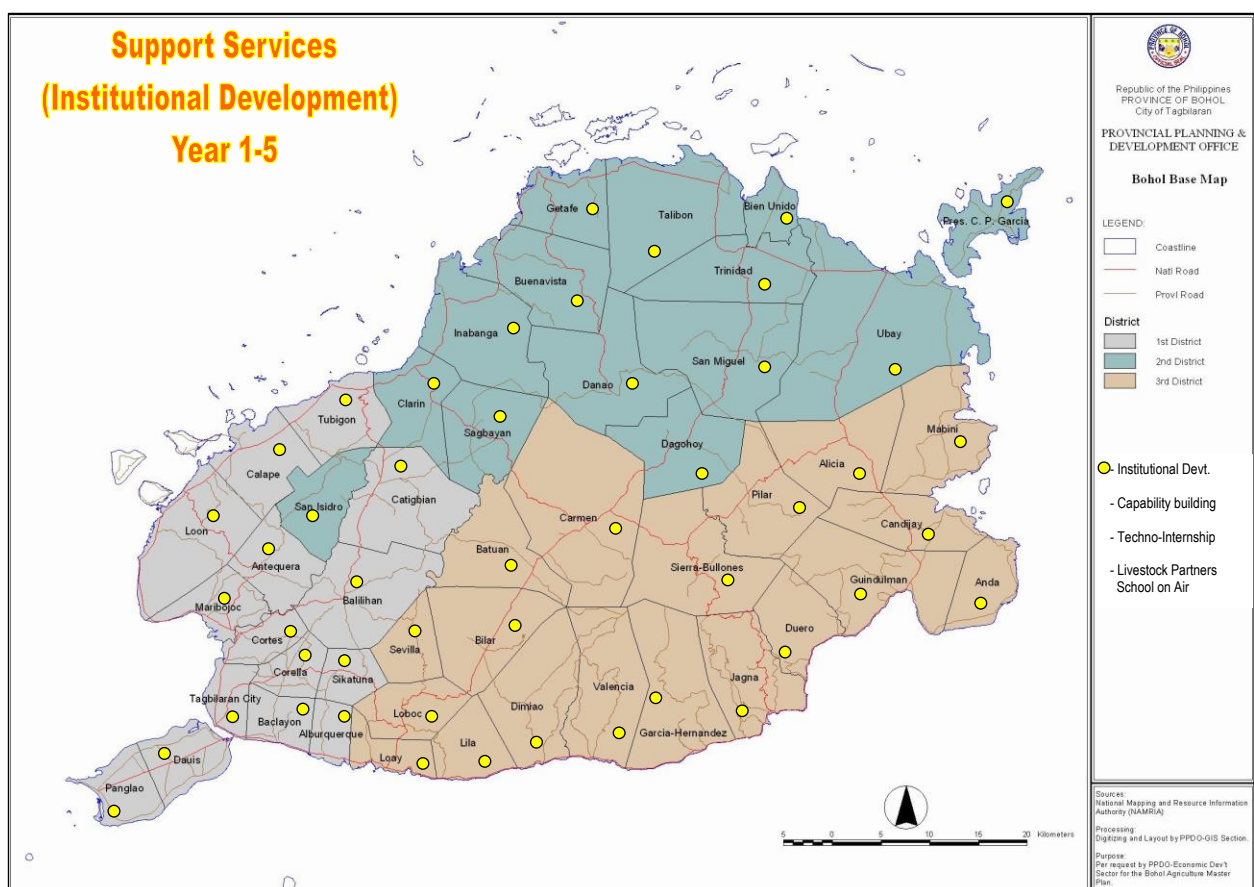
5) Support Services

(1) Institutional Development Support

- a. Institutional Building** – In the province, there already exist both government and non-government institutions. However, there is still a need to develop more of such institutions like People's Organizations and Cooperative to serve as conduit and partners in the implementation of the program.

Initially, Associations and Cooperatives of commodity producers and entrepreneurs will be formed in target municipalities. These will be federated to come up with a provincial network that will coordinate and facilitate delivery of services concentrating on production, processing and marketing. *Figure III-7* is a map presenting the different centers for Institutional Building to be developed within the span of five (5) years.

Figure III-7. Institutional Development, Year 1-5



Associations for carabao, cattle, goat, swine and poultry raisers will be strengthened and integrated to form a single “umbrella” body called the Provincial Livestock and Poultry Association, Incorporated which will oversee and coordinate operations of primary livestock-based

enterprises all over the province. Livestock-based establishment operators can also be organized to form part of the network. There is an imperative need to systematize these operations in order to ensure quantitative and qualitative growth and development that will meet national and global standards.

- b. Capability Building and Strengthening** – Program implementers from the government and non-government sectors will be trained and equipped with relevant technical expertise as well as techniques on extension, farm planning, project management, information technology and social mobilization. To upgrade service standards, specialization grants and exposures, both local and abroad shall be programmed based on established guidelines. Hiring of additional qualified manpower to augment the inadequate number of existing personnel would greatly enhance delivery of services to the communities.

Local institutions especially in convergence areas and project sites and the Barangay Livestock Aides (BALA) will likewise be capacitated thru training and exposure (refer [Section 3.5 Local Social and Institutional Strengthening for detailed presentation](#)) to actual situations relevant to the program aside from the provision of appropriate logistics, paraphernalia and livelihood projects in a counterparting system. Scholarship grants can also be extended in form of short-term specialization studies or sponsorship that shall be linked with the private sector, the academe or other government institutions of similar interests.

A Techno-Internship Program for Livestock Farmers and Entrepreneurs (TIP for LIFE) shall also be implemented where interested farmer-entrepreneur and students can undergo training, hands-on application and exposures to livestock technologies. This program maybe coordinated with the Department of Agriculture or its line agencies of similar orientation, the academe and other learning institutions.

One possible causes of low livestock productivity is the inability of farmers particularly in remote areas to be informed on technology updates and innovations. With this scenario, strengthening the farmers' ability to adopt productive technology can be easier and faster through education on air or a "Livestock Partner's School on Air". This should be done periodically and can be linked with the Department of Agriculture, the radio and television stations willing to undertake the responsibility at no cost.

(2) Regulatory Support

- a. Veterinary Quarantine** – The Veterinary Quarantine Services is the first line of defense against the spread of animal pests and diseases. This is carried out by regulating movements of people and commodities in airports, seaports and other points of entries in and out a protected area.

In Bohol, quarantine offices or posts are found at the Tagbilaran seaport and airport, which are manned by one (1) veterinarian and two (2) livestock personnel as support staff. No other quarantine facility exists elsewhere in the province.

The other ports where movements of people and commodities are significant are those of Garcia Hernandez, Jagna, Ubay, Talibon, Getafe, Inabanga, Clarin, Tubigon and Loon. These ports are manned on part-time basis very irregularly and therefore very porous when it comes to rendering effective services.

An organized, systematic delivery and conduct of quarantine service is indeed very urgent and necessary through establishment of a strong and well-organized provincial quarantine network in coordination with the Department of Agriculture -Regional Field Unit No. 7 (DA-RFU7) and the Bureau of Animal Industry.

The Provincial Veterinarian in tandem with the Veterinary Quarantine Officer assigned by DA to the province will head the network. This set-up is a consideration of the fact that the development of the local livestock and poultry industry as well as the welfare of the people relative to veterinary public health and food safety is assigned through operations of pertinent laws to the Office of the Provincial Veterinarian.

As component of the network, resources and facilities will be put in place like manpower, office devices and equipment, synages, footbath, incinerator, communication and transport facilities.

As the province is aiming to develop the livestock and poultry industry towards international standards, it is therefore of utmost importance to keep and maintain Bohol free of Foot and Mouth Disease and Bird Flu. Furthermore, a big boost to agri-tourism is the elimination of the dreaded rabies disease through strict quarantine and regulation of dog movement.

- b. Licensing, Registration and Accreditation** – At present, mainly the DA-RFU 7, National Meat Inspection Service and the Bureau of Animal Industry carry out licensing, registration and accreditation of livestock-related establishments. Accreditation of organized stakeholders, animal handlers and other related entities is not done at all. However, these offices lack personnel to perform these functions, thus deputizing personnel from LGU is resorted to.

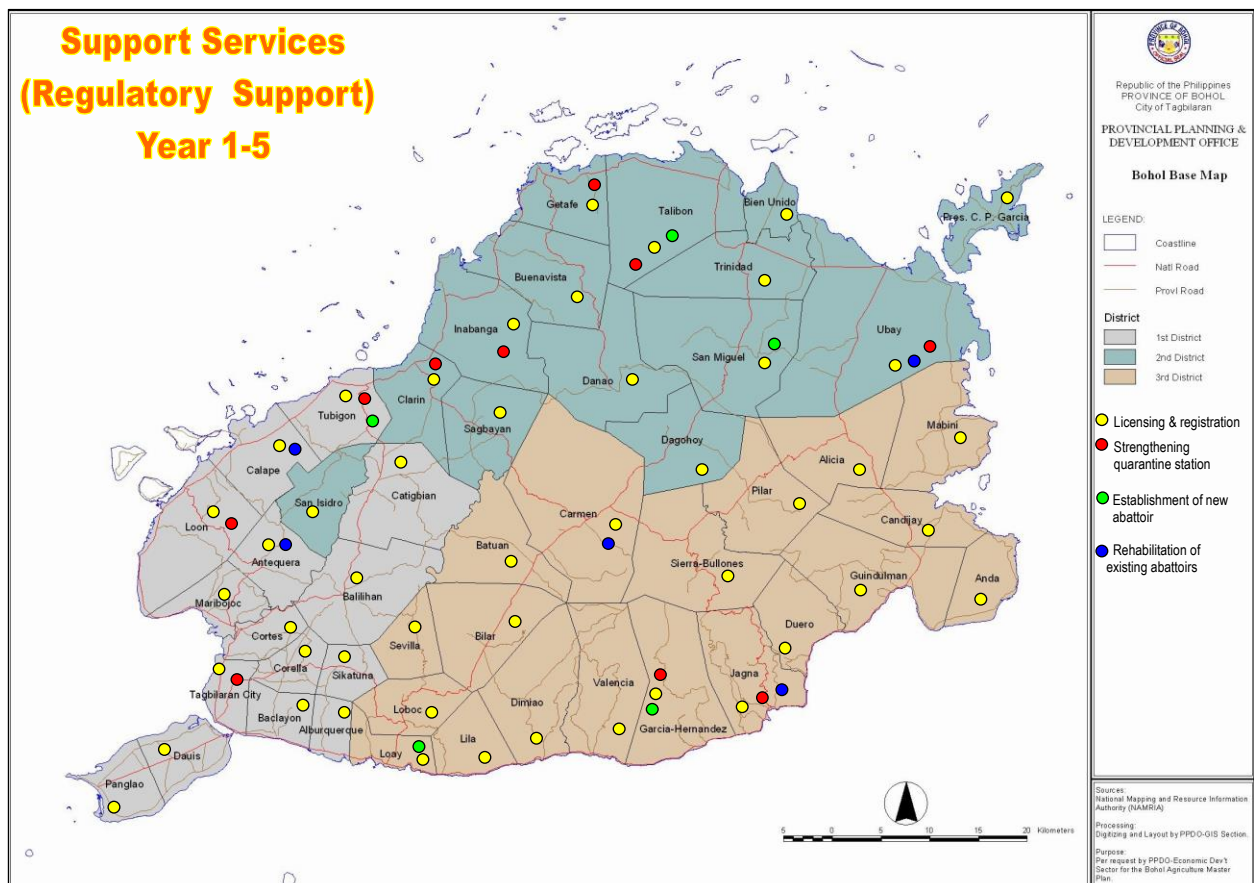
The proper conduct and strengthening of these regulatory functions will enhance the promotion of product quality and food safety. In the process, revenues are also generated. For this purpose, a formal agreement shall be forged between concerned agencies. Local ordinances, regulations and policies within the bounds of law to support the proper execution of the aforesaid regulatory functions shall be promulgated. Provision of logistical support and paraphernalia in addition to the installation of a central unit based at the Office of the Provincial Veterinarian will enhance implementation. Supervision over

similar units established in strategic municipalities with ports shall be within the Provincial Veterinarian.

- c. Meat Inspection** – The meat inspection services have been devolved to the LGUs but under the technical supervision of the National Meat Inspection Services (NMIS) formerly the NMIC. Abattoirs, dressing plants and processing plants are the major support facilities manned by fully-trained personnel. There are 2 dressing plants; only one is functional at present, and no processing plants nor storage facilities and refrigerated vans in the province. To respond to these inadequacies, considerations are focused on upgrading the classification of the Tagbilaran City Abattoir to triple “AAA” and equip it to meet international standards; establish class “A” abattoirs in production areas such as Jagna, Ubay, Carmen, Talibon, Tubigon and Catigbian and class “B” slaughterhouses in all other municipalities. This will ensure safe and better quality of meat for sale and for consumption.

Other considerations include the establishment of a meat laboratory as component of the triple “A” livestock complex of Tagbilaran City to look after the quality of meat and other products passing thru the facility. This will be under the joint administrative supervision of the City Veterinarian and the Provincial Veterinarian and the technical supervision by the National Meat Inspection Services. [Figure III-8](#) is a map showing the different regulatory support centers and it's projected growth in the span of five (5) years.

Figure III-8. Regulatory Support, Year 1-5



(3) Production Support

- a. Animal Health Services** – This addresses the area of disease prevention and control. The important facility that is direly needed is a Provincial Veterinary Diagnostic Laboratory, which will be linked to the Regional Animal Disease Diagnostic Laboratory of DA-RFU 7 and the Philippine Animal Health Center of the Bureau of Animal Industry.

A joint City and Provincial Veterinary Laboratory has been envisioned to be put up in the abattoir complex of Tagbilaran City that will cater to product quality control. This will be capacitated in terms of equipment and competent manpower in order to handle diagnosis of animal pests and diseases.

Animal health services shall be sustained and even expanded to cover more animals that will be protected and treated. Based on surveys and scientific studies, at least 3% of the total value of the animal population in the Philippines including that of Bohol is lost thru pests and diseases. Translated in monetary terms, this would amount to a national total of P3.8 B of which P72 M comes from Bohol. This can be reduced from 3% to 2% thru proper vaccination and parasitic control. And this would translate to P21.8 M, as value of the animals saved from mortalities and morbidities caused by pest and diseases in Bohol alone per year.

- b. Pasture and Feed Grains** – Pastures or grasslands are generally native in vegetation. Small patches of areas planted to improved species are found in private farmers and organizations where pasture development is a requisite to receiving dispersal projects. Larger areas are developed in government farms like the Philippine Carabao Center and Ubay Stock Farm in Ubay and the Provincial Livestock and Poultry Farm in Bilar.

Expansion of improved areas is a consideration. In as much as land resources is limited, maximum utilization of land shall be encouraged thru planting of fodder trees along land boundaries and in hilly and sloping areas not planted with fruit trees. The use of these fodder trees, which can withstand better the ill effects of weather extremes than grasses, help control soil degradation aids in watershed development and are therefore, ecology and environment friendly. It will be used as contour strips to prevent soil erosion at the same time source of feed for the animal.

Forage and pasture establishment will be compulsory to individuals and POs that will be participating in any ruminant projects. The proposed crop- livestock integration would be targeting areas under coconut plantations, orchards like mangoes and under tree crops or "silvipasture". Assistance will be given to individual and PO partners for acquisition of planting materials that will be used in the establishment of forage areas.

An aggregate area of at least 1,000 has may be established in farm boundaries, marginal lands and land slopes. Herbage produced from

this forage area can already support about 10,000 animals on a cut-and-carry basis if properly managed. This forage trees last very much longer than grasses, therefore, return on investment is likewise much higher. To pursue this program, the establishment of seedbanks or nurseries for the propagation of planting materials is needed.

Feedgrain production will be undertaken in conjunction with prevailing corn production program of the national and local governments. Sorghum may also be included especially in areas where corn does not perform well. Past experiences and observations showed that sorghum fare better than corn in acidic soils.

- c. Strengthening the Localized Artificial Insemination Services** – The AI program for cattle and carabao in Bohol is performing well and has the highest conception rate and calf dropped among the provinces in the country. This should be sustained and even improved thru the following interventions; a strengthening program shall be implemented to cover advance courses for existing technicians, procurement of equipments and paraphernalia to include communication and mobility. The implementation shall be coordinated with other government institutions of similar interests and mandate like the Philippine Carabao Center, the Bureau of Animal Industry-Livestock Development Council, the Department of Agriculture and possible non-government partners like JICA, PACAP and others.

Professionalizing AI is envisioned in the next 5 years. The Provincial Government through the Office of the Provincial Veterinarian in an interim capacity shall establish a classification standard for government AI technicians and practitioners in the absence of any government entity charged by such duty or responsibilities. This classification shall be earned by the technicians or practitioners thru the quality of performance within a prescribed period of time.

Eventually, AI services will be for a fee and becomes a viable occupation. Expansion of service coverage where it is possible and feasible is targeted in the next 5 years.

- d. Waste Management and Utilization** – Manure, feeds and soilage leftover will be gathered and utilized as fertilizer. This will support the organic farming program being promoted in the province. Biogas production will also be promoted as source of fuel to replace imported oil products, which are becoming more and more expensive. Demo sites to initially showcase the technology shall be established in addition to the conduct of trainings and exposures.
- e. Product and By-product Development** – As a component of the existing livestock facility complex in Tagbilaran City, a processing laboratory has been envisioned to be put up which will serve as research and training center for livestock and poultry producers and prospective entrepreneurs who wish to gain added values to this animal products and engage in business.

A rendering plant is also a component of this said facility complex, which will process by-products of slaughter such as hides, hooves, blood, bones, hairs, feathers and others into durable and saleable items.

- f. Strengthening the Operation of the Provincial Livestock and Poultry Farm** – The existing Provincial Livestock and Poultry Farm is a government facility owned by the Provincial Government and managed by the Office of the Provincial Veterinarian. It is located at Roxas, Bilar with an area of about 25.0 has. with on-going projects like goat, carabao and poultry production. The Center also serves as the Pooling Area for program animals under the LETS HELP BOHOL Program.

Primarily, establishing the Farm aims to: serve as a training venue for students, livestock raisers and farmers, a showcase of livestock-related technologies that can be adaptable at farmers level and a production area for dispersal animals.

Today's operation has been slowed down as facilities need to be rehabilitated and some need to be established. Additional animal sheds need to be constructed to accommodate farm-born stocks and breeders that shall be infused later on. Other facilities that are also very necessary include carabaos wallows, perimeter and divisional fences, additional range area and a hatchery to support the breeder requirements for chicken and ducks that shall be distributed to project participants.

Forage and pasture area rehabilitation and expansion must be done to support the feed requirements of existing animals and also serve as seed bank for farmers who shall venture on ruminant production. For better productive performance, drugs, biologics, feeds and supplements will also be provided.

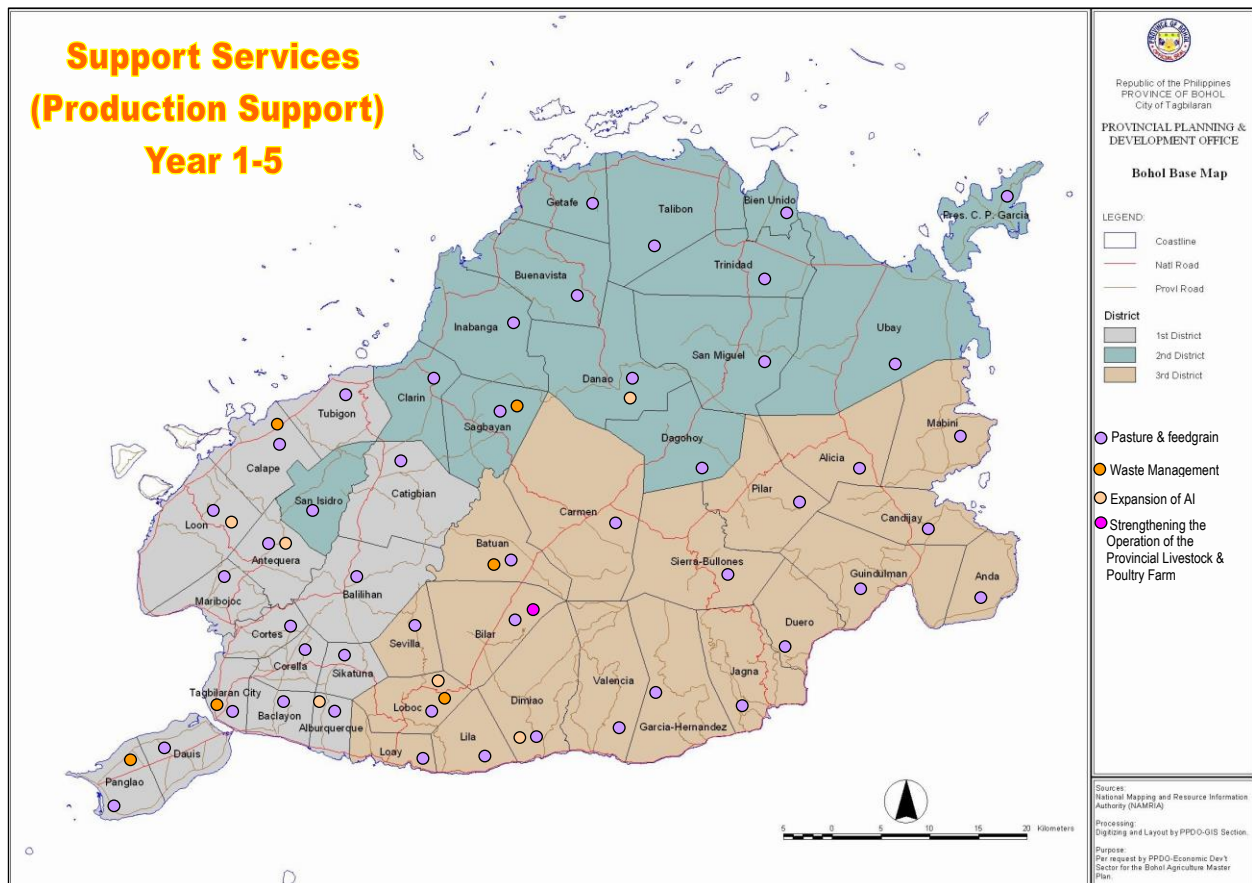
To complement the implementation of TIP for LIFE, a training center complete with furniture and fixtures can be constructed. Farm activities and operation can be tied up with research institutions, government line agencies, farmers' organizations and the academe. A map showing the production support centers in Bohol as projected within five (5) years can be found in [Figure III-9](#).

(4) Research and Development

There are lots of research outputs already milled out thru years of research works. However, many are in the shelf and only very few are adopted. One big reason is the seemingly ineffective transfer mechanism or poor extension system. This is one aspect of R& D that should be strengthened. Research and Development should continue to be coordinated with concerned national government agencies such as DA, DOST, the academe, the NGOs with People's Organizations and farmers regarding the actual application of research outputs in the field. A Research and Development Unit should be established in the Office of the Provincial Veterinarian to serve as focal body in

these coordinative efforts. Techno-demo projects as well as indigenous but productive practices of farmers should be covered in the R&D program. Demo sites and model farmers will be developed through POs. These are easier replicated and adopted by clienteles and stakeholders. The thrust of the R&D support therefore would be towards the promotion and utilization of research results. Researches can also be conducted in coordination with DA, the research institutions, private sector and the academe.

Figure III-9. Production Support, Year 1-5



(5) Credit and Financing

Services from institutions that offer windows on lending or financing programs like Land Bank, QUEDANCOR and others will be tapped for this purpose.

Another scheme would be the implementation of a PO-based Microcredit for Livestock Facilities, Equipment and Enterprise (Micro-LIFE) that shall be implemented through Peoples' Organizations. The first 2 years of operation shall be under the supervision of the Office of the Provincial Veterinarian. As it is envisioned that partner POs shall be organized into an umbrella organization, eventually, the operation of the Micro-LIFE shall be turned-over in the next succeeding years.

This type of assistance has been going well in the LETS HELP BOHOL Program areas and can be expanded to cover other areas. This scheme offers friendly

and interest-free loan assistance in a prescribed period of time. The operation of such shall be based on established policies and guidelines that will be incorporated in the Operations Manual to ensure proper execution of the project. At present, an initial fund of P400,000 is available but limited to the LHB Program participants and partners. For expansion, funds shall be sourced out from NGOs, the Provincial Government and other donors that are willing to undertake the responsibility.

(6) Marketing Support

A provincial agribusiness unit that is livestock oriented should be installed in the province to organize and oversee a livestock marketing system that covers all aspects of the industry. The marketing of products per se will also include the economic parameters of production and processing. Integration of production, processing and marketing into one big operation will ensure better coordination and efficiency in the industry.

The existence of a livestock facility complex in Tiptip, Tagbilaran City which is now partly in operation thru an arrangement between the Department of Agriculture, the City Government of Tagbilaran and AV Bernardo, Inc. (a private firm engaged in the construction and operation of agri-product establishments), is the best place to consider for the support facilities integration.

For the full operation of this complex, improvement and provision of manpower, support equipments and facilities need to be established and installed to include weighing scale, stockyard, "oksyon" arena, triple "A" abattoir, a rendering plant, quality control laboratory, product processing and training units, feed mill and transportation and communication facilities. E-marketing shall be in operation to facilitate transaction. Marketing support can also be in terms of establishing networks down to the barangays through POs and BALAs.

Rehabilitation shall be programmed for existing operational Municipal Livestock "Oksyon" markets in Catigbian and Sagbayan, a soon-to-operate one in San Miguel including those in Clarin and Trinidad, which are not anymore operating. Additional LOMs can also be established in areas where it is feasible. These LOMs shall be linked to the operations of the livestock facility complex.

(7) Other Infra-Facility Support

- a. Production Center and Stock Farm** – The existing Provincial Livestock and Poultry Farm in Bilar will be beefed up with more breeding animals and facilities/equipment to be more responsive to the needs with the genetic improvement program. This will also be linked to Ubay Stock Farm and PCC-Ubay for some complementation arrangements.
- b. Artificial Breeding Centers** – Municipalities with big breeder base will be encouraged to put up Artificial Insemination Centers especially for swine. This will be supported by the province and other concerned agencies with technical assistance and logistics on a counterpart scheme.

- c. Hatcheries** – There will be established one (1) hatchery at the Provincial Production Center in Bilar for chicken and one (1) in Pilar thru a private cooperator, for ducks. Support in terms of technical assistance and equipment will be extended.
- d. Establishment of an Artificial Breeding Complex** – Establishment of an Artificial Breeding Complex that shall house a Liquid Nitrogen Plant and Semen Processing Laboratory, which is targeted in the municipality of Carmen. Its operation will be coordinated with Ubay Stock Farm and the Philippine Carabao Center in Ubay for the supply of breeder bulls for semen collection and the DA or JICA for technical assistance.
- e. Establishment of a Tannery** – With the intensified drive for improvement of production systems and the introduction of new farming ventures, livestock products like hides can be processed in the province with international standards. This will provide an opportunity for export-oriented market and assured market outlets for raisers.
- f. Feed Mill** – There already exists one commercial feed mill in the province that is owned and managed by a private corporation. If and when feasible, additional one can be established in a strategic area that shall be operated by the Provincial Livestock and Poultry Association, Incorporated or Corporatives. This will open other opportunities of farmers to undergo contract growing of corn and other products that are necessary ingredients in the formulation of feeds.

(8) Policy Support

Local policy support through corresponding ordinances, resolution and executive orders shall be promulgated and issued in the areas of breeder stock conservation, disposal of AI offspring, animal product quality, animal movement, enforcement of laws and regulations and others that would relate to livestock program implementation.

Existing laws maybe reviewed, modified and enforced which may include:

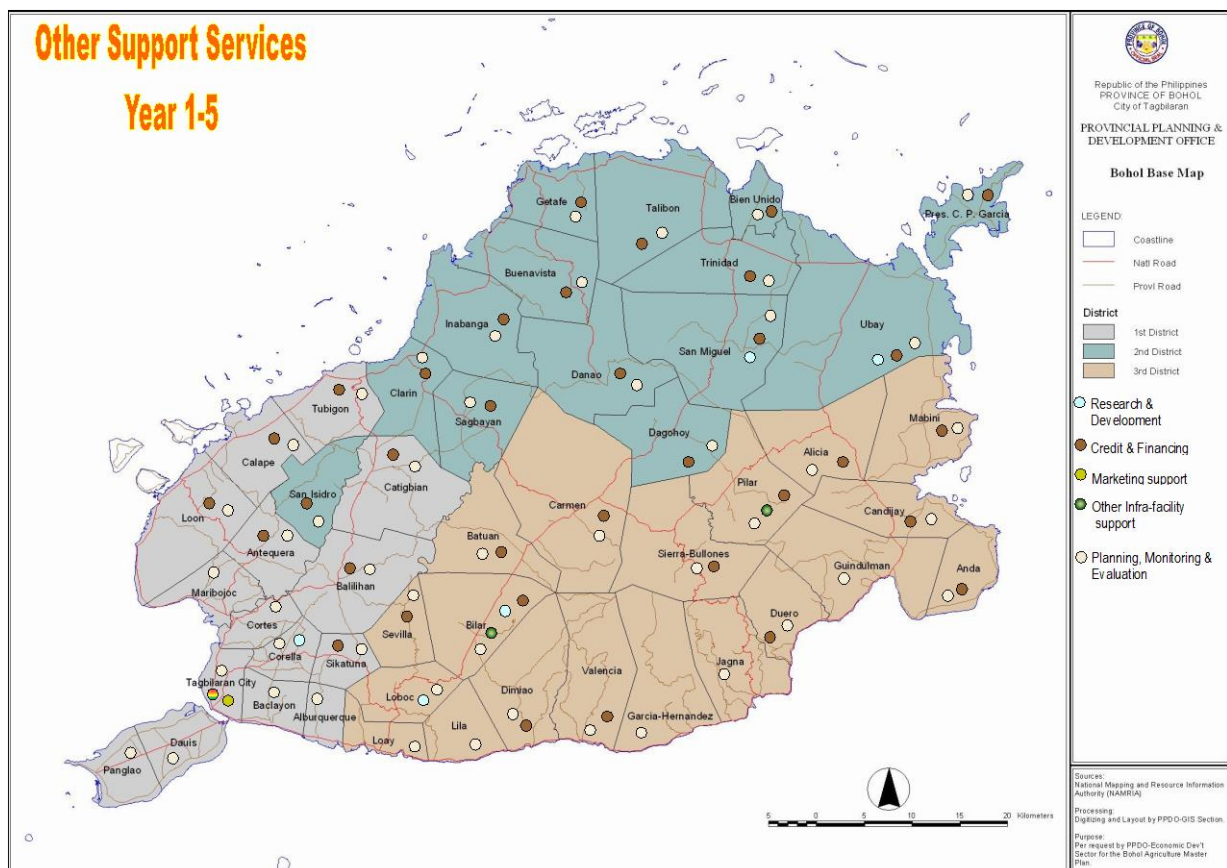
- a. A pre-requisite to disposal, either through slaughter or out-shipment, there shall be conducted a pregnancy diagnosis of females through palpitation. Likewise, males possessing good breeder quality and offspring from AI services shall be evaluated and conserved.
- b. Emaciated animals shall not be allowed for slaughter in accredited abattoirs. Likewise, animals for slaughter shall be handled in accordance with pertinent provisions of the Animal Welfare Act and the Meat Inspection Law.
- c. All animals for shipment outside the province shall be covered by a shipping certificate before it is issued a health certificate or shipping permit by concerned agencies. The shipping certificates shall attest to the quality of the animal as a breeder.

d. There are existing laws and regulations that are not fully enforced or implemented relative to the promotion of the livestock industry and food safety, as follows:

- RA 1556 or the Animal Feed Law, which regulates the manufacture and sale of animal feeds
- RA 1071 or Biologics and Medicinal Preparations Act which control the quality of drugs, vaccines and other biological products for the diagnosis and treatment of animal diseases.
- Other laws that maybe applicable to the province.

Figure III-10 shows a map presenting the different support centers for research and development, credit and financing, marketing support, infra-facility and policy support in Bohol within the next five (5) years.

Figure III-10. Other Support Services, Year 1-5



(9) Planning, Monitoring and Evaluation Services

Relay of reports and information from municipal level to the provincial level can be facilitated through establishing an agri-network. Data banks need to be installed in every Municipal Agricultural Office for easy access of information and data that can be used for reference and planning by any interested institutions and investors. With this proposed network, comes the

provision of related electronic equipments, software and corresponding training programs for implementers.

It is also imperative that every barangay and municipality shall establish its own municipal short-term livestock plans, aligning it with the provincial livestock plan. This will provide direction, information and definition of the roles of each individual unit towards a unified implementation of programs and projects for farmers.

As a sort of incentive, an evaluation system shall be established with a corresponding recognition of outstanding farmers giving emphasis on its good practices, innovation, and contribution to the community and impact on their lives and family. Incentives can be in form of cash, a travel exposure to livestock enterprises both local and abroad or a scholarship grant for the farmer or his direct family members. This can be linked and coordinated with other institutions, NGOs or private corporations with similar mandate and interests and award giving bodies. Similarly, program implementers at different levels shall also be given due recognition with emphasis on project implementation and impact.

2.2.5 Implementation Plan

To institutionalize the adoption of LIFE as the development framework of the livestock sector in the next 20 years, a new functional structure for the Provincial Veterinary Services Office (PVSO) shall be in placed (please refer to [Figure III-11](#)). Appropriate memorandum order shall be issued by the Provincial Governor to formalize its adoption. The set-up shall be composed of the following divisions and their corresponding responsibilities:

1) Production Division

- Breeding services
- Feed development services
- Operation of the Provincial Livestock and Poultry Farm
- Animal products and by-products and waste management and utilization
- Animal dispersal

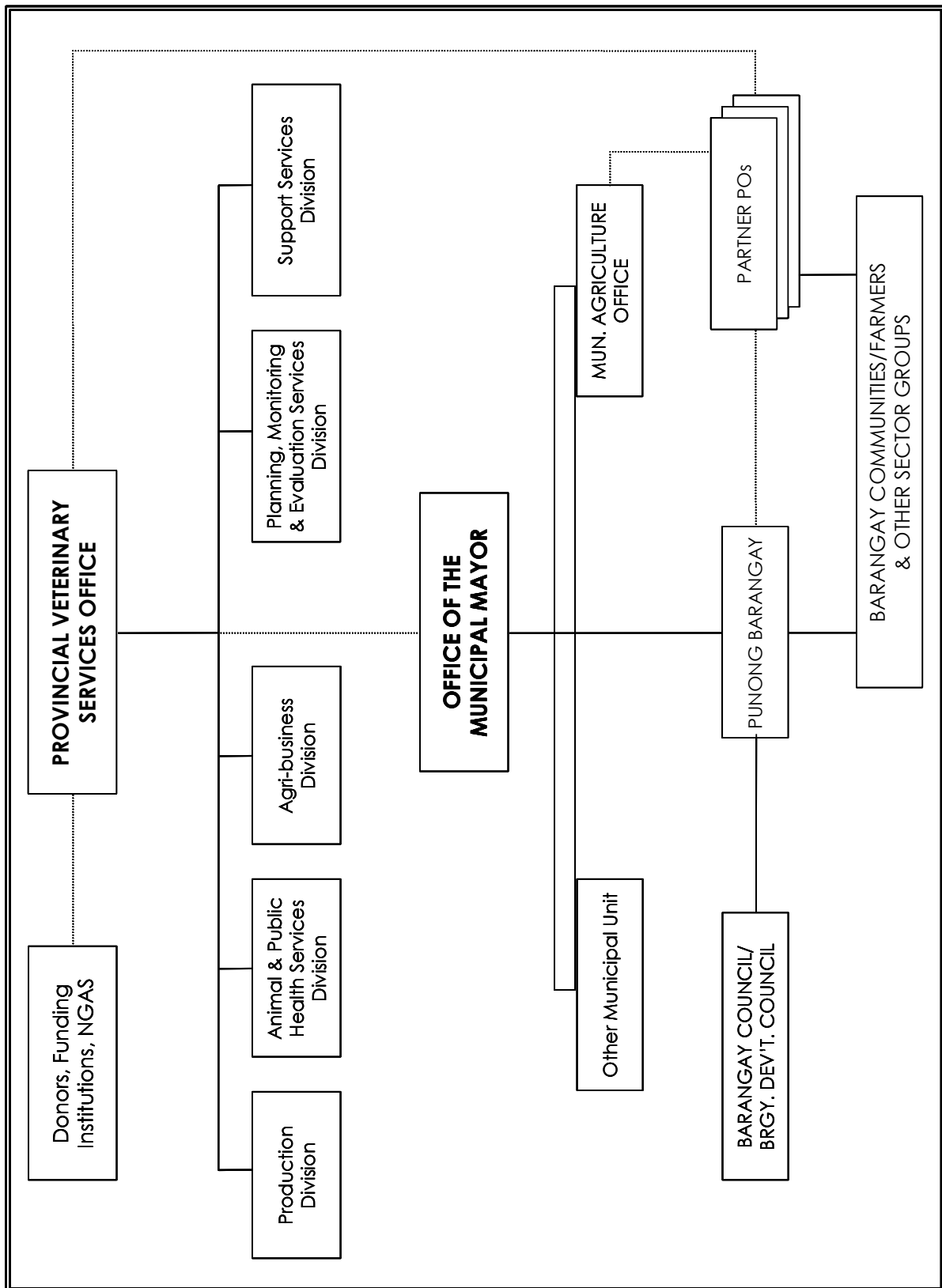
2) Animal and Public Health Services Division

- Animal disease prevention and control
- Monitoring of livestock establishments
- Meat inspection
- Laboratory services

3) Agri-business Division

- Price monitoring
- Accreditation of livestock handlers and operators
- Proposal preparation, i.e., FS, MS
- Monitoring of existing marketing facilities and systems
- Research
- Market linkage

Figure III-11. Proposed Organizational Structure of the PVSO cum LIFE Program



4) Planning, Monitoring and Evaluation Services Division

- Database establishment and updating
- Monitoring and evaluation of programs and projects
- Proposal preparation and packaging for funding
- Industry situationer and analysis

5) Support Services Division

- Administrative support services
- Trainings and capability building
- Institutional development services
- Special projects unit
- Program marketing
- Partnership building and linkaging

All projects to be implemented at the municipalities shall be coordinated with the Municipal Mayors being the Local Chief Executives and who has direct supervision over the Municipal Agricultural Offices (MAO) as well as the barangays. The execution of projects by the Municipal Agricultural Offices down to the barangays where most of the project participants are qualified Peoples' Organizations shall be coordinated and facilitated in nature.

Donors, funding institutions as well as other government agencies shall be coordinated and tapped for financial and technical support in program implementation. The implementation schedule is found in [Table III-12](#).

Table III-12. Implementation Schedule of the Livestock Integration for Food and Enterprise (LIFE) Program

Program / Project/ Activities	Implementation Year					
	1	2	3	4	5	6-20
I. RUMINANT DEVELOPMENT						
A. Livestock loan						
- Carabao						
- Cattle						
- Goat						
B. "Save the Herd"						
C. PO-based Livestock Mortuary Assistance System (LiMAS)						
D. Strengthening the Livestock Breeding Services						
- Establishment of AI Centers for cattle & carabao						
- Breeder Males (Loan)						
E. Dairy Development						
- Cattle and Carabao						
- Goat						
F. Livestock Fattening						
II. POULTRY DEVELOPMENT						
A. Strengthening the Improvement of Native Chicken						
B. Village Level Native Chicken Enterprise						
C. Duck Production						

Program / Project/ Activities	Implementation Year					
	1	2	3	4	5	6-20
III. SWINE DEVELOPMENT						
A. Establishment of swine breeding centers						
B. Rehabilitation of swine breeding centers						
C. Access to Post Harvest Facilities						
D. Swine Breeder Loan						
E. Meat Processing at backyard level						
IV. EXOTIC FARMING						
A. Crocodile Farming						
B. Ostrich farming						
C. Bee Farming						
D. Butterfly Farming						
E. Quail Farming						
F. Rabbit Farming						
V. SUPPORT SERVICES						
A. Institutional Development						
Institutional Building						
- POs						
- Commodity Raisers Asso.						
<i>(Carabao, Cattle, Goat Swine &</i>						
<i>Poultry, Beekeepers, Butterfly</i>						
<i>Farmers)</i>						
- Provl Livestock & Poultry Asso. Inc						
B. Capability Building						
- Government implementers						
- Non-government sector						
- Barangay Livestock Aides						
- Techno-Internship for Livestock						
Farmers and Entrepreneurs						
- Livestock Partner's School On Air						
C. Regulatory Support						
a. Veterinary Quarantine						
- Strengthening quarantine stations						
b. Licensing, Registration & Accreditation						
c. Meat Inspection						
1. Strengthening of existing						
slaughterhouses						
- accreditation to "AAA"						
- accreditation to "A" & "B"						
2. Establishment of new						
slaughterhouses						
D. Production Support						
- Animal health services						
Establishment of Provincial						
Veterinary Diagnostic Laboratory						
- Pasture and Feedgrain						
- Strengthening the Localized						
Artificial Insemination Services						
1. Trainings of technicians						
2. Licensing & accreditation for AI						
technicians						
3. Expansion of service areas						
4. Waste management and utilization						
5. Strengthening the operation of the						
Provincial Livestock & Poultry Farm						
6. Product and by-product devt.						

Program / Project/ Activities	Implementation Year					
	1	2	3	4	5	6-20
E. Research & Development						
F. Credit & Financing						
PO-based Micro-Credit for livestock facilities, equipment & enterprise (Micro-LIFEE)						
G. Marketing Support						
a. Joint venture operation of the livestock facility complex						
b. Rehabilitation of existing Livestock Oksyon Market (LOM)						
c. Establishment of new LOM						
H. Other Infra-facility support						
Establishment of facilities:						
- Hatchery						
- Artificial Breeding Complex (ABC)						
- Tannery						
- Feed mill						
I. Policy Support						
a. Review of existing policies						
b. Promulgation of new Policies						
VI. Planning, Monitoring and Evaluation						
a. Establishment of agri-network						
b. Recognition of livestock farmers & entrepreneurs						
c. Establishment of Data bank						
d. Updating of data base						

The directions and strategies for the LIFE Program is presented in Table III-A.2 of the Annex Report.

2.2.6 Financial Plan

1) Summary of Project Cost

The total cost for the implementation of the Livestock Integration For Food and Enterprise (LIFE) Program components is estimated at P349, 211.50 million over ten years (Table III-13).

Table III-13. Summary of Cost Estimates for LIFE Program, Bohol AMP

Components	Project Cost (P'000)			% to
	Year 1-5	Year 6-10	Total	Total
1. Ruminant Development	51,185	24,505	75,690	23.84
2. Poultry Development	4,190	-	4,190	1.32
3. Swine Development	5,100	11,100	16,200	5.10
4. Exotic Farming	210	-	210	0.07
5. Support Services	23,950	154,125	178,075	56.09
6. Planning, Monitoring & Evaluation	14,100	29,000	43,100	13.58
Sub-total	98,735	218,730	317,465	100.00
7. Unallocated Contingency (10% of Sub-Total)	9,873	21,873	31,746.50	-
Total Cost	108,608	240,603	349,211.50	-

2) Financing Scheme

A combination of financing options is proposed to respond the investment requirements for the components of LIFE Program. Considering the limited financial capacities of concerned LGUs, external sources are considered in the form of development assistance grants, joint ventures, partnership with donor institutions and organized groups, fund matching, access to financing and banking institutions and countrywide development funds from the national leadership identified to be supportive to agricultural development initiatives.

3) Financing the Components Implementation

Financing scheme to be employed in project implementation under the LIFE Program will be similar to SIAP (Refer to *no. 3, first paragraph of 3.1.7*). For the component projects, the identified significant sources of funds are: (i) the national government through the annual General Appropriation Act; (ii) local government units through the Internal Revenue Allotment and the 20% Economic Development Fund; (iii) private sector through schemes such as build-operate-transfer, volunteerism and group/personal initiatives; and (iv) foreign assistance through grants and loans. Funding institutions both government and private, shall also be tapped to finance other components such as dispersal projects where payments can be facilitated.

2.3 FISHERY RESOURCES DEVELOPMENT AND MANAGEMENT (FRDM) PROGRAM

2.3.1 Rationale

Coastal resources in the province are severely degraded after years of mismanagement and neglect. With the passage of the 1991 Local Government Code, the responsibility for managing fisheries and coastal habitats within the municipal waters was devolved to coastal municipalities and cities. Over the last seven years, coastal local government units (LGUs) throughout the Philippines have increasingly recognized the vital role that coastal resources play in economic development, food security and overall well-being of coastal communities. Substantial progress has been observed in the establishment of the management system needed to attain sustainable use of these resources. An example is the recognition of the LGUs for the need to draft a Coastal Resource Management Plan (CRM Plan) which serves as guide and provide a concrete direction in the management of their coastal resources. Records in the province show that there are 20 municipalities who have adopted and implemented CRM Plans through SB Ordinances, of which five are certified as Level 1. Meanwhile, eight municipalities have drafted their CRM Plans and had them validated through barangay consultation. Only two municipalities have not come-up with a draft plan.

Other improvements in the management of coastal areas are the establishment of 120 MPA's with an approximate area of 1,368 hectares and the adoption of a monitoring tool, a Marine Protected Area Rating System, for the purpose of improving the management of marine sanctuaries provincewide. The establishment of MPA's is a strategy to help solve poverty in coastal areas.

Inter-LGU collaboration on law enforcement proved to be successful through the organization of the Coastal Law Enforcement Council in every Congressional District.

To clarify the area of jurisdiction, the municipal waters of nine municipalities have been delineated and affirmed by NAMRIA and reinforced through the passage of an SB ordinance. While the delineation of other municipalities is in progress, these have been set aside with the revocation of DAO 17, which provides the guidelines for the delineation of municipal waters.

Considering past experiences in successful implementation and “good practices” on CRM, and with the lessons learned from related management projects and programs, local government officials, coastal communities and civil societies strongly believe that proper management of coastal resources and habitats would eventually result to an increase in fish population. These initiatives will ultimately contribute to attaining incremental fishery production within the municipal waters.

Basically, these “good practices” comprise the protection and rehabilitation of mangrove forest, protection and preservation of seagrass beds, and protection and conservation of coral reefs including establishment of municipality-initiated marine sanctuaries. To some extent, there are some municipal LGUs that have adopted measures to mitigate the harmful effects of water pollution and preserve good water quality. Many local people further believe that efforts to increase fishery production are dependent on a productive habitat.

However, the issues on illegal and destructive fishing practices continue to recur in some municipal waters. Enforcement of fishery regulations at the municipal level has been apparently not effectively implemented. This is widely evident and is perceived to be brought about by the still uncompleted but long-required fisherfolks registration and establishment of an updated profiling that is commonly observed in most coastal municipalities. These are basic requirements and reference for achieving effective fishery regulation. Closely related to this is the issue on the permitting system. Many LGUs have low or even zero revenue generation despite increasing coastal and fishery resource users. In some instances, there were reports of improved fishing gear catch efficiency, harvesting endangered marine fish species, juvenile and mother-spawners that significantly contribute to overfishing.

The FRDM Program, therefore, is envisioned to address these prevailing issues. Covering an estimated area of 6,245 km², the LGUs have the legal mandate to manage the municipal waters. Each LGU is also responsible of providing for the welfare of its constituents by ensuring their food security. Planning and implementation shall always be in complementation with other existing development programs and projects of the provincial and municipal LGUs. Likewise, in certain areas which have been declared by the national government as protected seascape, the LGUs and the duly constituted Protected Area Management Board (PAMB) shall continue to coordinate and monitor natural resources development and management in pursuance to RA 8550 and the Bohol Environment Code.

2.3.2 Goals and Objectives

The primary goal of the Fishery Resources Development and Management (FRDM) Program is to set the framework for the provincial government and specifically the coastal municipalities with regard to the implementation of the initiatives under the fishery sector of the Provincial Agriculture Master Plan. This will be carried in an effective and sustainable manner with due consideration to the ecosystem approach in managing the coastal resource-base habitats simultaneously with strategic interventions geared towards attaining incremental production of the fisheries resources thereby ensuring widespread benefits and food security to the increasing human population.

Specifically, the strategic objectives of the FRDM Program are:

- (1) To develop programmatic detailed implementation plan to restore/rehabilitate the ecosystems in areas with declining coastal resources and habitat condition including its biodiversity (e.g., mangrove forest, seagrass beds and coral reef) through the participation of coastal communities and involvement of other stakeholders;
- (2) To develop a separate programmatic detailed implementation plan to address declining trend in the production of economically known fish species;
- (3) To promote strategic directions aimed at enhancing aquaculture/marine production in inland bodies/marine waters.

2.3.3 Targets

- 1) Spatial locations/areas.** Target municipalities are grouped into nine clusters (refer to [Figure III-A.1 of the Annex Report](#)) and are categorized under five priority areas following the criteria on established poverty incidence pattern in the province. The first five years of program implementation is focused on the 1st priority clusters 1 and 2 municipalities, namely: Ubay, Talibon, Bien-Unido, Pres. Garcia, Trinidad, Getafe, Buenavista and Inabanga. The rest of the municipalities will follow and shall be classified according to the established priority and cluster.
- 2) Beneficiaries/Project Participants.** For the 1st priority clusters 1 and 2 municipalities, the following are the target beneficiaries:
 - 85 fishpond operators/fishpond areas with approved fishpond lease agreement from the government covering an approximate area of 2,115 hectares;
 - Seven (7) People's Organizations involved in productive fishery enterprise with approximately 1,875 member-fishers;
 - 20 backyard fishpond operators with an approximate area of 10 hectares to undertake culturing of tilapia and other freshwater species;
 - 5,000 seaweed farmers to plan an approximate area of 3,531;

- 400 oyster farmers, with an approximate area of 10.0 has. planted with oysters hangings;
- 10 fish cage operators to be involved in the culture of grouper and rabbit fishes, with 10-module fish cages;
- 10 pond operators culturing mudcrab with an approximate area of 15 hectares.

2.3.4 Component Description

1) Fishery/Coastal Resource Management

Fishery Resource Management or Coastal Resource Management is the process of planning, implementing and monitoring the beneficial and sustainable uses of coastal resource through participation, collective action and sound decision making. It is an intervention that provides specific direction to the coastal LGUs on how coastal resources shall be managed and developed through the formulation of a CRM Plan. It also involves adoption of the different management options since CRM is first and foremost a process of governance.

Objectives

- To regenerate depleted marine resources and coastal environment;
- To ensure adequate supply of fish for food security;
- To ensure sustainable use and management of the fisheries and coastal resources; and
- To improve the living condition of the coastal communities.

(1) Establishment of Marine Sanctuaries and Strengthening of Existing MPAs

Marine Fish Sanctuary is a CRM intervention aimed at setting aside an area by the government for special protection where fish are able to spawn, grow and reproduce undisturbed and where fishing and other activities are absolutely prohibited. At present, there are 120 MPAs established provincewide. The need for the establishment of more MPAs and strengthening the existing ones is interconnected to resource depletion propelled by the increasing fishing pressure and other unwise economic activities. This activity is critical in order to sustain the fishery resources.

Program Component

- **Resource and Ecological Assessment.** This component will primarily generate relevant information on the existing resource and ecological status of the coral reefs, seagrass, seaweeds beds, fish biomass and other parameters. A team of scuba divers, technical experts from BFAR, DENR and LGU together with fisherfolks shall conduct the required assessment. Data generated from this component will be used as basis for determining the impact of and for subsequent development planning activities.
- **Socio-economic Resource Assessment.** This assessment will basically gather socio-economic information to determine the extent of

awareness, perception of the people on CRM interventions, income status, existing livelihood and other related information. This will likewise provide information as baseline data including the stakeholders' perception about the establishment of marine sanctuaries.

- **Legal and Institutional Aspect.** This component will take charge of the necessary consultation and roundtable discussion concerning the preparation of resolutions and ordinances relative to the establishment of MPAs. Fees to be imposed upon divers in the area should be considered to help defray the cost of maintaining the MPA.
- **Development of Management Plans and Creation of a Management Committee.** This component will involve the conduct of a planning activity of all stakeholders with the technical staff facilitating the formulation of the Plan. This will also determine who will be responsible for the management aspect and the proposed fund allocations to sustain the project.
- **Economic Valuation of MPAs.** Valuation of an MPA refers to the allocation of cost and value to resources present in the MPA and the corresponding activities. The bigger the resources of an MPA, the greater the benefits it will give and the greater the commitment it will get from the communities.
- **Organization of a Pool of Scuba Divers and Assessment Team.** The project shall organize a pool of scuba divers that will help in the provincewide monitoring of MPAs. A training shall be conducted both by local and foreign instructor-volunteers to local government units, partner NGO as well as private individuals who are interested to participate in the said activities. Assessment shall be conducted bi-annually, during the wet and dry season.
- **Monitoring and Evaluation.** A standard monitoring tool for database updating shall be used by the monitoring and evaluation team. Periodic reports shall be generated and submitted to the decision-makers to form part of the references for subsequent planning exercises and for determining measures that should be adopted to address problems and issues that may arise in the course of implementing the Plan.

Table III-14 shows the estimated cost for establishing a marine sanctuary and Table III-15 provides the potential direct and indirect revenues that will be generated by the sanctuary.

Table III-14. Estimated Cost for Establishing a Marine Sanctuary, Bohol Conditions

Task/ Objectives	Total Cost 1 st year	Cost Estimate per Year					
		Yr 2	Yr 3	Yr 4	Yr 5	Yrs. 1-5 Total	Yrs. 6-10 Total
Resource and Ecological Assessment at P 350,000/area <ul style="list-style-type: none"> • Assessment of critical habitats (200,000). • Area delineation (100,000) 	1.7 M	1.7 M	1.7 M	1.8 M	1.9 M	8.8	6.8

Task/ Objectives	Total Cost 1 st year	Cost Estimate per Year					
		Yr 2	Yr 3	Yr 4	Yr 5	Yrs. 1-5 Total	Yrs. 6-10 Total
• Data Presentation & Validation (50,000)							
Socio-economic Resource Assessment @ P 250,000/ area • Socio-economic Survey (200,000) • Public Consultation (50,000)	1.6 M	1.6 M	1.6 M	1.6 M	1.6 M	8.0 M	6.8 M
Legal and Institutional Component @ P 350,000/ area • Public hearing consultation (100,000) • Preparation of resolution/ ordinances (100,000) • Presentation to BC, SP & SP (P 100,000) • Creation of Management Council (50,000)	1.6 M	1.6 M	1.6 M	1.6 M	1.6 M	8.0 M	6.5 M
Economic Valuation of MPAs (400,000) • Economic Valuation of MPA areas P 200,000/ valuation	2.0 M	-	-	2.0 M	-	4.0 M	2.0 M
Organization of Pool of Scuba Divers and Assessment Team	100,000	-	-	100,000	-	P200,000	P200,000

Table III.15. Sustainable Annual Net Economic Revenues (direct and indirect) per km² of Typical Healthy Coral Reef in the Philippines with Tourism Potential

Resource Use	Production Range	Potential Annual Revenue (US \$) (range)
Sustainable fisheries (local consumption)	10 to 30 tons	12,000 –36,000
Sustainable fisheries (live fish export)	0.5 to 1 ton	4,000 – 8,000
Tourism (on-site residence)	100 to 1,000 persons	3,000-30,000
Tourism (off-site residence)	500 to 1,000 persons	3,000 –6,000
Coastal protection (prevention of erosion)	-	5,000-25,000
Aesthetic/ Biodiversity Value (willingness to pay)	600 to 2, 000 persons	2, 400-8,000
TOTAL		29, 400 -113,000

Source: White and Cruz-Trinidad, 1998.

(2) Fisheries Management

Fisheries management is an intervention applied directly to fish stocks. It is one key aspect that has been overlooked in the past coastal management programs.

Project Component

- **Formulation of Fisheries Management Plan.** To guide decision makers on the appropriate fisheries management activity, a plan must be formulated through a participatory process. Such plan must be validated at the barangay level to ensure that it is understood by the local communities and the interventions are appropriate.
- **Registration of Municipal Fishers.** To come up with an inventory of users of municipal waters, LGUs shall require the registration of fishers including information on the name of operator, address, type of fishing gears used, fishing ground and estimate volume of production. This information is very important when setting priorities and giving licenses or permits to fishers within municipal waters particularly non-resident fishers.
- **Designation of Closed Areas for Identified Migration Route of Commercially and Ecologically Important Fishes.** There are fishes that by nature migrate to look for shelter and food. The areas where these important species settle must be given protection to give a chance for them to regenerate. Local fisherfolks have traditional knowledge and could assist in identifying these species and areas. Documented studies can be used as references in identifying these areas as well as the biological characteristics of the species.
- **Licensing and Permitting.** Registered fishers who are residents of the locality must be given priority in the granting of license or permit by the municipality. While fishers will benefit from the resource, they also have the accountability to pay back what is due to the government in the form of a license fee.
- **Designation of Closed Season in Harvesting Commercially- and Ecologically-Important Fish and Invertebrates during the Spawning Season and/or their Juvenile Stage.** Resource assessment and technical studies validated through the information gathered from the fishers could be the best information when protecting these fish species during spawning season when catching them is prohibited.
- **Color Coding of Boats.** For easy identification of resident fishers from non-residents, municipal bancas are color- and letter-coded corresponding to the letter of the municipality and alphabetical order of the barangay where they reside.
- **Policy Support.** To complement the identified project component, policy is needed to give sanctions for non-compliance as well as regulation on the use of gears. For contiguous areas with similar resources, a unified policy is important to ensure collaborative management among the concerned LGUs.

(3) Shoreline and Foreshore Management

The economic cost of coastal erosion can be enormous for both government and individuals. Coastal protection structures are expensive to build and usually do not last very long. The government cannot always respond to annual flooding and erosion.

Coastal setbacks lines should be established to prevent construction of buildings close to the shorelines. Setbacks are a cost-effective approach to erosion protection.

Shoreline areas are subjected to wave action, which result to erosion of soil along the dike and even affects structures closer to the shoreline areas. Mangrove reforestation is recommended to protect these areas.

Sand is an important construction material and due to the increasing demand, shoreline areas are not exempted from extraction. However this should be strictly regulated. Barangay LGUs must be very vigilant in monitoring foreshore areas. The LGU however may identify zones where communities could extract sand for community projects and home use but not in commercial scale.

(4) Coastal Zoning

For purposes of administratively identifying the jurisdiction over the management of municipal waters, boundaries are delineated and reckoned with the coastal terminal points, with the affirmation of NAMRIA. It will then be adopted by the LGU through ordinances issued by the SB. Presently, only nine municipalities have their municipal boundaries affirmed and adopted by SB. Meanwhile, municipalities having islands and islets have to set a mechanism to delineate and agree with the adjacent municipality.

This component shall take charge also of the delineation of zones into the following:

- Strict Protection Zone
- Rehabilitation Zone
- Sustainable Use Zone
- Tourism Zone
- Trade and Navigational Zone

Delineated zones are mapped out to determine the exact location and areas covered which shall be adopted by the SB through an ordinance. Policies per zone are drafted and became part of the CRM plan as basis for the policy makers to draft the succeeding ordinances.

(5) Enterprise and Livelihood Management

Enterprise and livelihood development is an identified need at the community level. It is important, however, that this component be done correctly since it is an intervention that has a huge impact on sustenance fishers. It also lessens

pressure on the municipal waters thus allowing the resources to rest and given a chance to regenerate. Ideally, it should be tied together with resource management and other development in the community. It also contributes to income diversification and lessens dependence on fishing.

The livelihood must graduate into an enterprise that is environment friendly. The spirit of cooperativism as a strategy is also encouraged. Criteria for selecting specific enterprise development must be formulated to have a greater chance of success. Proper selection of beneficiaries coupled with the technical skills training is of utmost important,

(6) Coastal Tourism Development

It will take a long time for established marine reserves and sanctuaries to effect an increase in fish catch and for fishers to have a higher income. As such, eco-tourism is seen as a better alternative. Marine eco-tourism in particular can be utilized in promoting the concept of resource management as well as alternative livelihood for the dislocated sectors. The reserve can be developed as educational tour destination for students and nature lovers and regular tourists to promote the concern for the environment to the youth and the community.

The strategy is to make use of these areas as venue for eco-tourism by simple zoning of the reserve area for activities such as snorkeling and scuba diving. This may take some time but it is worth investing with the end in view of conserving and managing the environment and at the same time creating employment and income. It can be integrated to other sites of ecological or historical significance to form a network of tourist destinations. It is hoped that all LGU's will continuously support and maintain the existing Marine Fish Sanctuaries and Reserves. In effect, it is expected that this will allow the resource base to regenerate until it reaches the desired level.

Meanwhile, affected small-scale fishers and fisherfolks who might be displaced as a result of the regulation of fishing activities in the sanctuary must also be given appropriate alternative livelihood package. Their need for cash security must be met and eventually it should result to the generation of income in order to enhance the economic and social condition of the stakeholders.

An analysis of the revenue generated from Olango Island in 1999 is presented in [Table III-16](#).

Table III-16. Annual Revenue per km² Based on Olango Island, 1999

			2000	2010
Reef Fisheries	Consumption	4-6 tons	\$ 8,400	\$ 16,800
	Export	2-4 tons	-	-
Tourism	On site	0	-	-
	Off-site	50-80 persons	\$ 390	\$ 585
Coastal Protection	-	not available	0	0
Aesthetic (Biodiversity Values)	-	-	0	\$ 2,050
Total (270 km² of reef)			\$ 8,790 \$ 2,373,000	\$ 19,435 \$ 5,247,000

(7) Mangrove Management

Mangrove ecosystems are extremely productive and supply resources such as wood, fish and crustaceans and other ecological and economic benefits to the coastal municipalities. Mangroves are woody seed bearing trees with specialized roots that thrive in brackish or in waterlogged soil and exposed conditions.

Legally, mangroves are under the jurisdiction of the state, thus giving the management responsibility to the DENR. To date, 2,110.61 hectares of mangrove forests (Bohol Island Profile, 2000) have been awarded to deserving communities in Bohol for management and have proven to be a successful program.

In order to sustain mangrove management some successful initiatives have been undertaken like:

- **Reforestation projects** through DENR and DepEd coupled with monitoring of survival rate after the planting;
- **Moratorium** on the cutting of mangroves for fishpond development;
- **Replanting of old abandoned fishpond.** Establishment of multi-species mangrove or mangrove gardens as source of supply of propagules and mini-learning centers for students;
- **Integration of environment-friendly enterprise to CBFMA areas;** and
- **Implementation of Joint DA-BFAR and DENR Memorandum Order No. 3 Series of 1991** and turnover of idle, unproductive and abandoned fishponds to the communities to manage and rehabilitate.

Table III-17 shows an estimated net annual economic value (in US \$ per ha.) of Philippine mangrove areas for different levels of management.

Table III-17. Estimated Net Annual Economic Value (in US \$ per ha.)

Level of Management	Wood products (Value/ ha.)	Fish Products (Value/ ha.)	Total (Value/ ha)
Mangrove plantation	156	538	694
Managed naturally regenerated	90	538	628
Unmanaged under stocked stands	42	538	580

Source: White and Cruz-Trinidad.

Note: **Wood harvest value** based on average price of about US \$ 12 m³ of wood;
Fish Products based on average annual weight of fish and shrimp/ ha. associated with mangrove areas and an average of US \$ 0.80/ kg.
Values based on Philippine pesos, US \$ 1= 25 pesos in 1991.

(8) Integration Of Population Management In Coastal Resource Management

National food security program rarely considers fishery resources in the inventory of stable sustainability and predictable food supply. At the worst, this is alarming given that data from international research organizations and experts throughout the world confirm that the global supply of fish is dwindling and in some cases collapsing under the heavy pressure of increased global population.

As the supply continuous to decrease, it will become more and more difficult to meet the food requirements. Managing population increases can be achieved in the following:

- Conduct public awareness campaign linking family planning and improved health and welfare
- Coordinate with appropriate agency in the strengthening of family planning program
- Improve agricultural practices and land tenure agreement for upland and lowland farmers to lessen migration to coastal areas.
- Regulate settlement of squatters in the shoreline areas.

2) Aquaculture Development

Aquaculture is referred to as fishery operation involving all forms of raising and culturing fish and other fishery species in freshwater, brackish water and marine water areas.

(1) Brackishwater Aquaculture

In Bohol, the average harvest of a fishpond operator in brackish water is only 1.0 mt which is far lower than in other Visayas areas like Iloilo and Negros. Most of the fish farmers are using traditional methods and management practices, thus, the apparent low production per unit area.

To address the issues on low fish production in fishponds, the Aquaculture Development component intends to provide technical assistance to resource farmers in the priority areas like the adoption of "Polyculture system". This entails maximizing the effective production areas by culturing different species of fish with different feeding habits. The approach works because an ecological system such as a pond produces different natural food organisms that can be consumed by different fish species. This contention is based on the principle that in an aquatic ecosystem, both the autotrophic and heterotrophic food chain exist; they are producing various types of natural food, which the fish may consume to have rapid growth and ensure their survival. Another advantage is the fact that if the culture of one species fails, the other will be producing. Another modification in the culture system in brackishwater fishpond is the adoption of " Modified Extensive Culture " of milkfish in ponds.

Objectives

- Provide technical assistance to fish farmers to increase production
- Promote environment-friendly technology; and
- Increase fish farmers' income

Project Component

- **Environmental Scanning.** This will provide baseline information on the status and condition of aquaculture production and the industry as a whole. This information will be used as inputs for planning and assist fish farmers and operators in improving their fishing techniques and increasing production.
- **Technical Training and Skills Development.** Based on the environmental scanning, training needs and skills required will be addressed by the component. Cross visits to successful areas will also be given attention in particular relative to technology adoption.
- **Provision of support services and facilities.** The needs for farm inputs, market and credit facilities will be the main concern of this component. Coordination and facilitation to have access to various government and private enterprise will be given emphasis in the process.
- **Monitoring and Evaluation.** This component will provide the overall status of performance of the project's implementation, hence, it is an integral part of the project.

Table III-18 shows the cost and return analysis for the culture of milkfish.

Table III-18. Cost and Return Analysis for Modified Extensive Culture of Milkfish in One (1) Hectare Brakishwater Ponds

A. Assumptions	
Farm Area	1.0 hectare
Stocking density	7,000 pcs/ hectare
Initial weight at stocking	3 to 5 gms.
Survival rate	90%
Weight at harvest	250 gms.
Biomass	1, 575 kgs.
Total biomass for 3 croppings	4, 725 kgs.
Culture period	3 months (90 days)
Selling price per/ kg.	P 60
Feed conversion ratio	1:1
B. Fixed Asset Investment	151,200.00
C. Operating Expenses (Cost of fingerlings, fertilizer both organic & inorganic, hired labor in pond preparation, caretaker salary, feeds, 10% contingency and marketing cost which is 5% of gross sales).	208,022.50
D. Depreciation Expenses (Submersible flashlight, development cost)	15,600.00

E. Gross Sales (4, 752 kgs. X P 60)		283, 500.00
Less: Operating expenses		208, 022.50
	❖ GROSS INCOME	75,477.50
Less: Depreciation expense		15, 600.00
	❖ NET INCOME	59, 877.50
F. Financial Analysis		
$\text{ROI} = \frac{\text{Net Income}}{\text{Operating expenses \& Depreciation Expenses/ Year}} \times 100$		
$= \frac{59,877.50}{223,622.50} \times 100$		
$= 27.0\%$		
$\text{Payment Period} = \frac{\text{Operating Expenses \& Depreciation Expenses/Year}}{\text{Net Income}}$		
$= \frac{223,622.50}{59,877.50}$		
$= 3.7 \text{ years}$		

Source: BFAR

(b) Freshwater Aquaculture

Bohol has several freshwater bodies suited for raising fish either in ponds or in cages.

Objectives

- To address the declining fish catch of municipal fisheries;
- To provide the protein requirements of the population residing in the interior communities;
- To maximize utilization of freshwater bodies for aquaculture.

Project Component

- Stocking and dispersal of existing dams, rivers, and irrigation canal of giant tilapia and native catfish;
- Promotion of other high value commodity such as giant catfish, native catfish, white clams, white shrimps, freshwater eel and other cultivable specie;
- Promotion of fish cages in dams; and
- Development of backyard fishpond in rice paddles or from diversion canal.

The establishment and operating cost and projected income from the culture of tilapia for two of technology are presented in [Tables III-19 and III-20](#).

Table III-19. Cost and Return Analysis for Tilapia Culture in Ponds

A. Assumptions;				
		Area	4,800 sq. m.	
		Stocking density/ sq.m.	2 pcs.	
		Total number of stocks	9, 600 pcs.	
		Average body wt. at harvest	250 gms.	
		Survival rate	85%	
		Harvest volume	2, 040 kgs.	
		Price/ kg.	P 55.00	
		Feed conversion ratio	1: 1.5	
		No. of crop/ year	2	
B. Fixed Asset Investment				
Qty.	Unit	Item Description	Unit Cost (P)	Total (P)
1	Unit	Farm House (light materials)	30,000	30,000.00
12	Pcs.	Fish Tubs (banyera)	600	7,200.00
2	Units	Wooden gates	22, 325.16	44, 650.32
2, 400	Cu.m.	Pond		96, 000.00
280	Meters	Dike (trimming & compacting	15.00	4, 200.00
TOTAL				182, 050.32
C. Operating Expenses				
Cost of fingerlings, fertilizer both organic and inorganic, lime, flashlight, raincoat and hired labor for personP 66, 811.80				
D. Depreciation Expenses P 29, 923.44				
E. Income				
❖ GROSS SALES:				
2,040 Kgs. X P 55.00 x 2 cropping			224, 400.00	
Less ; Operating expenses			133, 623.60	
❖ GROSS INCOME			90, 776.40	
Less: Marketing Cost (5% of Gross Sales)			11, 220.00	
Less: Depreciation Expenses			29, 923.44	
❖ NET INCOME			49, 632.96	
F. Financial Analysis				
$\text{ROI} = \frac{\text{Net income}}{\text{Operating Expenses \& Depreciation Expenses/ year}} \times 100$ $= \frac{49, 632.96}{163, 547.04} \times 100$ $= 30.53 \%$				
$\text{Payback period} = \frac{\text{Operating Expenses \& Depreciation expense/ year}}{\text{Net income}}$ $= \frac{163, 547.04}{49, 632.96} \times 100$ $= 3.30 \text{ years}$				

Table III-20. Cost and Return Analysis for Tilapia Culture in One Module Floating Cage with Four (4) Compartments Measuring 6m x 6m. x 3m. Each

A. Assumption (per crop/ cage)	
Cage volume	360 cu.m.
Stocking density/ cu.m	50 pcs./ cu.m.
Total number of stocks	18,000 pcs.
Average body weight at harvest	250 gms.
Survival rate	90%
Harvest volume	4, 050 kgs.
Price/ kg.	P 55.00
Feed conversion ratio	1: 1.8
No. of crop/ year	2
B. Fixed Asset Investment (fish tubs or banyera, paddleboat and 4 units fish cage)	
	57, 508.85
Bills of Materials for one (1) module with 4 units measuring 6m x 6m x 3m each.	34, 451.00
Labor Cost (10% of material cost)	12, 057.85
C. Operating Expenses (Cost of fingerlings, feeds with 10% contingences) Note: Family managed, no labor cost.	
	140, 068.50
D. Depreciation Expenses (fish tubs or banyera, paddle boat and 4 units fish cage) Note: All cage materials such as floats, etc. will last more than 3 years except bamboos & other netting materials which need replacement after 2 years.	
	P 27, 254.00
E. Income	
❖ GROSS SALES:	
4, 050 X P 55.00 X 2 crops/ years	445, 500.00
Less: Operating expenses (P 140, 065.50 x 2 crops/ year)	280, 137.00
	156, 363.00
❖ GROSS INCOME	
Less: Marketing Cost (5% of gross sales)	11, 081.40
Less: Depreciation Expenses	27, 027.20
❖ NET INCOME	127, 027.20
F. Financial Analysis	
$ROI = \frac{\text{Net Income}}{\text{Operating Expenses \& Depreciation Expenses/ Year}} \times 100\%$	
$= \frac{127, 027.20}{307, 291.40} \times 100$	
$= 41,34 \%$	
$\text{Payback period} = \frac{\text{Operating Expenses + Depreciation Expense/ year}}{\text{Net Income}}$	
$= \frac{307, 291.40}{127, 027.20}$	
$= 2.4 \text{ years}$	

(c) Fish Pens and Cage Farming

Fish pens are artificial enclosures constructed within a body of water for culturing fish and fishery aquatic resources. They are made up of poles closely arranged in an enclosure with wooden materials, screen or nylon netting to prevent fish from escaping. **Fish cages**, although similar to fish pens, look like an inverted mosquito net with support floats as buoys attached to a sinker. They have a depth of not less than three feet during the lowest low tide. Both enclosures are installed in bays or coves that are sheltered from open sea or adverse weather condition.

Fish pen or fish cage operator must observe appropriate management practices to avoid pollution of coastal waters brought about by unused feeds. Bottom scraping must be done to remove sediments that might occur and cause pollution and danger to fish stocks. There are success stories in Bohol on fish cage farming but the technology has to be refined for it to be more environment-friendly. The association's financial capability and sustainability of the operation should also be considered.

Under this proposed program component, available and commercially important species like grouper, lobster, siganid, bangus and tilapia shall be promoted.

Cost and return analysis for the culture of grouper is presented in [Table III-21](#).

Table III-21. Cost and Return Analysis for Grouper Culture in Cage

A. Assumptions:	
No. of stocks	2, 160 pcs.
Survival rate	90%
Stocking density	30 pcs./ cu.m.
Culture period	8 months
No. of croppings per year	1
Average body weight at harvest	0.75 gms.
No. of kgs. At harvest	1,458 kgs.
Price/ kg. (delivered at market)	P 300
Feed conversion ratio	1:6
No. of pcs. At harvest	1,944 pcs.
B. Fixed Asset Investment	
(farmhouse made of light materials, chest freezer, paddleboat, floating cage with bamboo frame, Styrofoam box, basin. Submersible flashlight, raincoat, airpump-electric operated & battery operated, oxygen tank, weighing scale)	97, 291.95
Bill of Materials (P.E. net & double A net, Styrofoam, polarex screen, mono-nylon, rope, PAMO twine, full length bamboos, cement, sand gravel, used tires, color cost & contingency).	67, 671.45
C. Operating Expenses	
(cost of grouper fingerlings, trash fish as feeds, hired labor (1 person) salary for caretaker with contingencies)	✓
D. Depreciation Expenses	
(farmhouse and other materials procured)	✓

E. Income ❖ GROSS SALES: 1,458 kgs. X P 300 Less: Operating Expenses ❖ GROSS INCOME Less: marketing Expenses (5% of Gross Sales) Less: Depreciation expenses ❖ NET INCOME	✓
F. Financial Analysis $\text{ROI} = \frac{\text{Net Income}}{\text{Operating Expense} + \text{Depreciation expenses/ year}} \times 100$ $= \frac{131,137.02}{236,278.92} \times 100$ $= 55.5\%$ $\text{Payback period} = \frac{\text{Operating Expenses} + \text{Depreciation expense/ year}}{\text{Net Income}}$ $= \frac{236,278.98}{131,137.02}$ $= 1.8 \text{ years}$	

Source: BFAR

(d) Seaweed Farming

Seaweed farming in Bohol consists of culturing two species, *Euchuema spinosum* and *Kappaphycus alvarezii* or *cottonii*. Seaweeds production has contributed a lot to sufficiency level of the province and has been export commodity. The trend of production for the last seven years showed a remarkable annual increase. However, marketing problem was encountered during the previous year when the European Union set high standards for carageenan.

Seaweed farming consists of the following sub-components:

- **Establishment and promotion of seaweeds farming in areas with high potentials.** Although seaweeds farming proliferates in many islands of Bohol, there are still other areas that are untapped and can be tested for planting. Farming technologies must be developed in areas exposed to open waves.
- **Support post-harvest facilities for development of new products aside from the traditional practices of drying.** Tapping a research institution that has patented this technology is proposed for dissemination of the technology and to encourage academe to develop the same as avenue for learning. Private investors must also take the opportunity to participate in the development of new products out of seaweeds where the supply of raw materials is assured.
- **Establishment of Seaweed Nursery.** To sustain the production of *Kappaphycus alvarezii*, and other allied varieties, a nursery must be established as source of seedlings. This can be spearheaded by the LGU or private cooperator. Pricing of seedlings will of course depend

upon the prevailing market prices. In areas identified to have potentials for farming, test planting is recommended.

It is however emphasized that in terms of skill and technology on seaweeds farming, the fishers and fisherfolks knowledge should be given due consideration considering experiences in the area and their observations during their fishing activities.

The costs that will be incurred in the operation of a one-hectare seaweed farm is shown in [Table III-22](#).

Table III-22. Cost and Return Analysis of a 1.0 Hectare Seaweeds Farm

A. Assumptions:	
Seaweeds area	1.0 hectares
Culture period	60 days per cycle
Cycles per year	4 cycles
Production:	
Harvest/ hectare/cycle	46, 000 kgs.
Less: no. of kgs. for seedlings	6, 000 kgs.
Seaweeds for drying	40,000 kgs.
Ratio fresh to dry 38% moisture	8:1
Dried seaweeds	5, 000 kgs.
Selling price	P 18.00/ kg.
B. Fixed Asset Investment (cost of motorized banca with 10 Hp engine, farm house with drying platform, wooden banca, mazo, bamboo, rattan baskets & flashlights.)	65, 900.00
C. Depreciation Expenses	12, 050.00
D. Income	
❖ GROSS SALES: 5,000 Kgs, x P18/ kg. X 4 cycles	360,000.00
Less: Depreciation Expenses	137, 088.00
❖ GROSS INCOME	172, 912.00
Less: Depreciation Expenses	12, 050.00
❖ NET INCOME	160, 862.00
E. Financial Analysis	
$\text{ROI} = \frac{\text{Net Income}}{\text{Operating Expenses \& Depreciation Expense/ year}} \times 100$ $= \frac{160,862.00}{199,138.00} \times 100$ $= 80.78\%$	
$\text{Payback period} = \frac{\text{Operating Expense \& Depreciation Expense/ year}}{\text{Net Income}}$ $= \frac{199,138.00}{160,862.00}$ $= 1.24 \text{ years}$	

(e) Strengthening and Promotion of Mariculture/Aquaculture Projects

- Oyster Farming.** Oyster farming in riverine areas has proven to be successful aside from not being delicate to culture. “Talabang tsinelas” or the “slipper oyster” is the most common species and has an attractive market. There are breeders in several municipalities of Bohol (i.e., in Inabanga, Buenavista, Talibon, and Candijay) and have been producing oysters in commercial scale. Their farming operations have to be strengthened to sustain the production.

Details of the cost and return for oyster culture is presented in [Table III-23](#).

Table III-23. Cost and Return Analysis for Oyster Culture

A. Assumptions	
Area	0.5 hectares
No. of plots each measuring 12m x 1m	139 plots
One (1) sack of empty oyster shells (800 pcs)	
Collector strings at clutches or shell per strings makes	114 strings
350 collector strings per plot x 139 plots	48,650 strings
Culture period	12 months
Estimated quantity at harvest	2,862 kaings
B. Fixed Asset Investment	
(Bamboo poles, mono nylon, bamboo stumps, labor & contingency)	210,543.30
Support facilities (farm house, caretakers hut, various tools & paraphernalia, banca (dug-out))	37,000.00
C. Operating Expenses	
(cost of oyster shells & labor for hanging & harvesting, contract labor for preparation of collector strings & plot construction)	196,704.65
D. Depreciation Expenses	
	113,271.65
E. Income	
❖ GROSS SALES: 2,862 baskets x P 200	572,400.00
Less: Operating Expenses	196,704.75
❖ GROSS INCOME (for one cropping only)	375,695.25
Less: Depreciation Expense	113,271.65
❖ NET INCOME	262,423.60
F. Financial Analysis	
$\text{RIO} = \frac{\text{Net Income}}{\text{Operating Expenses \& Depreciation Expense/ year}} \times 100$ $= \frac{262,423.60}{309,976.40} \times 100$ $= 85\%$	
$\text{Payback period} = \frac{\text{Operating Expenses + Depreciation Expense/ year}}{\text{Net Income}}$ $= \frac{309,976.40}{262,423.60}$ $= 1.8 \text{ years}$	

Source: BFAR

- **Mudcrab Culture in a Pond or Pen.** Mudcrab is another luxury commodity with a high market potential. Few operators are successful in this venture due to some marketing and management problems. People's organizations tend to fail in this venture probably due to inadequate capital and inappropriate technology. Therefore, skills and technology training would improve management of the project.

Scylla species are the most recommended for culture. However, they have to be sourced outside the province while other operators tend to rely on local species that do not grow fast.

This component also involves the establishment of the support facility that will complement production and ensure its sustainability.

Cost and return analysis for the operation of a 0.5-hectare mudcrab pen is shown in [Table III-24](#).

Table III-24. Cost and Return Analysis for Mudcrab Culture in 0.5 Hectare Pen in Mangroves

A. Assumptions:	
Assumed area	0.5 hectares
Culture period	5-6 months
Stocking density	1 per sq. m.
Total no. of stocks	5,000 pcs.
Survival rate	70%
Average body wt. At harvest	250 gms.
Volume	875 kgs.
Total feeds	3,500 kgs.
Feed conversion ratio	1:4
Average price/ kg.	P 250
Cropping per year	2
B. Fixed Asset Investment	
(Digging & excavation of paddles, net inclosures & labor cost during installation)	66, 540.00
Bill of materials foe net enclosures (P.E. nets, bamboo poles, mono-nylon. Plastic sheet, CW.C nails, wooden gate).	48, 300.00
C. Operating Expenses	
(Includes cost of crablets, feeds, salary of caretaker, marketing cost, depreciation cost and contingencies)	132, 099.00
D. Income	
❖ PRODUCTION AND SALES:	
5,000 pcs. X 70% survival rate – 3,500 pcs.	
3,500 pcs. X 250 gms./ pc. = 875 kgs.	
875 kgs. X P 250	218, 750.00
Less; Operating Expenses	132, 099.00
❖ NET INCOME	86, 651.00

F. Financial Analysis

$$\text{ROI} = \frac{\text{Net Income}}{\text{Operating Expenses} + \text{Depreciation expense/ year}} \times 100$$

$$= \frac{86,651.00}{132,099.00} \times 100$$

$$= 6.5 \%$$

$$\text{Playback period} = \frac{\text{Operating Expenses} + \text{Depreciation expense/ year}}{\text{Net Income}}$$

$$= \frac{132,099.00}{86,651.00}$$

$$= 1.52 \text{ years}$$

- Lobster Culture in Pens.** Lobster is another promising livelihood project that has been tested and proven to be successful. In Tubigon, the people's organization managed the project in the island barangays. Technology is not a problem, however, the species used is not available in the locality but from other province like those in Mindanao. More research and further studies have to be undertaken to improve the culture.
- Green Mussel Culture.** Since oyster proved to be successful in Bohol, there are also similar prospects for green mussel. Brown mussels are present everywhere but the green one, "Perna Virides", is not. There were plots previously tested but were not sustained due to several factors. However, the location and environment needs and other parameters required were met which proves the possibility of a successful culture. Seeding and more test plants are required as a start up activity.

Cost and return analysis for green mussel culture is presented in [Table III-25](#).

Table III-25. Cost and Return Analysis for Green Mussel Culture

A. Assumptions	
Culture period	4-8 months
No. of crops/ year	1 crop
Average size at harvest	8-10 cm.
Estimated volume at harvest	30,000-50,000 kgs/ ha. (live weight)
Estimated price per kilogram	P 20
Marketing cost	5% of gross sales
Estimated area of the project	One (1.0) ha.
B. Fixed Asset Investment	
(farmhouse made of light materials, paddleboat, hammer, raft (bamboo) flashlights, bolo)	26,800.00

C. Operating Expenses (materials like styrofoam, coco-husk, mussel seeds, full-length bamboo, bamboo stumps, P.E. rope, caretakers salary, hired labor, labor cost & contingency)	375, 479.00
D. Depreciation Expenses	6, 533.33
E. Income	
❖ GROSS SALES: 30,000 Kgs. X P 20	600,000.00
Less: Operating Expenses	405, 479.00
❖ GROSS INCOME	196, 725.00
Less: Operating Expenses	6, 533.33
❖ NET INCOME	190, 191.67
F. Financial Analysis	
$\text{ROI} = \frac{\text{Net Income}}{\text{Operating Expenses} + \text{Depreciation Expense/ year}} \times 100$ $= \frac{190, 191.67}{412, 012.33} \times 100$ $= 46.16 \%$	
$\text{Payback period} = \frac{\text{Operating Expense} + \text{Depreciation Expense/ year}}{\text{Net Income}}$ $= \frac{412, 012.33}{190, 191.67}$ $= 2.16 \text{ years}$	

- **Caulerpa Culture.** Caulerpa is another commodity with market potential particularly in the northern part of the province. Prawn ponds that has been unproductive for so long a time due to pest and diseases in prawn could be utilized. A good pond bottom is required in order to produce a healthy caulerpa. More studies have to be carried out to look into the processing aspect.

(f) Setting Up of Aquaculture/ Marine Investment Fund

One of the many problems in the aquaculture industry is the inadequate financing to start up the project particularly to small-scale farmers. An amount is set aside by the government for an investment fund both for small-scale farmers and fisherfolk who would like to invest in aquamarine projects with a maximum amount specified. This is in a form of a soft loan. This component shall also take charge of the guidelines and criteria to be formulated.

3) Capture Fisheries

The province of Bohol is rich in natural endowments that provide and produce multi-species of fish in commercial quantity. Further, its inland bodies of water are suitable for the culture of a variety of fish species commercially. However, the sector is beset with problems such as declining fishery resources, depressed socio-economic condition, illegal fishing, increasing population and conflict among resource users.

Fish production from municipal fisheries registered a minimal increase over three years (1998 to 2000) but went down again in 2004. The trend is erratic and there is likelihood that may it even continue to decline.

Resource use conflicts are observed in some areas. However, it is noted that by virtue of the law preferential rights are given to bonafide municipal fishers who are registered in the municipality and are using non-destructive and non-prohibited types of gears. An incentive system must form part of this component to increase awareness of the fisherfolks on the seriousness of the government in promoting a marine conservation program.

Meanwhile, commercial fisheries production continued to increase in the last six year. It has replaced the municipal fisheries in terms of the volume of fish catch landed in Central Visayas.

Commercial fishing has always been seen as a competitor in municipal waters. A strategy has to be formulated where these commercial fishers will be active development partners in fisheries conservation and protection rather than as an "enemy" of the municipal fishers.

This component will comprise the promotion of such strategies as "policing their own ranks" on the part of commercial fishers coupled with the granting of incentives and rewards. It will also include the formulation of zoning mechanisms and guidelines in the different zones to avoid resource use conflict as a gradual step towards responsible fisheries.

4) Marketing/Trading

Another important aspect under the fishery sector is marketing and distribution. Though considered shorter in terms of distribution channels, it generally favors markets with relatively higher prices for the commodity.

In general, good quality and high value fish and aquatic products are transported to Cebu as the prime marketing outlet particularly among the fishers in the northern portion of Bohol which has many islands. Cebu is more accessible than the capital city of Tagbilaran. What remains in the rural areas are low-priced species of small sizes that local consumers are able to afford.

The distribution of the catch takes many different forms, which nonetheless could be described, as exploitative or symbiotic. Some fishermen market their catch directly to the market places, some to their "suki" or "preferred/favored buyers" and receive a special favor from him in return (World Bank, 1980). In many cases, a patron-client relationship exists 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 the catch but the price of which are usually at the patron's convenience and advantage. Fishermen very rarely have contact with the final consumer.

Another form of selling the catch is through vitalized middlemen. These are usually well-to-do fishermen who own commercial fishing boats of more than three gross

tons like likum, bag net or lawag, and employ resident fishermen to operate them. They are called “vitalized” and grant loans to fishermen. The fishermen are in turn required to deliver their catch to them as payment for debts. Many of the “suki” are also fish processors during the peak season of catching tuna from March to June. These are processed into “paksiw” using pure vinegar as preservative and are transported to the Mindanao region. Seaweeds are marketed either in raw or dried form. Raw seaweeds are retailed per kilo direct to Cebu and local markets. Dried seaweeds are marketed to exporters through middlemen dispatched by these exporters to the island barangays.

Bangus is marketed direct to Cebu via a pumpboat or a public conveyance system. Some bangus and prawn are sold to processors in Tubigon and are frozen for export to Japan and U.S. Bangus intended for export are deboned and vacuum packed..

Groupers are sold live in hotels, restaurants and resorts in Cebu and in the province, together with mudcrab, oyster and lobster. They command a higher price when sold live. Other marine products like sea cucumber and seahorse are exported in dried form. Blue crabs are being processed by a local processor stationed in Ubay and Talibon causing the price to escalate.

Generally, as mentioned earlier, the good quality marine products are sold outside the province to get a higher price and only the products of lesser quality remain in the area and are affordable to the local communities. The hotels, restaurants and resorts in the capital city of Tagbilaran share a minimal volume of these commercial value species.

Hatchery-bred bangus fry are sold locally, but the bulk is sold to other provinces including Manila, Bulacan and Pangasinan.

It is therefore recommended that in order to have control over all the fisheries and aquatic products shipped out of the province, an auxiliary invoice must be issued by the municipality which have port facilities. For records purposes, the volume and price of the products should be summarized on a monthly basis.

5) Support Services

(1) Local Institutional Capability Strengthening

The life of the project and its sustainability depends on how prepared are the targeted beneficiaries. This can be perceived in terms of their acceptance as well as their participation in every endeavor. Capacitating people in order to capacitate others may not be an easy task, it requires skills, expertise and commitment. At the provincial level, the Human Resource Management Office (HRMDO) is tasked to capacitate employees of the Provincial Government so that they may able to deliver the tasks expected of them. They may gather a pool of trainers to be trained at the provincial level who will replicate the same at the municipal level.

(2) Community Organizing/ Development and Entrepreneurship for Fisherfolks

There are approximately 260 fishers' organizations with an estimated 6,500 members provincewide. They are classified either as active or non-functional. Entrepreneurship training will be prioritized to the functional PO's which have shown a greater degree of success. Non-government organizations can be tapped in organizing and strengthening these communities to prepare them for entrepreneurship and cooperativism. Other groups are being strengthened and reactivated as support to project implementation, both at the provincial and municipal levels, such as the municipal CRM TWG, Ecosystems TWG, PTWG for CRM Certification, TWG in the monitoring of Marine Researches, Bohol Rescue Units of Marine Mammals (BRUMM), Organization of the Fish Examiners League of FARMC, Coastal Law Enforcement Councils in 3 Congressional Districts of Bohol, Organization of Scuba Divers and the Bohol Coastal Resource Management Task Force (BCRMTF).

(3) Fishery Extension, Training and IEC

Fishery extension service is the technology information dissemination arm of Research and Development. While it is true that there are mature technologies that have been developed this has to be refined to suit the present times and make it applicable to local conditions. Further, failure of some livelihood aquaculture projects must be analyzed to determine the real cause.

Skills training must be conducted prior to the conduct of the actual course. . The trainings must also incorporate marketing and packaging aspect. Visits to successful livelihood projects could enhance ability to manage projects.

The lack of competent and qualified fishery extension officers is also a problem ever since the devolution of personnel to the local government units. Extension officers are usually generalists with no sufficient training on fisheries technology. This component will also look into the appropriate fisheries technology training to equip devolved fisheries personnel with sufficient knowledge and be real extension workers.

Finally, this component will look into the customized module and methods of delivery and conduct of formalized training courses based on identified training needs assessment and approaches to IEC preparation, implementation and monitoring and evaluation of delivery of services.

(4) Research and Development

Research and development are key factors in developing appropriate technologies. A strong research and development will provide avenues and better opportunities for the application of technologies developed in other areas. The focus is to verify and refine technologies on farm, which then can lead to the development of appropriate technology in the province. This will likewise address the issues and problems on marketing and post-harvest product development, value adding and packaging. A brighter prospect for fisheries and aquatic products is seen in this area. Markets for seaweed

products for example prescribes stricter regulations and standard for semi-refined carageenan. The current product has to be processed first and new products have to be developed out of the semi-refined carageenan. There is however an advantage since handling and problems associated with quarantine of raw materials are reduced because it is easier to comply with the quality of the product. But still, processing will contribute in providing local employment.

In marine waters, stock assessment studies can be also carried out by the national government agencies like BFAR. They can identify and focus on special management concerns like protecting an endangered or rare species. Underwater assessment to determine the status of the habitat and the biodiversity in marine protected area must be undertaken. It is also important that this information is translated into layman's term to solicit the support and commitment of the locals. Another research area is the socio-economic status of the communities managing the sanctuary considering that this is crucial to the success of the project. Moreover, it will also be worthwhile to determine the biology of high valuable specie so that culture technology will be complemented with species compatibility.

(5) Enforcement of Fishery Laws and Regulations

All initiatives in the coastal areas are meaningless without effective enforcement of rules and regulations in the coastal areas.

Coastal Law Enforcement Councils (CLEC) is organized in every congressional district of Bohol. It is a multi-sectoral and multi-agency body, which is designed to address enforcement of coastal laws and issues in marine fisheries in respective areas of jurisdiction. It is chaired by the local chief executives and has advisory bodies coming from national agencies, House Representatives and the private and NGO sectors chosen by the council. A Coastal Enforcement Team serves as the seaborne patrol arm of the CLEC and supports law enforcement at the municipal level. These councils must be strengthened to ensure sustainability in coastal law enforcement.

Law enforcement requires skills and competence as well as adequate knowledge of the policies, techniques in apprehension, map/chart reading, use of the gadgets. An appreciation and understanding of local policies enacted through SB ordinances, techniques in handling illegally caught fish and almost all aspects related to law enforcement are imperative since coastal areas are beset with a number of problems which needs varied solutions. Building the capabilities of the team reduces risk of cases being dismissed by the Courts and other authorities due to technical reasons. Continuous capability building of law enforcers and fish wardens is seen as an important strategy in strengthening law enforcement.

Another strategy in sustaining law enforcement and to boost the morale of law enforcers is to institutionalize a reward and incentive system. The province shall look into a mechanism for rewarding the good performance of the CLEC and its Coastal Law Enforcement Team. This can be replicated at the municipal level.

During the coastal law enforcement summit in 2000, the issue on “unholy” alliance of law enforcers with the violators was discussed. To have transparency, control is instituted through the organization of the CLECTAT whose function is to investigate, recommend, monitor and publish the accomplishments of the team. Protocols are observed in doing investigation.

The O-plan is instrumental in making law enforcers in motion. The O-plan serves as the guide on how the day-to-day operations shall be conducted with the proper briefing and skills required of a model law enforcement team. A law enforcer must be multi-skilled and the team leaders should have the right qualifications and have established credibility and carries with him the authority to act as the leader of the team.

A mother patrol boat is deployed in every congressional district to assist the municipalities in patrolling the area. However, the capacity of the existing mother boat is not enough to outrun the boat used by the violators. This component will identify and provide the support facilities and equipment required to have sound and effective law enforcement.

Monitoring and Evaluation will not only focus on the in-house performance of the team involved but will likewise give importance to the council as a law enforcement body. Cases filed in court will also be monitored to determine the progress and input the status to the database.

To be able to get updated information, the law enforcement team of the CLET shall provide an accomplishment report to the chairman of the council. Likewise, the municipal law enforcement team shall also submit an accomplishment report to the local chief executives.

Enforcement may also entail the conduct of market denial operations in public fish markets to determine whether fishes that are for sale were caught through the use of explosives. A certification issued by Fish Examiners, and the joint patrol team of the PNP and Fish Warden shall be sought

(6) Licensing and Permitting

The Coastal Resource Management in the Philippines operates within the framework of R.A. 7160 (Local Government Code) and R.A. 8550 (Fisheries Code of 1998) which provides that fisherfolks must be registered. They will be assisted by the FARMC which will also determine the priority resource users of the municipal waters. Under this concept, bonafide and resident fisherfolks shall have priority on the use of municipal waters. Fisherfolks are being encouraged to register so that the number of users from among the residents of the municipality will be identified first before allowing other non-resident fishers. Permits and licenses are issued only to registered fisherfolks.

This component will also look into general issue of conflicts on the use of open resources.

6) Support Facilities Development

(1) Multi- Specie Hatchery

For a couple of years now, government programs have been focused more on exploitative activities to accelerate production. Introduction of a more efficient technology to increase fish catch was the major concern without considering the management of the resources. There was also a misconception that the seas are infinite and cannot be exhausted until relevant studies revealed that there is a decline in the production of the municipal fisheries over the last ten years. Corollary to this, ADB studies in 2001 revealed that the catch exceeded the sustainable level and maximum yield was already reached in 1987 according to BFAR. These are proofs that indeed there is overfishing in the municipal waters.

To augment the gap in production, some operators have shifted to fish farming or fish culture. To sustain the production, hatcheries were established. Bangus and prawn hatcheries in commercial scale are owned by the private sector. The government established a hatchery for research purposes and production is limited to support input-assisted projects. This includes the Tilapia hatchery in Clarin which is managed by DA-BFAR and have proven to be successful. However, other research studies on fish culture failed.

Objectives

- To support on-farm production of some freshwater species;
- To augment the dwindling and declining fish catch from marine waters;
- To provide small farmers access to the supply of fry; and
- To ensure the availability of species that are already threatened and in danger of extinction.

Project Component

- **Freshwater Hatchery.** Among the cultivable freshwater species that farmers are familiar with are the giant tilapia, African and native catfish, and freshwater eels. Technologies for the culture of these species are available and they are not hard to culture. However, the volume of fry needed can only be supplied by a hatchery/breeding facility. Success stories in other provinces doing similar endeavors can be a study area. Presently there is an on-going construction of a multi-species freshwater hatchery in the interior part of the province with a good source of water but this has to be expanded to accommodate the expected demand.

[Table III-26](#) shows the production cost and estimated income from a tilapia hatchery.

Table III-26. Cost and Return Analysis for Tilapia Hatchery in Semi- Concrete Tanks

A. Assumptions:	
Area	450 m ²
Total number of breeders	1, 800 pcs.
Sex ratio	3:1
Total no. of female	1,350 pcs.
Average production/female/breeder/cycle	150 fingerlings
No. of breeding cycles per year	8 cycles
Annual fingerlings production	1, 620,000 pcs.
Selling price per fingerling	0.30
B. Fixed Asset Investment	
(oxygen aviatir tank cylinder, plastic basin, water pump, concrete water reservoir, portable electric aerators with accessories, breeding/ conditioning/ hatching tanks)	228, 029.22
Bill of materials for 3 units (10m x 15m x 1m) Breeding tanks and 5 units (2m x 3m x 1m) Fingerling nursery/ holding tanks	196, 187.42
C. Operating Expenses (cost of breeders, feeds, fertilizers both organic & inorganic, lime, assorted packing materials, caretaker's salary, electricity, marketing cost and contingencies)	288, 563.00
D. Depreciation Expenses	30, 102. 92
E. Income	
❖ GROSS SALES: 1, 620,000 fingerlings x 0.30	486, 000.00
Less; Operating Expenses	288, 563.00
❖ GROSS INCOME	197,437.00
Less Depreciation Expenses	30, 102.92
❖ NE INCOME	167,334.08
F. Financial Analysis	
$\text{ROI} = \frac{\text{Net Income}}{\text{Operating expenses} + \text{Depreciation Expense/ year}} \times 100$	
$= \frac{167,334.08}{318, 655.92} \times 100$	
$= 52.5\%$	
$\text{Payback period} = \frac{\text{Operating Expenses} + \text{Depreciation Expense/ year}}{\text{Net income}}$	
$= \frac{318, 665.92}{167, 334.08}$	
$= 1.9 \text{ years}$	

Source: BFAR.

- **Multi-species Mollusks Hatchery.** This component will include the establishment of a concrete tank for different mollusks or shells that can be propagated to support the marine conservation program on the basis of their production potential. Abalone, tridacna species and sea urchin will be considered.
- **Forging of an Agreement with privately-owned commercial hatcheries.** While commercial private hatcheries are being put up by the local government units, the forging of agreements to help support the marine conservation program shall be explored. It will involve the provision of assistance for the seeding of marine waters with bangus and prawn fry from these hatcheries.
- **Establishment of a Holding Cage for “berried” blue crab.** “Berried” blue crabs accidentally trapped through fish net or crab pot shall be put in a holding cage and given a chance for the matured egg to form a zoea. This practice is in support to the blue crab conservation project which is supported by policy intended for the protection of these species.

(2) Post Harvest Storage and Processing Plants

Presently, there are six ice plants established in Tagbilaran City, Alburquerque, Trinidad and Talibon whose capacity ranges from 5 to 30 MT. Based on a survey of these establishments, the demand for block ice is from March to June, at the onset of the summer season.

The only fish processing plant is located in Tagbilaran which processes prawn and bangus (boneless) for export to Japan and U.S. Another small-scale enterprise is the processing of the meat of blue crab which is located in Ubay and Talibon. This establishment has generated employment in the locality.

Seaweed farmers have built-in drying facilities made of bamboo where seaweeds are dried directly after harvesting. The seaweeds must be free of any impurities in order not to degrade its quality. The number of days of drying depends on the buyer's requirement on the percentage of moisture.

The increasing number of ice plants is a manifestation of the demand as a result of the expanding volume of production from capture and aquaculture fisheries. This component shall likewise look into the needed support for post-harvest storage and requirement for processing plants of the FRMD program.

(3) Laboratory Facilities

The existence of laboratory facilities in the province is limited for the analysis of fish catch. There is however need for soil analysis in agricultural farmlands and brackishwater fishpond. Water quality is also analyzed for the presence of coliform bacteria particularly for sources for water for domestic use and to determine the quality of water in public beaches. Water for irrigation is also analyzed to ensure that its chemical content is suitable for irrigation.

The need for the establishment of a laboratory in the province is of vital importance. Fish samples allegedly caught with cyanide are submitted for laboratory analysis but must reach the laboratory within 24 hours. Beyond this period, samples are no longer fitted for examination due to the volatile characteristics of the substance. The present laboratory facilities will be enhanced and upgraded to cater to other types of analysis and thus to become a “One-Stop-Shop” laboratory. The personnel manning the laboratory will be trained based on the needed skills as part of the facility upgrading scheme.

(4) Fish Landing

Fish landing are areas zonified for trade and navigational purposes. Fishersfolk could land their fish catch in these areas.

Auxiliary revenue is issued by the LGUs for the shipment of fishery products outside the province. The landing area could also serve as a venue for controlling and monitoring the movement of these products. For effective implementation of this component, the barangay where the fisherfolks come from could be encouraged to cooperate by giving them a share of the municipal landing fees. Local policy support would complement this initiative.

2.3.5 Implementation Plan

1) Implementation Arrangement

As outlined in Chapter 4.0 (Organization and Management) of this report, the FRMDP component will be lodged both at the Bohol Environment Management Office (BEMO) and at the Office of the Provincial Agriculturist (OPA). This is consistent with the existing structure of the provincial government which will be established for the implementation, management and coordination of the development program. This strategy is also in line with the institutional strengthening agenda promoted under the Bohol AMP.

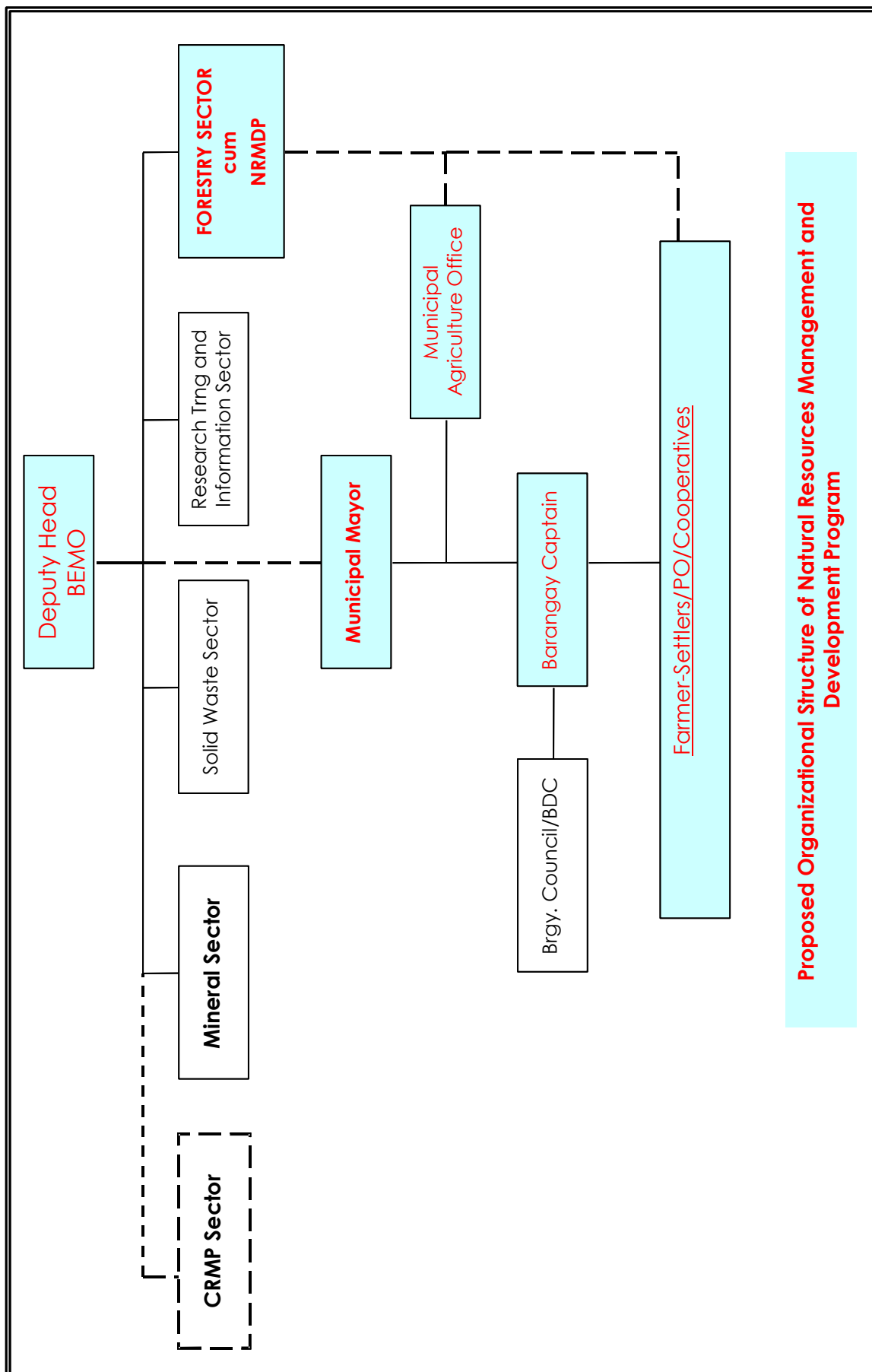
The following are the proposed implementation arrangements for the FRMDP component.

(1) The Natural Resource Management Division with the Coastal Resource Management Unit

The Natural Resource Management Division of the BEMO will be the executing unit and shall be mandated by the Provincial Governor, upon the recommendation of the Deputy Head, as the co-implementing unit for the FRMDP component. The organizational structure of the BEMO-NRMD which integrates the CRM unit is provided in [Figure III-12](#).

The Agriculturist II of the CRM unit shall be designated as Project Officer on concurrent capacity. The project officer shall be assisted by three regular staff designated as coordinators for each congressional district. Technical support and specialists shall be hired on a contractual basis to augment the deficiency in the staffing of the BEMO.

Figure III-12. Proposed Organizational Structure of the BEMO-NRMD



(2) The Productivity Division with the Sector Management

Upon the recommendation of the Provincial Agriculturist, the Governor shall officially designate the Productivity Division of the OPA as the co-implementing unit with the Coastal Resource Management unit of the BEMO.

The Fisheries Sector Unit of the Productivity Division shall be designated as Project Officer on concurrent capacity. He shall be assisted by regular staff technically trained for the purpose. Experts will be hired on a contractual basis in case there is need for support in project implementation.

Both the BEMO and OPA, through the Coastal Resource Management Unit and the Fisheries Management Unit shall primarily perform coordination and monitoring functions. Its responsibilities will include the following:

- Preparation of the annual work and financial plan for submission to and approval by higher management.
- Coordinate with the participating LGUs through the Municipal Agricultural Officers for the component's project planning and implementation including training on community organizing and community development.
- Coordinate with the Barangay Council/ Barangay Development Council, technicians from the cluster production zones, people's organizations concerning project implementation .
- Coordinate for the establishment, operation and maintenance of demonstration or model farms and applied research and on-farm trials by the cooperators.
- Coordinate the operation of the Provincial Multi-Species Freshwater Hatchery, Mollusk Nursery, and the forging of agreements with national agencies and private sector which own/manage the hatcheries, as well as laboratories and pilot projects supported by the FRMDP.
- Collaborate with other development partners from the NGA's, NGO's and facilitate delivery to POs of technical assistance and resource inputs of the LGU's.
- Monitoring of the progress of activities and accomplishment during the period and preparation of regular status report for submission to higher management.
- Collaborate with the Technical Assistance Group and MLGU's on the redesigning/packaging of certain components for consideration by potential donor agencies and on the conduct of impact evaluation studies over time.

The CRM unit of BEMO and Fisheries Sector Unit of OPA shall be provided with technical backstopping support by the regular staff of the divisions in BEMO and OPA.

(3) The Municipal Agriculture Offices of Participating MLGU's

The participating MLGU's through their existing Technical Working Group (TWG) shall undertake preparation of a Project Implementation Plan for their priority projects or package of projects under the FRMDP. For the MLGU's programs under the FRMD component, the Municipal Agriculture Office

(MAO) shall be mandated as the executing unit with the Municipal Agriculturist designated as Project Coordinator on a concurrent capacity. The MAO shall either mobilize all their staff or designate selected agri-technologists to the project on full-time basis.

The existing staff of OPA and BEMO shall be trained on community organizing/community development in partnership with the CO of BPRMO. They shall team up with the technologists of the LGU to cover the priority cluster communities within the cluster production zone. The team shall work with the barangay officials and PO officers, fisherfolks and fish farmer participants and other sectors of the cluster community.

The FRDM Projects will be implemented within the span of 20 years. A summary of the implementation schedule is found in [Table III-27](#).

Table III-27. Summary of Implementation Schedule of the Fisheries Resource Management and Development of the Bohol Agriculture Master Plan

COMPONENT ACTIVITY	ACTIVITY SCHEDULE							
	Yr. 0	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6-10	Yr. 11-20
I. Pre-Implementation Phase								
• Screening and staff selection								
• Executive Order preparation								
• Organization of PD cum FRDM unit								
• Generation of commitment from MLGU's and training of TWG's on Project Implementation preparation								
II. Purchase of Equipment Commodities								
• Preparation of documents								
• Transport								
➢ Hatchery Equipment								
➢ Laboratory Equipment								
➢ Office Equipment								
➢ Diving Equipment								
➢ Applied Research & Demo Farm Equipment								
➢ Fish Landing Equipment								
➢ Fishermen's Training Center								
➢ Fishermen's Production Equipment								
III. Construction/ Enhancement of Facilities								
• Multi- specie Freshwater Hatchery								
• Multi-specie Mollusk Hatchery								
• Post-Harvest Storage and Processing Plants								
• Holding cage for berrish blue crab								
• Fishery Laboratory								
• Seaweeds Drying Pavement								
• Fish Landing Facility								
• Fishermen's Training Center								
• Backyard Freshwater Fishpond								
IV. Establishment and Operation of Demonstration/ Model Projects, Fields Trials and Marine Seeding								

COMPONENT ACTIVITY	ACTIVITY SCHEDULE							
	Yr. 0	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6-10	Yr. 11-20
V. Special Studies, Applied Research and Case Studies								
VI. Operation of Multi-specie Freshwater and Mollusk Hatchery								
VII. Operation of Laboratory Facilities								
VIII. Component Projects Development and Operation								
1. Organizational Development								
• Organization and strengthening the alliance of 5 MLGU's								
• Individual LGU Fisheries Development & Management Planning								
• Cluster LGU Fisheries Development & Management Planning								
• Cluster LGU Yearly Action Plan								
• Strengthening and Sustaining Alliances								
2. Enhancement of Brackish water Aquaculture Production								
• TA services for modified Extensive culture of Milkfish in ponds								
• TA services on "Polyculture System" in brackishwater fishpond								
• Stocking and dispersal of existing freshwater bodies with fingerlings								
• Development of fish cages/ fish pens in dams and impounding								
• Caulerpa ' lato" culture in brackishwater pond								
3. Enhancement of Mariculture production								
• Development of Seaweeds farming								
• Development of oyster farming								
• Development of green mussel farming								
• Development of grouper farming								
• Development of lobster farming								
4. Coastal Resource Management Plan Implementation								
• Intensify establishment and strengthening of Marine Protected Area or Marine Sanctuaries								
• Coastal Tourism Development								
• Integration of Population Management in CRM								
• Solid Waste Management								
• Responsible Fisheries Planning Management & Development								
• Foreshore and Shoreline Management								

COMPONENT ACTIVITY	ACTIVITY SCHEDULE							
	Yr. 0	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6-10	Yr. 11-20
IX. Local policy Formulation and Implementation								
X. Fish Handling, Transportation and Marketing								
XI. Project Promotions								
1. Showcasing "Best Practices" of Cluster Production tones with Techno-sharing thru Field Bays								
2. Promotion of "Festival of the Sea"								
3. Fisherfolk/ Fishfamer's Congress								
4. Eco-Agri Tourism Packages								
5. Project Documentation								
XII. Strengthening Coastal Law Enforcement Support								
XIII. IEC Activities and Training Courses								
XIV. Phase out scheme								

2.3.6 Financial Plan

1) Project Cost Estimate

The estimated total cost for the implementation of FRDM project over a ten (10) year period is P423,432 million. The summary breakdown of cost per component is shown in [Table III-28](#). The details for the 20-year implementation can be found in [Table III-A.4](#) of the Annex report.

Table III-28. Summary of Cost Estimates (P'000), Fisheries Resource Management and Development of the Bohol Agriculture Master Plan

Component/ Key Activities	Estimated Cost		Total Cost (10 Years)
	Years 1-5	Years 6-10	
1. Organizational Development	1,510.00	2,050.00	3,560.00
2. Coastal Resources Management (Habitat) Plan Implementation	35,620.00	29,620.00	65,240.00
3. Responsible Fisheries Planning, Development and Management	28,200.00	13,500.00	41,700.00
4. Entrepreneurial Livelihood Development Support	132,000.00	72,500.00	204,500.00
5. Infrastructure & Facilities Support	50,000.00	-	50,000.00
6. Foreshore and Shoreline Management	15,020.00	6,700.00	21,720.00
7. Local Policies Support Formulation & Implementation	2,725.00	2,725.00	5,450.00
8. Fish Handling, Transport & Marketing System	1,180.00	1,180.00	2,360.00
9. Support Services on Local Capability & Capacity Building	2,200.00	2,200.00	4,400.00
10. Applied Research & Special Studies	15,250.00	9,250.00	24,500.00
Grand Total	283,705.00	139,727.00	423,432.00

2.4 NATURAL RESOURCES DEVELOPMENT AND MANAGEMENT PROGRAM (NRDMP)

2.4.1 Rationale

Existing natural resource database shows that of the total provincial area of 411,278 hectares, only 25% is classified as timberland. This comprise of the upland and mangrove forests. In reality, these areas are not totally vegetated; existing natural vegetation continue to diminish due to timber poaching, forest fire, kaingin practices, uncontrolled illegal quarrying, infrastructure development and other forms of land conversion. Heavy rains cause dams siltation and flashfloods in lowland areas since most watersheds are highly eroded and deficient of vegetation cover.

Of the ten (10) watersheds in Bohol, only three (3) have been assessed and rehabilitation programs have been identified. The Inabanga-Wahig Watershed which covers 14 municipalities (i.e. Inabanga, Buenavista, Trinidad, Talibon, Ubay, San Miguel, Alicia, Pilar, Jagna, Sierra Bullones, Carmen, Dagohoy, Danao and Sagbayan) has a total of 20,456 households living within the watershed area. It consist of 57,675 hectares catchment area, about 675.5 kilometers of rivers and streams, and with 11,851 trees/hectare in the naturally growing and reforested areas and 44 trees/hectare in the grasslands. In Duero-Cansuhay Watershed which covers the municipalities of Jagna and Duero has a total of 3,826 households living within the watershed area; the total catchment area is 6,325 hectares, and with 74.4 kilometers of rivers and streams. The vegetation cover is about 44 trees/hectare for grassland and 122 trees/hectare for the planted trees, e.g., mahogany. The most degraded watershed is the Caroud Watershed which covers the municipalities of Ubay, Mabini and Candijay. It has a total of 6,214 households living within the 20,472 hectares of catchment area. The total length of the rivers and streams is approximately 49 kilometers.

The area covered by a Certificate of Ancestral Domain Claim (CADC) of the Eskayas, an indigenous people in the province is another concern. The total area is 3,170 hectares located in the barangays of Taytay, Duero; Bayabas and Mayuga in Guindulman, and portion of the municipality of Sierra Bullones. Suitable areas within the CADC are presently utilized to subsistence vegetable production, and proposed for the expansion under the highland HVCs farming systems (refer to component 3.1.5-B: Diversified Highland and HVCs Enterprise). Its protection forests component shall form part of the priority targets under this project.

2.4.2 Goals and Objectives

Goals:

- 1) Poverty alleviation; and
- 2) Environmental rehabilitation and protection.

The specific objectives are as follows:

- 1) To implement wider information campaign to increase the level of environmental awareness of local communities;
- 2) To establish database on the watersheds; its biodiversity, environment initiatives, existing vegetation cover and related data as reference for planning and decision-making;

- 3) To establish endemic nurseries and gene banks in support to reforestation programs and biodiversity conservation;
- 4) To enhance and sustain water supply for domestic and agricultural use;
- 5) To develop production forests and idle lands within alienable and disposable areas into agro-forestry and/or commercial tree farms to provide the timber requirements of the province;
- 6) To assist in the creation of functional watershed management councils and in the crafting of their management plans;
- 7) To promote forest products development leading to the establishment of viable enterprises; and
- 8) To assist in the identification, planning and packaging of ecotourism development projects within the watersheds and forest resource areas.

2.4.3 Component Description

A. Watershed Rehabilitation and Management Project (WRMP)

1) Brief Description

The economic growth of the province is predicated on the sustainability of its natural resources. Based on the assessment of the present natural capital stock, Bohol has already reached a critical level of natural forest depletion. This alarming state of Bohol's natural resources is reflected in its social and economic performance, i.e., increasing rural poverty, declining agricultural production, soil fertility depletion, soil erosion and flash floods, etc. Population pressure further intensify the use of these resources. The remaining forest reserves are declining due to kaingin, forest fires, illegal timber poaching and conversion of forest areas to agriculture use.

The DENR Provincial Environment and Natural Resources Office (PENRO) data shows that of the ten watersheds in Bohol, eight are classified as Non-NIPAS and two with NIPAS declaration. *Most of these watersheds experience 26-30% soil erosion rates and those at critical stage have an annual soil erosion rate at 10 m³ per hectare.*

The present policy of the Provincial Government is to ensure the sustainable management of watershed for the benefit and enjoyment of all Boholanos. It appreciates a local government driven, inter-agency and multi-sectoral watershed management approach.

For the initial to medium term implementation of the project, the priority areas will be the Inabanga-Wahig Watershed (IWW), the Duero-Cansuhay Watershed (DCW), and the Caroud Watershed. The specific interventions for the rehabilitation are based on the watershed resources assessment, development and management plans, which outlined the priority programs and activities. For the Caroud Watershed, the basis is the output of the series of community consultation cum project planning sessions.

Seven (7) watersheds (i.e., Lumbay, Panampan, Manaba, Ipil, Abatan and Banban watersheds) shall be the focus of detailed assessment and management plan preparation studies. Simultaneously, the formation of local watershed

management group will be undertaken in each watershed to ensure a participative development planning process, and to reinforce the sense of community ownership of the watershed resources management plan. Such plans shall be the basis for development intervention in each watershed over the longer- term.

- In the case of the Loboc Watershed, the area focused approach (AFA) is being piloted in the area. This pilot intervention could generate valuable lessons which may be useful in succeeding watershed resource-based development. The Loboc Watershed Advisory Council (LWAC) therefore shall primarily undertake monitoring and evaluation, and documentation of development lessons.

2) Objectives

The WRMP specifically aims to:

- (1) Institutionalization of watershed management body for each watershed;
- (2) Delineate microwatersheds as the manageable spatial unit for the interventions;
- (3) Manage and develop the strict protection zones, streambanks and the rehabilitation zone composed of severely eroded grassland and cultivated settlement areas;
- (4) Manage and develop the 216 hectares NIA reservoir in Pilar into a wildlife habitat and ecological destination and Campo Verde for ecological and outdoor recreation;
- (5) Manage and develop the buffer zone into an effective social fence;
- (6) Conduct information, communication and education campaigns for the barangays inside the catchments and service area of the watershed; and
- (7) Establish collaborative efforts with the colleges/ universities, civic organizations, NGOs/POs for the rehabilitation and management of the watershed.

3) Strategies/Activities

Reforestation of Degraded Areas. This activity shall be concentrated on the severely eroded open areas inside the watershed with ≥ 50 percent slopes such as grassland/grazing land, cultivated/settlement areas, abandoned roadbanks and others. These areas are highly susceptible to erosion and are the major sources of sediments and debris affecting the streams in the watersheds.

With the various forms of watershed degradation going on in the area, rehabilitation measures and strategies are needed. Such measures are aimed to restore the areas into their original or even improved condition. These measures

and strategies will include but not necessarily limited to, the use of vegetative means.

This component will involve the identification of degraded sites within the watershed areas and establishment of endemic satellite nurseries. The scheme of satellite nurseries are: (a) seedlings to be raised are endemic or native species, (b) it will be managed by school (secondary/elementary) students and their respective PTCA organization and the Department of Education, (c) technical assistance and start-up seedlings and seeds will be provided by the project, and (d) BLGU and MLGU will allocate funds for this purpose.

Rehabilitation of Critical Slopes and Gullies. As a result of continuous cutting down of trees, forest fires and kaingin, soil erosion is prevalent in the three watersheds. It is therefore imperative to rehabilitate the water sources to protect further erosion. Some specific measures to address this problem are brush fills, earth plugs, brushwood check dams, loose stone check dams. The community will shoulder the labor components while the cost of materials will be provided under the project.

Similarly, degraded grasslands hasten deterioration of the landscape through the enhancement of active erosion and formation of gullies. During summer, farmers obtain young shoots for their livestock or prepare the land for cultivation usually by burning. On slopes, the soil that is exposed after grass fires is usually gullied during the first rainy season. This zone is also considered the primary source of sediments and other pollutants that affect adversely the quantity and quality of streams in the watershed. As such, this zone will be rehabilitated to reduce the adverse environmental impacts of activities in the watershed. Several activities are suggested in these areas such as management of the cultivated hillside ($\geq 50\%$ slope), alley cropping, improved fallow system, border planting of fruit trees and other plants.

River Rehabilitation and Protection Management. Vegetation on both sides of the rivers or streams will be established as streambank protection forest. This will be accomplished by planting bamboo, ipil-ipil, bananas, coconut, romblon, rattan, edible fruit bearing trees for wildlife and other suitable tree species. The occupants shall be encouraged to plant tree species to prevent destabilization of the streambanks. Suggested spacing for bamboo is 10 m x 10 m; ipil-ipil, 2 m x 2 m; coconut 10 m x 10 m; and fruit trees 5 m x 5 m. The community organization shall formulate sustainable harvesting plan for this purpose. Harvesting of planted bamboos and ipil-ipil shall be allowed based on the approved plan. Ipil-ipil shall be harvested following the shelter wood method.

River clean-ups is very vital activity to maintain the stability of the rivers. This may be difficult to do, however, if the community will have its concerted efforts in collaboration with POs, NGOs and existing institutions, this burden will be rendered easier. Focused promotions shall be done to encourage local potential groups to spare time for the rehabilitation and protection of rivers. Moreover, for heavily silted rivers, desiltation shall be conducted for rehabilitation purposes.

Adopt a River/Stream Project. This strategy is complementary to the protection of the bodies of water which is essential for a profitable production of both crops and livestock. Active civic organizations such as Rural Improvement Club (RIC), SCFO, and even church based organizations and other religious organizations, youth organizations (SK, PYM, 4-H club), secondary or elementary school student

council and PTCA will be tapped for this project. Each participating organization or institutions will be assigned and/or encouraged to select and adopt a river or streambank for them to take care or rehabilitate. Under the project, the BEMO and MLGU/BLGU will allocate funds for the provision of plantable seedlings such as bamboo, ipil-ipil or suitable fruit trees for this purpose.

It is also highly suggested that celebration of barangay/municipal holidays will be celebrated by designing activities that are environment friendly. For instance, if the topic for monthly barangay assembly can be done for half day, the other half shall be utilized to river cleaning. Donors' forum is also very vital for this project to obtain commitments from potential donors.

Biodiversity Protection and Management. Bohol's biodiversity is under threat due to persistent and excessive utilization of different tree species, coupled with conversion of forests to agricultural and settlement areas, monoculture farming with exotic species, farming on steep hillside and mountains, coral reefs destruction and over-fishing. In fact, several flora species that were previously noted abundant are already extinct in some islands while others are becoming rare and endangered. With this scenario, conservation and protection are deemed necessary through the following strategies: establishment of BMS, establishment of wildlife sanctuaries, establishment of botanical gardens, harmonizing research with conservation, and comprehensive IEC programs on the conservation and protection of biodiversity. An expert/specialist in this field is deemed necessary, thus, the provincial government will request assistance from VSO, US Peace Corp or other agencies to provide assistance to the activity.

Water Source Protection and Enhancement. Water is life. However, in most cases, we do not consider the future state of the sources of water in the province. It is very evident that LGUs do not have comprehensive plans for the sustainability of water supply, specifically water sourced from the green environment. This activity will draw out appropriate interventions for the sustainable supply of water in the province.

Natural rainwater collector shall be established in the strategic areas of the watershed to properly conserve excess water. It is necessary not only for agricultural use but for alternative sources of livelihood of forest occupants such as upland freshwater fishponds, duck waterpond, wallowing pond for ruminant livestock and/or upland crops irrigation system.

Adopt a Watershed Project (AWP). This strategy will focus in the rehabilitation, protection and management of the watershed area. Interested colleges and universities through their Community Extension and Outreach Services Programs or their Reserve Officers Training Corp will be invited to this program. Each participating institution will be given a designated area in the watershed for them to rehabilitate, develop and manage. Civic organizations who are environmentally motivated will also be encouraged to develop part of the timberland similar to that of the colleges and universities. A Memorandum of Agreement between the Provincial Government, the concerned MLGUs and the participating institutions/organizations shall be executed for this purpose.

B. Production Forest Development and Management (PFDM)

1) Brief Description

This project will cover priority areas (uplands and mangrove) awarded by the government under the Forest Occupancy Management (FOM) program, which were later transformed into Integrated Social Forestry Program with issued Certificate of Stewardship Contract (CSC) as proof of access and management rights, the Community-Based Forest Management (CBFM) with CBFM agreements, reforestation/afforestation sites in open timberlands (former grazing lands), communal forest, community established forest and all tree planting sites in municipal and barangay watersheds.

Significant areas of the aforecited lands have been developed into agro-forestry farms aimed at maintaining the stability of the forests by propagating forest trees side by side with food and cash crops. Agroforestry schemes generate additional income for household beneficiaries in both upland and coastal communities.

After the devolution of these forest management functions by the DENR to the Local Government Units (LGUs), the program did not gain much appreciation because its devolution was not accompanied by financial and technical support, and LGUs were not ready to accept and assume the function. As a result, most of the beneficiaries abandoned their areas, some transferred their rights to heirs or sold their rights. However, LGUs soon realized their legal mandate and responsibility to manage and protect their own local environment not just for compliance, but for environment stability and economic prosperity. For Bohol, idle production forest should be developed to increase the production of timber for local consumption. Considering the inevitable population increase, there will be corresponding increase in demand and pricing for forest products and by-products.

2) Objectives

- (1) To establish entrepreneurial endemic nurseries and gene banks in support to reforestation programs and biodiversity conservation;
- (2) To develop production forest and other idle lands within alienable and disposable areas into agro-forestry and/or commercial tree farms to increase land productivity and support timber requirements of the province;
- (3) To provide capability building program to key stakeholders and program implementors to improve technical competencies.

3) Strategies/Activities

Agro-forestation. The introduction of endemic tree species is one of the new strategies in enhancing agro-forestry as compared to the traditional technology. In this manner, indigenous trees are being saved from extinction especially those species that are considered endangered. Planting materials is not a problem since these are available in the adjoining areas. This strategy is in line with the

objectives of biodiversity conservation. In addition, farming methods that have employed technologies using commercial inputs would rather shift to organic farming as envisioned in the sustainable agricultural development strategy.

Prior to on-site project implementation, the following prerequisite activities will be conducted, to wit;

- (a) Inventory and assessment of ISF – CSCs, CBFMAs and other sites to assess tenurial status, land productivity and beneficiaries capabilities;
- (b) Re-orientation program for the stakeholders;
- (c) Bio-physical assessment and characterization;
- (d) Institutional strengthening activities; and
- (e) On-site technical assistance and training practicum sessions.

Community-based Forest Management. This program is a national strategy designed to achieve sustainable forest management by making community people as partners of the government in the conservation, management and protection of land resources as embodied in DAO-2004 -29. Community-based forest management approach gives opportunity to community people to enjoy benefits from natural resources and sharing responsibilities to protect and manage it.

Bohol has 65 people's organization (POs) granted with CBFM agreement (upland and mangrove). Unlike the ISF Program where individual beneficiary is issued with a Certificate of Stewardship Contract, the CBFM is granted with a single tenurial instrument known as the CBFM agreement. An ISF site can be converted into CBFM.

The interventions will include site assessment and inventory of resources, capacity building, policy advocacy, linkaging and partnership building and on-site improvement works. In order to attain sustainability of the program and to ensure better success, appropriate monitoring mechanism has to be instituted as part of the medium to long-term activity.

Reforestation/Afforestation. Priority sites to be reforested are areas identified as highly eroded mountains, side slopes, gullies and river banks within the watersheds, open areas surrounding local water sources for potable water, micro-catchments that drains water for lowland irrigation, sinkholes and recharge areas.

To enhance citizen participation, different cost-cutting management options will be adopted such as family-based or community-based strategy, school-managed, or joint venture development strategies.

In CBFM sites, the priority reforestation areas are those zones under strict protection. To restore the declining biodiversity, the aforementioned areas will be strictly re-vegetated with native or indigenous forest trees, shrubs, vines and other forest cover crops.

The development activities would include the following:

- (a) Site identification and verification;
- (b) Site analysis/biodiversity research;
- (c) Activation of Municipal/barangay nurseries;
- (d) Establishment of Central Endemic Nursery;
- (e) Forest fire control measures;
- (f) Capability building of stakeholders; and
- (g) Building linkages.

C. NIPAS and Other Natural Resources Reserve Protection and Management

The classification and administration of all designated protected areas is aimed at maintaining essential ecological processes and life support systems, preserving genetic diversity, ensuring sustainable use of resources found therein and maintain the natural conditions to greatest extent possible. These areas fall under the category of protection land, which are identified as portion of land or water set aside by reason of their unique physical and biological diversity. They are to be protected against destructive human exploitation.

Bohol has a total of 75,776 hectares under protection. All development within these areas follow the provisions and regulations under the NIPAS Law.

Areas not covered by the NIPAS Law but are still accorded equal protection fall under the non-NIPAS category. These areas include: (a) second growth forests above 1,000 meter elevation or in areas with more than 50% slope; (b) mangrove forests; (c) buffer strips along rivers and escarpment; and (d) freshwater swamps and marches.

Protection areas prohibits the cutting of timber, hunting/trapping of wildlife, kaingin making and illegal quarrying/mining. Effective protection of Bohol's NIPAS and Non-NIPAS resource will require hiring of forest guards and providing them with traveling expenses, uniform, construction of patrol stations and provision of equipments, office supplies and other needs, and maintenance of patrol trails. The posting of signboards (in local dialects) in strategic sites and yearly orientation of forest guards and the communities will help in improving local awareness for the protection and conservation of NIPAS and Non-NIPAS resource zones.

The responsibility for the protection and management of the NIPAS and other natural resources reserve is vested to the DENR thru its PENRO-Province of Bohol. Protection and management function shall be undertaken in close collaboration with the affected LGUs (i.e., province, city/municipality and barangays).

D. Ecotourism Development and Management

The immediate objective of the province is to become as one of the country's tourists destinations. Its assets, both natural and cultural, are comprised of a wide variety. For ecotourism sites, each has to be evaluated, a number developed and showcased. Its promotions as ecotourism assets may be initially patronized by the local community.

The potential ecotourism sites include the Camp Verde – historic campsite of the American and Filipino soldiers during the World War II; the Eskaya Cultural Community in the municipality of Duero and Jagna; the wild duck sanctuary at Wahig-Pamacsalan Dam in the municipality of Pilar. The latter covers a total area of 96.49 hectares, of which 92 hectares are natural secondary forest and timberland and 1.49 hectares within the alienable and disposable land for tourism purposes.

The Eskaya's are the remaining indigenous people in the Island of Bohol, with a rich culture preserved during the last 100 years and consisting of its own alphabet and dialect and traditional ways of living. The Eskaya Community in the watershed has become the focus of anthropological studies by the local and foreign anthropologists and sociologists. Their involvement in the development of the watershed will cover the rehabilitation of protection forest zone in the CADC area, and improvement of its highland HVCs farming cum diversification schemes (refer Section 3.1 Sustainable Integrated Agribusiness Project report).

Hundreds of wild ducks are now protected at the Wahig-Pamacsalan Dam, one of the potential tourism site which utilizes the dam as wildlife habitat. The municipal leadership now enforces a municipal ordinance which ensures the protection and conservation of the resource habitat, the wild ducks and other wildlife.

E. Support Services and Facilities

1) Organization of Boholano Pool of Experts

Several Boholanos are technically recognized and serving as consultants on their respective fields of expertise. This activity aims to convene these individuals and solicit their technical assistance specifically in the area of watershed rehabilitation and management, biodiversity conservation and mineral resources management. The Provincial Government through BEMO will launch a website campaign for this purpose under the provincial government website address. This group can serve as the advisory body of the Watershed Management Council. They can also bridge with financing donors for the funding requirement for the watersheds rehabilitation and management.

2) Environmental Scholarship Scheme

This project is intended for the son/daughter of forest occupants who cannot afford the cost of tertiary education due to economic reason. The watershed management council shall solicit financial assistance from international organizations such as Circulo Boholano sa Texas, Jaycess, Lions and others to sponsor deserving scholars. The Provincial Government through BEMO will also allocate funds for this purpose. Scholars shall take up technical courses that are needed for the development and management of the watersheds such as forestry, agriculture and related courses. Upon graduation, local agencies will assist the scholar/graduate to look for a job, preferably serving the project area.

3) Community Organizing and Organization Development

The people in the watershed communities need to be organized so that they can be effectively involved in community-based livelihood projects. They need a leader who can lead them effectively and that leader shall be identified through the community organizing process. Also, it is necessary for the communities to form themselves into cooperatives before they embark into any community-based livelihood project. The communities shall be assisted by the local personnel from MAO/MANRO and from the office of the Bohol Poverty Reduction Management Office (BPRMO) as discussed in Section 3.4 of the Local Social and Institutional Strengthening report. Community organizers shall be trained to carry out this task including facilitation of the desired technical trainings.

4) Hydrologic Data and Water Quality Monitoring

Development and management strategies/activities in the watersheds will be undertaken with the primary purpose of enhancing the quantity/volume and quality of water yield and stream discharges. The efficacy of the activities will have to be determined through periodic monitoring of the existing hydrologic instruments in the watershed. Monitoring instruments will be maintained and monitored regularly by technical personnel. Data generated shall be used in future refinement and/or revisions of resources development and management plans and programs.

River discharge water sampling and quality analysis shall be conducted periodically, specifically for conventional pollutants. Analysis will be done at peak of the dry season and other at the peak of the rainy season. The estimated cost of this activity is P90, 000/yr which includes laboratory analysis of water samples.

5) Monitoring and Maintenance of the Forest Meteorological Station and Runoff Plots

The monitoring of the forest meteorological station (comprised of one evaporation pan, one rain gauge and thermometer) and 10 run off plots shall be continued for the next 10 years. Two (2) gauge keepers shall be employed to do the monitoring. All run-off samples collected shall be analyzed at the DENR Region 7, Chemical Laboratory in Banilad, Mandaue City.

6) Information, Communication and Education Campaign

The series of ICE (information, communication and education) campaigns that were/are being conducted shall be continued to ensure the cooperation and participation of the local stakeholders, especially the local residents, in the protection and rehabilitation of the watershed at all times. Quarterly ICE shall be conducted at the barangay levels. Also, the LGUs, other government agencies, private sectors, NGOs and POs must be informed about the watershed (its importance, objectives, plans and programs) in order to get their social and political support for the watersheds management and development programs and projects. Moreover, it is believed that through proper information the awareness of these groups could create a lasting consciousness and appreciation of the project, which is basic to the success of sustainable management and development of the watershed resources.

7) Skills Development Training

The project will implement a strong skills development training program to maintain and/or improve the capability of its personnel to implement projects, and the local stakeholders to participate either as laborers or contractors of the project activities. This training will encompass the following activities:

(1) Conduct of Short-term technical training courses

Short-term technical training courses shall be developed and conducted for forest rangers, particularly on: (a) proper conduct of investigation and reparation of report; (b) preparation of complaint for filing in court; (c) conduct of pest/disease surveillance and preparation of surveillance report; (d) fire prevention and suppression. Similarly, a short-term training program shall be formulated and conducted for nursery and plantation workers, soil erosion and water conservation workers, wildlife protection and management workers, timber/plantation workers, etc. For the nursery and plantation workers the training shall include silvicultural techniques, e.g., identification of good seeds, seed collection and storage, germination, potting, balling, soil sterilization, thinning, pruning etc. Training methods shall include classroom lectures and demonstration, and field practicum.

(2) Women Development

The potential role of women in the communities shall be considered in the overall management and development of the watershed. As observed in some areas of the country and even in other countries of Asia, women do play very effective roles, even more effective than men in some fields of endeavor in the management and development of natural resources. It must be appreciated that the women, aside from being mothers, are also capable of enhancing the family's income by participating in some developmental activities. As such, it is deemed necessary to enhance their capabilities as mothers to their children, wives to their husbands and additional income earner of their families. Along this line, there shall be a periodic special training for the women on improving their roles as mothers, wives and income earners. This activity shall be tied up with the local DSWD, DOH and DTI (refer [Section 3.5 Local Social and Institutional Strengthening report](#)).

8) Infrastructure and Facilities Development

Infrastructure and facilities support to the implementation of field projects are very necessary not only to facilitate completion but also to provide safety to the personnel of the project. Infrastructure needs like field office and quarters, access roads and trails will be facilitated by the Provincial Engineers Office and its counterpart Municipal Engineers Offices.

Enhancement of the field office at Roxas, Bilar shall be conducted to facilitate the BEMO staff deployment. Provision of equipment and supplies, and provision of transport vehicle including trail type motorcycles shall be given priority.

9) Establishment of Reward System

A popular practice in the bureaucracy is the giving of awards to individual or organizations for their outstanding accomplishment or performance. An outstanding accomplishment is one in which all targets of the individual or organization assigned have been totally attained on time with acceptable quality. An award may take the form of cash, plaque of appreciation, development exposure trips and/or their combination.

2.4.4 Implementation Plan

1) Implementation Arrangement

The NRMDP component will be lodged at the Bohol Environment and Management Office (BEMO). The BEMO shall collaborate with different agencies concerned, the LGUs, the Non-Government Organizations (NGOs) and other concerned agencies. The proposed organizational structure is provided in [Figure III-13](#).

(a) The Forestry Sector cum NRMDP Unit

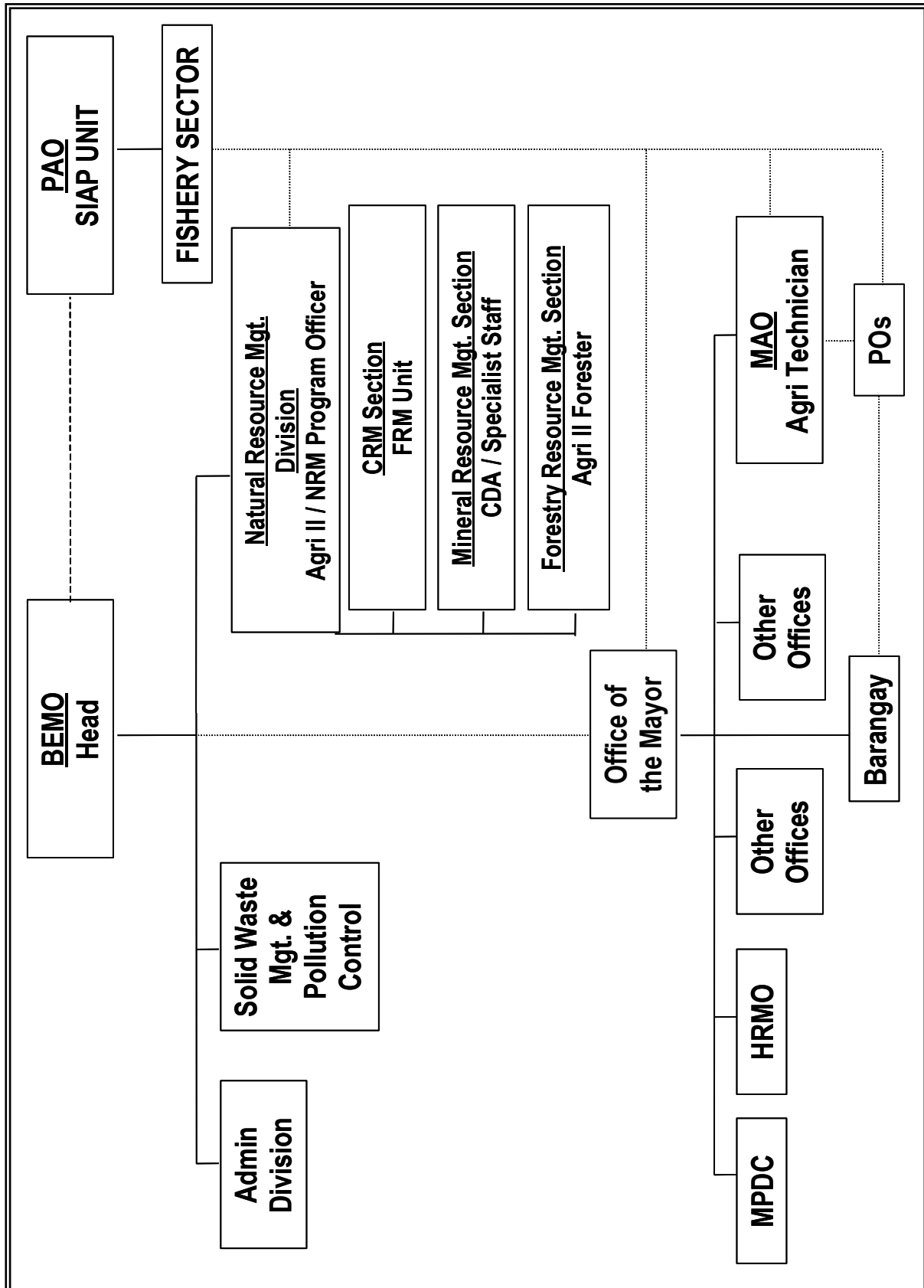
The Forestry Sector of BEMO will be the implementing unit and shall be mandated by the Governor, upon the recommendation of the head of the office, as the lead unit for this program.

The NRMDP unit will have the sector head designated as Project Officer of the program. The project officer shall be assisted by three (3) regular technical staff designated as: (1) Production Forest and Management Coordinator, (2) Watershed Management and Development Coordinator, and (3) Special Projects Coordinator for ecotourism development, NIPAS and Non-NIPAS management coordination, other special activities. Forest management and watershed specialists shall be hired on contractual basis to support the implementation of the project.

The Forestry Sector/Project Unit shall primarily perform technical assistance, coordination and monitoring functions which include, but not limited to, the following;

- Preparation of annual/quarter work and financial plan for submission and approval by higher management;
- Coordination with participating MLGU's for the component projects planning and implementation including training and CO-CD activities;
- Coordination for technical assistance and resource inputs of the LGUs, NGAs, NGOs and the private sector;
- Collaborate with the TAG and MLGUs concerned on the packaging of project for consideration by potential donor agencies; and
- Monitoring of the progress/accomplishment of project activities and preparation of regular status and special reports for submission to higher management.

Figure III-13. Proposed Organizational Structure of the Natural Resource Management Project



The Project unit shall be provided with technical backstopping support by the regular technical staff of the other sectors in BEMO, on need and call basis, and from the technical personnel of the DENR-PENRO, Province of Bohol.

(b) The Municipal Agriculture Offices of Participating MLGUs

The program shall be launched through a training for the Municipal Agriculture Office (MAO) staff, specifically their existing Technical Working Groups (TWG), on the preparation of the Project Implementation Plan (PIP) for their priority project or package of projects.

For the MLGU's program under the NRDM component, the Municipal Agriculture Office (MAO) shall be mandated as executing unit with the Municipal Agricultural Officer designated as Project Coordinator (PC) on concurrent capacity. The PC shall mobilize all existing regular staff of MAO or designate selected agri-technologies staff to the projects on full-time and shall team up with the CO-CD officer of the BPRMO. This team shall work with the barangay officials, the PO officers, farmer participants and other sectors. Their responsibilities will include, but not limited to, the following:

- (1) Provide technologies/extension services to farmers, PO's or cooperatives existing in the watershed areas;
- (2) Provide technical trainings to the project beneficiaries;
- (3) Facilitate in the planning of the project by the beneficiaries and/or groups; and
- (4) Coordinate with the line agencies in all project activities.

The Field Team shall be responsible to provide appropriate skills training to the project beneficiaries in order to prepare them for the implementation and management of their respective projects in the watershed areas.

(c) Farmer Beneficiaries, Their PO's or Cooperatives

Farmer-settlers and beneficiaries shall group themselves into people's organization or cooperatives and shall be registered with the CDA, DOLE, SEC or to any other registering agency. It is proposed that the POs registered in a certain watershed be federated. These PO's shall regularly consult and coordinate with the barangay officials, field team and other concern agencies.

2) Implementation Activities and Schedules

Table III-29 provides the summary of component activities and their implementation schedule.

Table III-29. Summary of Implementation Schedule, Natural Resource Management and Development Program

Component Activity	Activity Schedule											
	Yr 0	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	
A. Pre-implementation												
1. Screening & selection of staff												
2. Organization of PD cum NRMDP Unit												
3. Generation of MLGUs commitment and training of TWGs on PIP prep.												
I. WATERSHED DEV'T & MGT PROGRAM												
1. Reforestation of Degraded Uplands												
1.1 Identification of degraded open lands												
1.2 Establishment of satellite endemic nurseries												
2. Afforestation Project												
2.1 Site identification												
2.2 Plantation establishment												
2.3 Adopt a watershed area												
2.3.1 Promotion/meetings												
2.3.2 Donors forum												
3. Rehabilitation of Critical slopes and Gullies												
3.1 Gully stabilization												
3.2 Streambank stabilization and establishment												
4. River Rehabilitation and Protection Management												
4.1 River clean-up activities												
4.1.1 Organizational and promotional meetings												
4.1.2 River desiltation												
4.2 Adopt a river project												
4.2.1 Promotional meetings and consultations												
4.2.2 Donors forum												
5. Water Source Protection and Enhancement												
5.1 Establishment of natural rain water collector												
6. Biodiversity Conservation Mgt.												
6.1 Establishment of BMS												
6.1.1 Resource inventory monitoring												
6.2 Establishment of wildlife sanctuaries												
6.2.1 Resource inventory monitoring and updating												
6.3 Establishment of botanical gardens												
6.3.1 Site identification												
6.3.2 Coordination meeting to LGUs												
6.4 Organization of Boholano Pool of Experts Project												
6.4.1 Coordination meeting and promotions												

Component Activity	Activity Schedule										
	Yr 0	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
6.4.2 Launching of website											
6.4.3 Forum											
6.5 Environmental courses scholarship project											
6.5.1 Coordination and promotion meeting											
6.5.2 Donor/sponsors forum											
II. PRODUCTION FOREST DEV'T MGT											
1. Areas Covered by CSC's											
1.1 Inventory of ISF sites and beneficiaries											
1.2 Resource assessment appraisal and farming planning											
1.3 Enrichment planting agro-forestry farm											
1.4 Establishment of a Land Care Model											
2. Areas Covered by CBFMA											
2.1 Review of CRMF and Mgt Plan											
2.2 CBFM improvement and work protection											
3. Communal Forest with Co-management Agreement											
3.1 Resource assessment and appraisal											
3.2 Preparation of management plan											
3.3 Buffer zone development											
4. Mine-out Areas in A&D											
4.1 Inventory of mined-out areas											
4.2 Mined-out area rehab											
4.3. Plantation establishment											
5. Bohol Tree Enterprise Program											
5.1 Inventory of standing trees (planted and natural grown in A&D)											
6. Production and Enhancement of Non-Timber Forest Products											
6.1 Nursery establishment											
6.2 Plantation establishment of buri											
6.3 Plantation establishment of bamboo/rattan											
6.4 Inventory of existing non-timber products											
III. DETAILED WATERSHED STUDIES											
1. Lumbay Watershed											
2. Panampan Watershed											
3. Manaba Watershed											
4. Moalong Watershed											
5. Ipil Watershed											
6. Banban (Dimiao) Watershed											
7. Abatan Watershed											

Component Activity	Activity Schedule										
	Yr 0	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
IV. SUPPORT SERVICES AND FACILITIES											
1. Civil Works											
A. Farm to Market Roads (refer to PEO and DPWH)											
B. Endemic Nurseries											
1. Potting shed											
2. Nursery building											
3. Nursery water system											
2. Transport Equipment											
1. AUV, pick-up 4 WD											
2. AUV, stake truck											
3. Motorcycle, trail type											
3. Office Unit Equipment											
1. Computer & accessories											
2. Fax machine											
3. LCD projector											
4. Laptop computer											
5. Professional camera											
6. Digital camera											
7. GPS											
8. Surveying instruments											
9. Water sampling apparatus											
10. Video camera											
11. Raingauges											
12. Scanner											
13. Community organizing											
14. Skills trainings											
15. Water quality monitoring											
16. Formation and training of 3 man											
17. ICE team salaries											
18. Production of flyers, etc.											
19. Improvement of staff house											

2.4.5 Financial Plan

1) Project Cost Estimate

The total cost for the implementation of NRDM project for the span of 10 years is shown in [Table III-30](#). The details of this can be found in [Table III-A.5](#) of the Annex report.

2) Financing Scheme

The first five (5) years of program implementation will concentrate on the three (3) priority watersheds, namely: the Caruod, Alijawan, and Inabanga Watershed. Aside from the fact that these areas are considered critical watersheds characterized by high rate of poverty incidence and highly degraded with poor forest cover uplands, the comprehensive plans and project proposals have just been prepared for funding. Beyond the initial 5-year of implementation to Year 20, resources will be programmed for the development interventions in the remaining eight (8) watersheds of the province.

Table III-30: Summary of Estimated Cost (P'000) for the Natural Resource Development and Management

Item/Particular	Total Cost		
	Yr 1-5	Yr 6 -10	10-Year cost
I. Watershed Development and Management	2,647	2,439	5,086.0
II. Production Forest Rehabilitation and Management	8,805	1,150	9,955.0
III. Detailed Watershed Studies	2,570	0	2,570.0
IV. Support Services and Facilities	6,498	3,170	9,668.0
Grand Total	20,520	6,759	27,279.0

Generally, the list of specific environmental program components also include areas covered by NIPAS. However, fund requirement rest on the part of its PAMB and the DENR. Other agencies shall be tapped to share resources in the form of technical assistance, use of available equipments, material assistance such as seedlings/planning stocks, and financial counterpart funds.

Other financing schemes include guidelines to require MLGUs or BLGUs to set aside counterpart funds and to establish a nursery prior to the start of major reforestation activities. Such nurseries may also raise the needed fruit trees and plantation crop seedlings for agroforestry development.

3) Sources of Financing

The proposed sources of funds to finance the NRDM component projects is summarized below:

<u>Source of Funds</u>	<u>% Share</u>
• BLGU/MLGUs	25.0
• PLGU	25.0
• National Government/DENR	25.0
• NGOs and/or International Agencies/Donors	25.0
TOTAL	100.0

2.5 LOCAL SOCIAL AND INSTITUTIONAL STRENGTHENING

2.5.1 General Precepts

The importance of agriculture in the economy of Bohol could be gleaned from the fact that over 54% of the Boholano families are dependent on this sector for subsistence and income. It is where increasing population of the “poorest among the poor” live, with 47.3% of families living below the poverty threshold (LPRAP Report, 2002). The agricultural resource base is the life support system from the highland, hillyland/upland, lowland to coastal zones in a dynamic and highly interactive landscape system. However, these resource zones are now disturbed in varying degrees as exemplified by marginalization of lands and water/coastal resources. Considered as a cause and consequence of underdevelopment, resource degradation leads to more serious social, economic and political problems.

In the same manner, if agricultural productivity is not improved, it poses a destabilizing force in the peace and security situation of Bohol. However, if properly developed, it provides the pillar to sustainable local development. Thus, agricultural development is a key LGU strategy to contain poverty and attain greater social stability.

The success of the Bohol Agriculture Master Plan is predicated on its long-term sustainability. Experiences in various programs require the process of empowering the local communities to manage more effectively and efficiently the agriculture resource base and their environment, with sustained and committed support from the local government units (i.e., barangay, municipal/city and provincial). In fact, communities and/or barangay cluster communities must take leading role in local development, which shall form the backbone of the Local Social and Institutional Strengthening component.

It is envisioned that within the three-phased (immediate to short term, medium and longer-term) implementation of the Bohol Agriculture Master Plan (BAMP), the following institutional development objectives shall have been achieved:

- i) Target poverty groups will attain food security and nutritional sufficiency for their families over the short to medium-term. With improved skills, they could enjoy better rural labor employment and higher incomes while their household members tend to backyard vegetable plots for year-round nutritious food supply and to home-based livelihood projects. Household heads could then participate to community improvement activities and to their POs enterprise projects.
- ii) The barangay communities and cluster farms operators will be empowered to participate more productively in development projects. Through their POs and/or cooperatives/corporatives, they will continue to expand and sustain productive initiatives with greater concern for the resource base and the chain of ecosystems. With sufficient maturity and assets, the POs shall be in a better position to access technologies, resources and services necessary to support second-generation rural enterprises and/or agri-industries.

- iii) The LGUs will have increased capability as provider and/or enabler for planning, coordinating and managing community-based projects that require multisectoral expertise and activities. The LGUs development coordinating bodies, the Planning and Development Offices, and the frontline units (i.e., Agriculture, Natural Resources, Economic Enterprise Management, Cooperatives/Corporatives Development, Human Resource Development and Management) will possess increased capacity to plan, manage and implement local projects through more effective, efficient and transparent mobilization of resources.
- iv) The involvement of participating national agencies such as DA, DENR-PENRO/CENROs, DAR, PCA, FIDA, BSWM and others will result in their realignment and/or reprogramming of resources and services to respond to the requirements of the sector plan, increased capability and commitment to work with LGUs in addressing problems of the agriculture and natural resources sectors. Specialized skills and talents will be further enriched to better manage similar programs.
- v) The NGOs and local resource institutions (LRI) will be mainstreamed in resource-based, integrated and participatory planning, implementation and monitoring/evaluating of projects. Their involvement will bolster the participation in similar LGU-led projects. The formulation of their own projects addressing agriculture and natural resources issues could draw lessons from the program's experiences.

2.5.2 Components, Targets and Strategies

Component A: Local Social Preparation and Organization Development for Agricultural Enterprises Management

1) Objectives

This component aims to build and/or strengthen the capacity of the barangay cluster communities (i.e., upland settlers, rainfed/lowland farmers, marginal fisherfolks, etc.) to affect their resource ecosystem, enabling them to work toward a progressive and better living environment. Within the Bohol AMP context, the expected net result is sustained improvement in the socio-economic conditions of the people and gradual rehabilitation to sustainable management of their community's resources.

The areas of concern under this component are: (i) promoting food security and nutritional sufficiency of household members; (ii) increasing household incomes; (iii) developing and strengthening peoples' organizations; and (iv) supporting POs engagement in viable agricultural enterprises. The community organizing and community development (CO/CD) process will be directed to rural enterprises development by matured POs and/or cooperatives/corporatives.

2) Project Participants

Consistent with the resource-based and integrated strategies for the production components in addressing rural poverty reduction, CO/CD will not be confined to

the “poorest of the poor” constituents; rather, it will cover the barangays in the cluster production zone. Particular attention, however, shall be given to the marginalized sectors in the resource zone, namely:

- i) Farmer settlers/occupants and claimants of upland farmsteads;
- ii) Small farmholders and tenant families;
- iii) Small fishermen and boatless/assetless fisherfolks;
- iv) Landless farm workers;
- v) Elderly and disabled; and
- vi) Women and out-of-school youths.

3) Guiding Principles

Popular Peoples Participation. Sustained participation of people in the entire development process, from problem identification and prioritization, planning solutions, implementation and monitoring/evaluation of plans is very critical for the realization of a shared vision of development of the marginalized communities.

Equity Sharing of Facilities, Goods and Services. It is the goal of the Bohol AMP that the fruits of development must reach all segments of the community specifically for the poor. The access to basic social and economic facilities and services should be enhanced to increase the opportunities of people and communities to develop themselves. On the other hand, as natural resources are utilized by community members, there is a need to ensure the equitable allocation and access of these among community members.

Natural Resources Management. Contrary to the popular notion that the people are the main agents of resources degradation, the Bohol AMP's underlying belief is that the people and the natural resources system could coexist in a mutually sustainable manner. One of the main intentions of the Plan, as carried through its component projects, is to make people become “effective keepers and managers” of their natural resources and its regeneration.

4) Operational Approaches and Methodologies

The Experiential Learning Approach. For rural people to be socially prepared to undertake development projects/activities, they must be given trainings and capability building activities. For this purpose, the experiential learning approach is an invaluable strategy in ensuring participation and generating commitment from the people.

In such an approach, topics for learnings have direct connections with real life and their environs. As such, meaningful learning commences from real problems and real mental conflicts. Being exposed to a problem, people try to orient themselves toward it and usually find as clear a solution as possible.

Resource-based Planning. The key focal points of the Bohol AMP activities include people and the resource base, i.e., land and water. Both of these are considered as interactive and, as such, are perceived to be influencing each other greatly. People are dependent on the natural resources as these are basic to their

production systems and sustainability of these depends on how people manage these resources.

Inclusivity of Peoples' Organization. Local development processes shall consider various groups and their corresponding, and often conflicting, interests in the resources of the community. This calls for strong and viable organization of community members. Thus, Peoples' Organization (PO) shall be more inclusive, and its development planning process shall allow participation of rural women, youths and elderly, rebel returnees, the poorest of the poor and its members of indigenous cultural groups. This will draw these disadvantaged groups into the mainstream of the organization's objectives, structures and systems, and projects/agricultural enterprises.

Selection and Training of Indigenous Community Organizer. Problems in the rural communities do not just revolve around resource degradation but also on economic, social, political and cultural arenas of life, hence, community organizing is very necessary.

The Bohol AMP advocates the selection and training of Indigenous Community Organizers for the target barangay clusters. Such indigenous volunteer community organizers have the advantage of being identified with the community, of being familiar about community needs and problems and as well as having the ability to mobilize people and resources to produce sustainable and justly distributed benefits.

Use of Participatory Tools and Process of Data Analysis. Rural people, having been marginalized for so long, want to see immediate and tangible results for their involvement in development activities. They also want their involvement to be meaningful, productive and fun. It is important therefore that the Community Organizer is armed with tools that can answer these needs.

Participatory Rural Resource Appraisal (PRRA) presents a growing armory of approaches and methods for enabling local people to share, enhance and analyze their knowledge of life and conditions, and to plan and to act. Experiences in the use of PRRA tools and process revealed local peoples' capacity to analyze and present their knowledge graphically (i.e., through maps, models, diagrams/illustrations, estimates and ranks), enhances their capability to participate in planning and implementing community projects or livelihood schemes. Such tools are powerful in increasing commitment of rural people to further actions.

Linkages and Networking for Resource Mobilization. Under the Bohol AMP, there are different levels of linkages to be established, i.e., between and among POs, POs and LGUs officials and attached/frontline functionaries. Linkages will also be established with NGOs, national government agencies (NGA), academic institutions or local resource institutions (LRI) as well as financial institutions.

Through linkages and networking, local people are able to know what services and resources are available for them in these institutions and to identify areas of cooperation and mutual benefits. The on-going convergence scheme adopted

by the Local Poverty Reduction Action Program (LPRAP) directed to poverty communities basically utilize this approach at a higher level.

5) The Key Players

Under the on-going Local Poverty Reduction Action Program (LPRAP), the poverty areas/communities have been mapped and classified either as influenced, less influenced/threatened or infiltrated by leftist groups. Based on the BPRMO-LPRAP Report (May 2005), these areas number about 81 barangays within 20 municipalities of the province. Lately, the Convergence Strategy (i.e., pooling of resources and services from both government and NGOs and directing these to poverty communities) has been mobilized through coordinated efforts of the Bohol Poverty Reduction Management Office (BPRMO) and the concerned LGUs. There are now 17 convergence municipalities, five of which fall within the peace and security classification.

The Bohol AMP proposes major innovation particularly on community social preparation aspect to ensure sustainability of community development efforts. For the Convergence Municipalities, at least two (2) CO/CD officers of BPRMO shall be deployed as a Field Team of development catalyst in priority barangay clusters. A critical role of the Field Team is to *"find its fit"* in working with the convergence strategy in the cluster area.

The non-convergence poverty municipalities shall entail deployment of at least three (3) CO/CD officers to work with the MAO-agricultural technologists. Here, each Field Team (one CO/CD officer and two agricultural technologists) shall function as the spearhead in the social preparation of target cluster communities to ensure their productive participation in the convergence program.

The municipal-based agricultural technologists and CO/CD officer shall work as a team in facilitating development program activities. They need to familiarize themselves with the Bohol AMP approaches and strategies, and to adhere closely with the guiding principles outlined in this report and other program documents. It may be necessary that the Field Teams live in their respective cluster communities' assignment particularly during the initial years of program implementation. Their presence in the cluster communities may be gradually scaled-down once indigenous volunteer organizers/facilitators have been developed, or once a reputable local NGO commences operation in the cluster communities.

It is suggested that a NGO (preferably one which possess familiarity and working experience with Bohol resource zones) be contracted to conduct a 15-day intensive orientation cum training course on various aspects of CO/CD work within the Bohol AMP and LPRAP contexts for the Field Teams and other LGUs frontline staff. This should be undertaken in partnership with the BPRMO and HRDMO of the province. The course should include both classroom and field practicum activities. A barangay cluster-specific community organizing for community development workplan will be the major output of the training course.

6) The Municipal/Barangay Cluster Communities (Cluster Production Zones)

The LPRAP and initial PRRA findings both indicate that the strength or weakness of rural organizations is determined by two distinct, but related organizational dimensions: capacity and autonomy. Both of these dimensions are important in the overall health and sustainability of an organization. Organizing and mobilization of the cluster organizations can complement and facilitate the implementation of the Bohol AMP component projects, provided, community organizing and development activities are focused in the right direction and perspective to achieve social preparation and community participation in the target cluster areas.

The Field Team is proposed to be established in each MAO, or lodged in the barangay cluster growth center for closer contact with the target cluster communities. It will function as the extension unit of the municipal/provincial governments and shall serve as coordinating arm in the integrated development/convergence efforts within the cluster of barangays. For the short-term, Field Team deployment will be as follows:

i) Convergence Municipalities under the Peace and Security Classification

✓
✓
✓

ii) Convergence Municipalities (High Poverty Rating)

✓
✓
✓

iii) Other Priority Municipalities/Production Zones

✓
✓
✓

The MAOs shall be directly responsible for managing the operations of the Field Teams within their respective jurisdiction. They shall closely coordinate with the BPRMO and the lead implementing units for component projects for resources, logistics and technical assistance services.

At the cluster communities level, the Field Team shall work closely with the Barangay Council/Barangay Development Council (BC/BDC), with existing or new POs, project participants and other sectors of the community. Among their responsibilities are as follows:

- Serve as frontline unit to oversee and coordinate all convergence efforts and project activities in the cluster resource area;
- Supervise the site preparation, establishment and operations of community-wide and/or backyard bio-intensive organic vegetable gardens (BIG) for food and nutrition sufficiency;

- Facilitate the provision of extension services, technologies, material inputs and credit support to project participants and their POs livelihood and rural enterprise projects;
- Train/capacitate POs and/or cooperatives in detailed planning, implementing and managing resource-based livelihood and agribusiness enterprises;
- Monitoring of community improvements and progress of various resource rehabilitation and protection projects.

7) The CO for CD Process

Experiences gained from resource-based, poverty-focused and participatory projects showed that undertaking a real CO/CD process may take 6-8 months or even longer. The process depends primarily on the level of competence of CO/CD Officer, the receptiveness and support of cluster communities including peace and security situation in the area. The succeeding focus on strengthening of community organizations/POs, however, to become functional, matured and enterprise-oriented cluster cooperatives/corporatives will need much longer timeframe, most likely to extend beyond the medium-term period.

A brief outline of the CO/CD process is provided below. Defining the scope (what, how and when) of operation/activities should be done by each Field Team in consultation with the officials and sector leaders of the cluster communities.

Step 1: Integration with the Community and Area Familiarization are activities intended to truly feel the “pulse” of the area, establish rapport between the Field Team and various sectors of the cluster community, with deliberate bias to the poorest. It should be unstructured so as to assure spontaneity and sincerity in dealing with local people. Field Teams must bear in mind that *“CO/CD without sincerity will never succeed”*.

Step 2: Program Orientation-Seminar for Barangay Official and Officers of Cluster POs/Sector Organizations. This day-long event should produce a leveling of learnings about the Bohol AMP principles, strategies and component projects, emphasizing the rationale behind the need for active participation of the communities.

Step 3: Establishment of a Barangay Management Information System (BMIS) should build on the data gathered under the LPRAP. The entire process should be done in a participatory manner for local people to have ownership of the system for their own use and advantage. Once established, the BMIS will serve as the only database/data source about the barangay and avoid conflicting data information.

Community Assessment will involve gathering additional information required for both development and action planning, and for monitoring and evaluation purposes. This should be undertaken by a local BMIS Team trained and guided by the Field Team.

Community assessment that deals with existing POs and/or cooperatives within the cluster community will be undertaken by the Field Team.

Prioritization of Needs and Problems will basically anchor on the survey results. It will be decided in consensus through an assembly meeting of the cluster community.

Step 4: Barangay Development Plan (BDP) Preparation will entail careful analysis of the prevailing conditions of the communities as reflected in the BMIS. The BDP should provide the framework for action planning to respond to the priority needs and problems. It will be the *basis for convergence of resources and services* of LGUs, NGAs, NGOs and other participating units in the cluster community.

The BDP is not a static plan. It should be subjected to periodic review and updating/revisions as part of the CO/CD process.

8) Participation in Projects Implementation and Management

The BDPs may contain a number of interventions in the form of projects and activities. Several of these may already be included in the Bohol AMP component projects and therefore contained in the plan documents. For those not included, the Field Team should assist the cluster community in implementing such projects within the limits of their resources.

(1) Establishment and Operation of Homelot Biointensive Garden (BIG)

The establishment and continuing operation of bio-intensive gardens shall be a “must” in every coverage community cluster except for the highland vegetables growing barangays. The Field Team, therefore, should exert ‘deliberate influence’ to the community right at the start of the resource issues and problems analysis, projects identification and priority setting to action planning and implementation. The development of BIGs, either or both at individual backyard or purok/barangay communal garden, should be appreciated as the means to improve the daily food intake of household members, reduce malnutrition incidences and cut households’ expenses for vegetables which could be easily produced in their backyards.

Each target household will be assisted to plan, establish and operate their BIGs, or be required to participate in the development of their purok/barangay communal vegetable garden. In cases of the latter, appropriate sharing arrangements for vegetable produce should be discussed and agreed through consensus by the purok/barangay members beforehand in order to establish cooperation and participation.

The Field Team shall facilitate in the development and sustained operation of the BIGs. It will also assist the community officials coordinate and access resources and services support (i.e., seeds, technology, trainings, etc.) for the activity.

(2) Detailed Project Implementation Planning (PIP) of the Program Components

A detailed Project Implementation Plan (PIP) shall be prepared by each municipality comprising the priority cluster production zones, i.e., specific crop commodity, fishery, livestock and poultry. Based on their distinct resource endowments and potentials, each municipality may have their own priority project or a package of projects within the context of the Bohol Agriculture Master Plan. For details on the Program components, refer to Sections 3.1 to 3.4 of this report.

The detailed project implementation planning activities by the municipal LGUs should draw substantial technical support from the Provincial Program Planning Team (PPPT) specifically the trained technical staff of the PPDO, OPA, OPV, BEMO and BPRMO. The existing Technical Working Group for the Municipal Poverty Reduction Action Program (TWG-MPRAP), with additional membership from the Municipal Agriculture Office (MAO) staff, could spearhead the LGUs project development activity.

The municipal level PIP preparation should be participated by representatives of accredited POs particularly in the formation of barangay clusters and identification of priority project sites and identification of cooperators with the most strategic farm location for development as demonstration or model farm and applied research site. The prioritization of project participants in the identified community clusters that need to be provided with some inputs for farming/fishing systems improvement will necessarily be consulted with their POs.

(3) Development of Demonstration Farms and/or Enterprises

Under the component projects of the BAMP, a number of farmers/fishers/livestock and poultry raisers will be involved in the development of demonstration farms and/or enterprises. These model farming/fishing systems will be planned, established and maintained by the selected cooperator but fully supported under the program. Every cooperator shall be required to commit his/her resource asset (i.e., farmland, fish farm, livestock or poultry farm, etc.) for development into farmer/fisher/raiser managed showcase of specific farming/fishing systems and/or enterprise.

The Field Team shall be expected to facilitate the selection of candidate cooperators based on the recommendation of the cluster community. It should be emphasized, however, that every model farm cooperator must be a potential local trainer since he/she will be expected to assist the Field Team undertake local community trainings, farmers' field days, agricultural fairs and other related occasions.

Model farm cooperators shall be automatically required to keep and maintain simple farm records and do profitability analysis of their enterprises.

(4) Implementation of the Project Packages

Depending on the outcome of Item (2) discussed above, the project participants (recognized as the *in situ resource managers*) shall be the implementors of the proposed farming system improvements within their own resource asset or cluster of economic-size resource assets. Through their POs, they will undergo a purposive and sequential process of capability building and organizational strengthening with deliberate emphasis on entrepreneurship. Over time, the POs and/or cooperatives are expected to have acquired sufficient skills and resources thereby enabling them to invest, develop and manage their own rural enterprises found viable after careful study.

9) Organizational Development

The existing POs in the priority cluster production zones are in various stages of organizational development. The POs needs assessment in every cluster community will be undertaken by the Field Team, preferably with the assistance of the Municipal Cooperatives Development Officer. As and when appropriate, the POs officers and key members will be trained on various operational aspects of organizational management, records keeping, budget planning, conduct of meetings and related areas. The details of the Training Program are provided in Component B of this report.

10) Participatory Monitoring and Evaluation

The Bohol Agriculture Master Plan monitoring and evaluation will be done at various levels. The concern here is participatory monitoring and evaluation by the project participants specifically the cluster community residents or members of the POs.

Participatory monitoring is an instrument for measuring the progress of specific project designed, planned and implemented by the people themselves. The intent is to provide information regarding aspects which need immediate action or decision so as not to impair or disrupt project implementation. It is in effect a management tool for the local project participants, as well as for higher project management. Progress or accomplishment indicators are identified by the people/project participants themselves.

Evaluation is an instrument for determining the effects and measuring the impact of specific intervention in the community or barangay cluster. The methodology usually employed in participatory evaluation is dialogical such as time-line evaluation. Barangay assembly and/or PO assembly meetings are usually convened for the purpose.

This activity will be facilitated by the Field Team particularly the CO/CD officer. The designing of participatory monitoring and evaluation system will be done at the barangay/cluster barangay in collaboration with the POs and barangay officials. They will be tasked to implement this innovative system.

Component B: Local Institutional Strengthening

1) Institutional Support Strategies

The Bohol Agriculture Master Plan's component projects operate within the precept of participatory development to achieve the twin objectives of resource sustainability and local institutional capability building. Toward ensuring the success and sustainability of the agriculture and natural resources programs, the focus of local institutional strengthening shall be directed in providing proactive support to the cluster communities and POs in assuming greater role in detailed planning, implementing and managing their own projects. The operational meaning of project ownership must be anchored on the acceptance and participation of the cluster communities to lead and as partner in the implementation of on-site activities. The program support systems therefore are oriented toward this direction.

The institutional support strategies will include the following:

- i) A firm and definite commitment to CO/CD prior to any major program intervention or where there are on-going interventions in the coastal, lowland, upland or highland cluster communities. The lead role shall be played by the CO for CD officers in assisting the communities' access to the barangay and municipal units. Services at these units will be improved through the program and other projects interventions.
- ii) A Field Team will be constituted and deployed in the cluster communities to serve as extension unit of the MLGU, and the field unit for coordinating and supervising the implementation of component projects' activities by the communities and the POs. The Field Team (i.e., one CO for CD Officer and two Agricultural Technologists) shall spear-head the capability strengthening programme for both barangay government units (BGUs) and POs in order to assume greater responsibility of sustaining project operations.
- iii) The municipal LGUs within the cluster production zones shall lead in the detailed Project Implementation Plan (PIP) preparation and in managing and coordinating project activities. The ANR Program will thus provide its counterpart resources to the participating MLGUs, its frontline units and Field Teams with the view to strengthen the municipal governments' development stance vis-à-vis the technical and logistical requirements of the projects. Local projects management and administration shall evolve within the MLGUs structure in line with the institutional strengthening objective.
- iv) The role of NGOs and LRIs will be given importance in terms of participating in on-site research, technologies extension and training, income generating projects and rural enterprise management, and in the establishment of linkages for resources accessing.
- v) Relevant government agencies shall be tapped to provide technical and resources support, and to assist in responding to the issues within the

highland, upland, lowland or coastal ecosystem on a multi-sector and integrated approach.

- vi) Relevant/Appropriate training programmes shall be designed and conducted to respond to the identified performance gaps vis-à-vis knowledge, skills and attitudes requirement.
- vii) Provision of appropriate equipment, materials and other logistics necessary in facilitating the delivery of services.

2) Elements in Local Institutional Strengthening

(1) Training and Information, Communication & Education (ICE)

a) Objectives

The primary objective of the training and ICE component is to increase the level of awareness and competencies of the LGUs, POs and communities to become effective partners in planning, implementing and managing of program components designed to transform the cluster production zones into self-propelled, self-reliant and environment conscious communities.

The training and ICE component specifically aims to:

- i) Enhance the technical capabilities of local resource-based development staff and project participants on appropriate technologies to increase resource productivity in a sustainable manner;
- ii) Develop and sustain a shared development orientation among the development staff and project participants for more efficient and effective performance of their roles and responsibilities; and
- iii) Develop and maintain functional coordination and collaboration/partnership among program actors in the planning, implementation and management of program/project activities.

b) Scope of the Training and ICE

The indicative scope of the training and ICE component is as follows:

<u>Scope</u>	<u>Client Group</u>
(i) ANR program orientation/familiarization trainings for local officials and provincial units personnel	LGU Officials (province, city/municipal & barangay), Provincial Units Staff
(ii) Program policies formulation, planning and management	LCEs, SP/SB Officials, PDC/CDC/MDC Officials
(iii) General and specific	LGUs and Field Teams, NGAs, LRIs, NGOs

<u>Scope</u>	<u>Client Group</u>
trainings for provision of support services at the municipal, cluster barangays and barangay levels	and POs
(iv) General and specialized trainings for project participants	POs, Demo Cooperators, Farmers, Fishers, Livestock/Poultry Raisers, CSC/CBFMA Awardees, Women & Youth and other Sectors
(v) Trainers' Training	HRDMUs, MAOs and Field Teams, POs and Demo Cooperators
(vi) Development Exposure Trips/Cross-Visits	LGUs, Field Teams, Demo Cooperators, POs and Project Participants

c) Brief Description of Training Courses

Based on the PRRA survey and information provided by the frontline units (i.e., MAOs, OPA, OPV, BEMO, BPRMO), various training areas/courses were identified. As proposed, each training course will be comprised of several modules systematically organized to convey a set or sets of learnings designed to improve the understanding, capability and orientation of participants. The identified training courses and learning modules include the following:

General Training Course

The general training course (GTC) shall be conducted at all levels to enhance common understanding and development orientation towards sustainable resource utilization and management. It is also designed to promote interpersonal and functional working partnership among the program participants, implementers and management.

The GTC will be conducted through orientation-seminars, team building exercises, regular organizational meetings and CO for CD activities. These will be continuing activities to ensure progression of common values leading to internalization of a firm commitment to manage local resources in a sustainable manner.

Learning Modules include as follows:

- i) Framework for Sustainable Development: The Agenda 21, Philippine Strategy for Sustainable Development, the AFMA and the Bohol Environment Code.
- ii) Bohol Agriculture Master Plan: The Development Scenarios, goals and objectives, operational strategies, program/project components and targets, and implementation arrangements.

- iii) Local Government Code (relevant provisions on the devolved functions and specific services, participatory governance, role of barangay units, etc.).
- iv) Values clarification, development and orientation.
- v) Team building activities/exercises.

Specialized Training Courses

The specialized training courses (STC) deal with technical subject matter areas and technologies. The learning modules respond to specific knowledge or skills gap of participants relative to their functions and responsibilities under the program/projects. To respond to the identified knowledge, skills and desirable work ethics within the context of the Agriculture Master Plan and component programs, the following STCs and learning modules are crucial for the first 5-years of the plan implementation.

(i) **Specialized Course in Project Implementation Plan (PIP) Preparation.**

This course shall provide participants the basic knowledge and skills in preparing PIP document anchored on their area's resources and potentials, the present capabilities of target beneficiaries/participants and within the context of the Agriculture Master Plan and component programs. Participants will also be oriented on the requirements of potential funding agencies.

Learning Modules:

- Project development cycle
- Resource-based and participatory projects planning
- Goal and objective/target setting
- Activity planning and budgeting
- Designing the implementation arrangements
- Project analysis and justification
- Development projects fund sourcing/accessing

(ii) **Specialized Course in Project Management and Supervision.**

This course intends to provide key program staff additional skills in managing and supervising resource-based and participatory projects taking into account the requirements of the local government bureaucracy and other funding agencies/donors.

Learning Modules:

- Development projects management concepts, process and functions
- Present and potential problem analysis
- Decision analysis
- Implementation management tools and techniques
- Motivation for action
- Organization and management

- (iii) **Training Course on CO for CD Process.** The course shall provide participants the knowledge, understanding and skills on the different facets of CO/CD process. It will include understanding the historical roots of resources exploitation that leads to under-development and poverty. Participants shall also be exposed to actual resource situations to develop responsive approaches toward self-propelling and self-reliant communities.

Learning Modules:

- Understanding the setting of CO/CD
- Concepts, principles and practices of CO and CD, CO for CD
- ANR Program CO for CD process
 - Entry in the cluster communities
 - Social research/investigation
 - Integration with the community/rural folks
 - Identifying and developing indigenous leaders
 - Core group formation and organization
- Organizing/Reorganizing for action
- Strengthening of POs

- (iv) **Training of Local Trainers.** This course shall provide selected participants the appropriate knowledge, skills and orientation on the various stages of identifying/priority setting, designing, conducting, managing and delivering training programs, and in conducting of the Technology of Participation (ToP) including its documentation and evaluation.

Learning Modules:

- Training needs analysis
- Course designing
- Training objectives setting
- Training aids designing
- Training management and facilitation
- Training course delivery
- Documentation and evaluation

- (v) **Microwatershed/Farm Development Planning.** This course intends to provide participants with appropriate knowledge and skills in planning the improvements in their own farms and/or cluster farms with due consideration to the biophysical attributes and available technical and logistical support. The priority participants shall be the identified demonstration/model farm cooperators. All project participants shall undergo this training course.

Learning Modules:

- Understanding the setting of the watershed/microwatersheds
- Farm Planning
 - Sketch mapping of existing and proposed improvements
 - Cropping pattern and planting calendar

- Activity planning and budgeting
- Resources and support services requirement
- Farm records keeping
- Farm/Farming systems profitability analysis

(vi) **Nursery Development and Management.** This course shall provide participants the basic skills in planning, establishing and managing a nursery. It will also include the appropriate methods in asexual propagation to produce true-to-type and quality plantable materials.

Learning Modules:

- Understanding the rationale/need and functions of a nursery
- Nursery planning, establishment and operation
 - Nursery site selection and lay-out
 - Basic nursery facilities, equipment and tools
 - Seeds sourcing and handling, pre-germination treatments, sowing and care
 - Potting media preparation, potting and pricking/transplanting
 - Maintenance and protection
- Asexual propagation techniques
- Nursery records keeping

(vii) **Integrated Packages of Appropriate Technologies.** These courses will deal with different sets of appropriate production technologies proven viable in various ecosystems. It will include crops intensification and diversification, livestock and poultry production, fish and fisheries production, forest trees plantation establishment and management and rural enterprises development technologies.

Learning Modules:

- Appropriate cultural practices and management of specific crops, crops combination and crops-livestock integration, e.g., lowland and highland vegetable types, rootcrop, grains like hybrid/inbred and upland palay and corn, fruit trees and nuts, forest trees and coconut/mango – livestock farming systems.
- Appropriate practices and management of ruminants (carabao, cattle, goat and sheep), swine and poultry.
- Appropriate aquaculture/mariculture production technologies, i.e., freshwater, brackishwater and marine waters culturing of different species.
- Post-harvest practices, product handling, home-based/agri-based processing technologies
- Marketing practices and strategies
- Credit programmes

(viii) **Sustainable Fishery Resources Management.** This course intends to provide participants with appropriate knowledge and skills for the sustainable use and management of fishery resources. It will cover resources inventory and assessment, sustainable fisheries production, products handling and marketing.

Learning Modules:

- Understanding the Bohol fishery resources system
- Bohol waters fish stock assessment and monitoring
- Marine fishing systems/technologies
- Fish handling and marketing system
- Fishery products processing, packaging and marketing
- Products quality control and inspection

(ix) **Sustainable Upland Agricultural Technologies.** This course shall cover the proven upland farming systems, agroforestry and forest trees development and management. It will also include coconuts-based and mango-based farming systems technologies.

Learning Modules:

- Concepts and practices of traditional upland farming and the sustainable upland farming systems
- Soil and water conservation techniques
- Coconut-based farming systems modules, cultural practices and management
- Mango-based farming systems technologies and their application
- Agroforestry technologies, cultural practices and management
- Reforestation/Enrichment planting practices, practical cost-cutting strategies and management
- Improved pastures development and management
- IPM systems with emphasis on biological control

(x) **Highland High Value Crops Farming Systems.** This course shall cover the recent technologies for high value crops (HVC) production system in the highlands. It will emphasize the integration of soil and water conservation (SWC) schemes for sustainable land productivity as well as the sheltered/greenhouse culturing of HVCs.

Learning Modules:

- Understanding the highland resource setting
- Sustainable highland resource management
- Specific technologies for open field production of HVCs such as cabbage, lettuce, carrot, Irish potato, melon, strawberry and other semi-temperato crops
- Sheltered/Tunnel greenhouse culture of HVCs
- Product handling, packing and marketing
- Credit support services

(xi) **Cooperatives/Corporatives Development and Management.** This course shall provide selected project staff and POs membership the basic and applied knowledge, skills and orientation on the various facets of cooperatives/corporatives development, operation and management. It will focus on the rationale for organizing, leadership, motivation, human relations and major aspects of business operations such as records management, financial management and marketing.

Learning Modules:

- Concepts, principles and practices
- Procedural requirements
- Organizational development
- Values clarification and reorientation
- Operational requirements

- (xii) **Agri-based/Cottage Industries Development.** This course is designed to develop and/or enhance the skills and orientation of potential POs investing in agri-based or cottage industries found viable after careful study. It will also accommodate existing industry operators and workers particularly the women's group to improve the quality of products/outputs thus expanding their market outlets and commanding better prices.

Learning Modules:

- Scanning the investment climate
- Specific technology requirements of potential agri-industries, i.e., processing of agricultural products such as rootcrops, fruits, vegetables, meat, fish and other aquatic produce, minor forest products, etc.
- Credit support services
- Organizational requirements
- Relevant regulations and quality control for product lines
- Product packaging
- Market system

- (xiii) **Project Monitoring and Evaluation.** This course shall provide participants the basic knowledge and skills in planning, installation and maintenance of cost-effective and efficient monitoring and evaluation system for management use.

Learning Modules:

- M & E concepts, functions and typology
- Processes, methods and techniques
- Reporting

d) Training Participants

The participants of the various training courses are identified and discussed in each of the component programs under *Section 3.1 to 3.4* of this report. A summary is as follows:

- (i) Provincial Government Officials and units personnel
- Sangguniang Panlalawigan (SP) Officials;
 - Officials of the PDC and PDC-ExeCom, the PAFC and other concerned policy groups; and
 - Heads and key staff of the lead implementing units for component programs and senior personnel of supporting units.

(ii) City/Municipal Government Officials and units personnel

- Sangguniang Panglungsod/Bayan (SP/SB) Officials;
- Key technical staff of the Office of the Mayor;
- Officials of the C/MDC and C/MDC-ExeCom, the C/MAFC, C/MAENRC and other concerned policy groups;
- City/Municipal heads and staff of field implementing units for specific projects and the key personnel of support units.

(iii) Officials of the BCs and BDCs, and POs and/or cooperatives

(iv) Demonstration/Model farming systems cooperators and local leader

(v) The resource managers (farmers, fishers, livestock/poultry raisers, holders/awardees of CSCs, CADC and CBFMA), women and youth groups and other stakeholders.

e) Training Venues and Facilities

Basic training facilities and modest venue for the conduct of training activities are available within the province at very reasonable cost. These include the APC – ATI Farmers Training Center and the Bohol Bank and Cooperatives Training Center at Tagbilaran City, the Regional Training Center on Livestocks at Ubay Stock Farm and CVSCAF facilities in four (4) campuses, e.g., Bilar, Calape, Clarin and Candijay. There are also noteworthy private facilities available in the secondary growth centers (Tubigon, Talibon and Pilar) and in the urban centers of several municipalities that caters to training activities. At the cluster community level, there are existing multipurpose structures particularly in fast growing barangays that can serve as local training venues. Appropriate coordination with the local DepEd officials may be done for the use of school classroom or social hall during orientation seminars and trainings.

f) Activities

The training and ICE component shall be coordinated by the HRMD unit in close collaboration with the lead implementing units (i.e., OPA, OPV, BEMO and BPRMO) of component programs and the Technical Advisory Group (TAG). Upon organization of this composite group, the following activities will be undertaken:

- (i) **Establish linkages with NGAs and LRIs.** This is intended to organize the pool of trainers from the manpower expertise of cooperating national government agencies, local resource institutions and NGOs. They will provide the substantive content, technological and technical expertise required for particular courses. As and when necessary, appropriate agreement should be executed to spell out the involvement and participation of the agency/institution and the assigned personnel in the training programme.
- (ii) **Training of the HRMD-based Trainers Group.** A trainers' training will be designed and conducted for the composite group to provide

necessary skills and orientation as trainers and facilitators under the program. This will take place upon the organization of the composite trainers group.

- (iii) **Planning of the Training Activities.** This will be undertaken through consultation with the lead implementing units of component projects to ensure relevance and effectiveness of the learning activities. The timeliness of training courses as support activity to the production and resource development shall be considered.
- (iv) **Detailed Design of Training Courses.** The HRMD-based trainers group will be responsible for designing of the training courses. The training course design shall spell out the rationale, objectives, methodologies, number and level/category of participants, substantive content and expected outputs, budget and the daily activity schedule.
- (v) **Implementation of the Training Courses.** The HRMD-based trainers group shall conduct and manage the implementation of the training courses at the provincial and municipal levels. On-site trainings will be coordinated with the concerned MAOs and Field Teams. Appropriate preparation (i.e., training venue and facilities, supplies and materials including hand-outs and learning aids, notification of participants, etc.) shall be made to ensure smooth implementation of every training course.
- (vi) **Monitoring and Evaluation.** There will be pre-training (Entry Behavior Index) and post-training (Post-Training Behavior Index) evaluation of participants in all training courses with a duration of 3-training days or over. The HRMD-based trainers group will administer this evaluation to measure the changes in the level of knowledge and skills of participants attributable to the training course.
- (vii) As and when necessary, the HRMD in collaboration with the M & E group will conduct **periodic monitoring and evaluation** of the trained participants to determine verifiable effect or impact. The criteria for this evaluation will be established to guide the activity.
- (viii) **Reports Preparation.** A training completion report will be prepared to provide the users valuable insights and learnings from the conduct of each training course. The report shall highlight the strengths and weaknesses of facilitator and learners, the issues and problems, and the opportunities to serve as guide in improving succeeding training activities.

3) Staff Complement

The manpower complement of the program shall comprise of the technical and administrative services support personnel of the provincial government and the participating city/municipal government units. This is consistent with the key premise for local institutional strengthening through the utilization of existing LGUs

structure and personnel to undertake detailed project implementation planning, implementation management and coordination. They will be complemented by a modest number of technical and support staff that will be hired as contractual project staff.

The staffing plan for this component is shown in [Table III-31](#). Detailed staffing requirements are provided in each component project's implementation plans (refer [Sections 3.1 to 3.4](#) of this report).

Table III-31. Staffing Plan for BPRMO CUM Local Social and Community/POs Development Project Unit –Bohol AMP

Level/Position Item	Detailed Staff		Direct-Hired Staff		Total Cost (₱)	
	No.	Rate/Mo.	No.	Rate/Mo.	Year 1 - 5	Year 6-10
I. BPRMO cum LSCD Unit						
• BPRMO Head/Project Officer	1	-	-	-		
• Div. Head/Area Coordtr.						
✓ District I Coordtr.	1	-	-	-		
✓ District II Coordtr.	1	-	-	-		
✓ District III Coordtr.	1	-	-	-		
• Field Operations Staff						
✓ Community Affairs Officer	-	-	1	14,000	840,000	840,000
✓ CO for CD Facilitator/Worker	12	0	6	12,000	4,032,000	2,880,000
• Admin Services Support						
✓ Clerk/Encoder	1	0	1	8,000	480,000	480,000
✓ Driver/Messenger	-	-	1	7,000	420,000	420,000
II. Municipal-based Field Teams						
• MAO/Field Coordinator	TBD	TBD	-	-		
• Agri Technologists/Field Team Members	TBD	TBD	-	-		
TOTAL	17	-	9	-	5,714,000	6,002,000

4) Equipment Support

Equipment support will be provided under the program. The detailed lists of equipment and tools required for each component are provided in [Sections 3.1 to 3.4](#) of this report.

2.5.3 Component Cost

The estimated costs for the Local Social and Institutional Strengthening support is shown in [Table III-32](#). Other activity components are integrated in the cost estimates of the key project components presented under [Sections 3.1 to 3.4](#) of this report.

Table III- 32. Incremental Administration Cost for BPRMO cum Local Social & Community/POs Development Unit-Bohol Agriculture Master Plan

Budget Item	Estimated Budget /Year (₱'000)					5-Year Total	Year 6-10 Total
	Year 1	Year 2	Year 3	Year 4	Year 5		
I. PERSONAL SERVICES							
1. Salaries for Direct- Hired Staff	866	1,212	1,212	1,212	1,212	5,714	6,002
2. Benefits (15% of # 1)	130	182	182	182	182	858	901
Sub-Total I	996	1,394	1,394	1,394	1,394	6,572	6,903
II. MAINTENANCE & OPERATING COST							
1. Travel	220	220	220	220	220	1,100	1,400
2. Supplies & Materials							
• Std. Office Supplies	60	65	70	75	75	345	400
• Field Supplies & Materials	120	140	150	160	170	740	900
3. Community Research & Planning							
• Support for PRRA/PCRA	100	150	200	200	200	850	400
• BDPs Preparation	50	100	150	250	250	800	800
• BMIS Installation	50	50	75	100	100	375	500
4. Equipment Maint. & Repairs	20	30	40	50	50	190	250
5. Communications	12	20	20	25	25	102	150
6. Support for Comm. Consultations/Assembly Meetings	50	100	100	100	100	450	500
7. Other Services	70	80	90	100	100	440	500
Sub-Total II	752	955	1,115	1,200	1,290	5,392	5,800
III. EQUIPMENT SUPPORT							
1. Transport							
• AUV, Pick-up type, 4WD	0	800	0	0	0	800	800
• Motorcycle, Trail type	90	180	180	180	0	630	180
2. Office Equipment	120	120	0	0	0	240	300
3. Field/IEC Equipment	50	100	100	50	50	350	300
Sub-Total III	260	1,200	280	230	50	2,020	1,580
TOTAL (I & II & III)	2,008	3,549	2,789	2,904	2,734	13,984	14,283
IV. UNALLOCATED CONTINGENCY (10 % TOTAL)	201	355	279	290	273	1,398	1,428
GRAND TOTAL	2,209	3,904	3,068	3,194	3,007	15,382	15,711

3.0 ORGANIZATION AND MANAGEMENT

3.1 PRECEPTS

The development focus under the Bohol Agriculture Master Plan entails investment in the improvement of livestock and poultry and crop commodities farming systems, fishery resources management, community-based natural resource management and on-site infrastructures. Support services for these investments will be provided in the following: applied research, technology extension and training; community social preparation and organizations strengthening; development of barangay cluster nurseries, seedfarms and/or breeding centers; farm credit and post-production processing and marketing support; products quality control and regulatory services; and provision of basic facilities, farm power, starter stocks and/or breeds.

The management and implementation of tasks for agriculture and natural resource development shall be mainstreamed in the regular operational mandates of the line and staff offices of the local government units, i.e., province, city/municipal and barangay. This also includes for the local development council to form a functional committee or to reconstitute an existing functional committee, as a policy making and oversight body for an integrated agriculture and natural resources development and management.

The organizational and management set up of the affected line offices shall be restructured, their functions redefined and positions installed. Considering the limited budget of the provincial government, the new positions shall be manned by existing staff of affected offices and several detailed personnel coming from other local offices. At the municipal and barangay levels, the concerned line offices in coordination with the barangay governments/councils and accredited POs/NGOs operating at the locale, shall play vital roles in the detailed planning and implementation of component projects, delivery of trainings and technology support for the resource-based economic projects.

To jump-start the implementation for the agriculture and natural resource development, the local institutional strengthening component shall be pursued. The capability development of involved provincial offices, participating city/municipal and barangay governments, community cluster project teams, the POs and other stakeholders, will enable the province to gradually address the magnitude of development implementation tasks. Most of the agriculture and natural resources development activities shall be undertaken by the participating municipal governments through the barangay governments and communities, and POs using the participatory approach technique. This shall be managed by the provincial government through the lead implementing offices, with support from national government agencies (NGA), local resource institutions (LRI) and NGOs in terms of technical assistance, extension technologies, credit financing, resource accessing and monitoring and evaluation.

3.2 ORGANIZATION STRUCTURE, COMPOSITION AND FUNCTIONS

In the implementation of Bohol AMP development, the plan mode ceases when the tasks call for the implementation of the various development project components. This will entail mainstreaming of aforementioned tasks in the regular operation of the respective offices of the Provincial Government of Bohol. This shall also entails **managing change process** to cover the specific areas of organizational structure, policy and legislative support, and capability building. The use of existing operational mandates and structures prescribed under the 1991 Local Government Code (LGC), to deliver basic services is always a wise local government management practice since it ensures sustainability. Thus, to deliver the basic agricultural and natural resource services as translated under the Bohol AMP, the provincial government shall therefore have to ensure the institutional stability and responsive capability of its present structures.

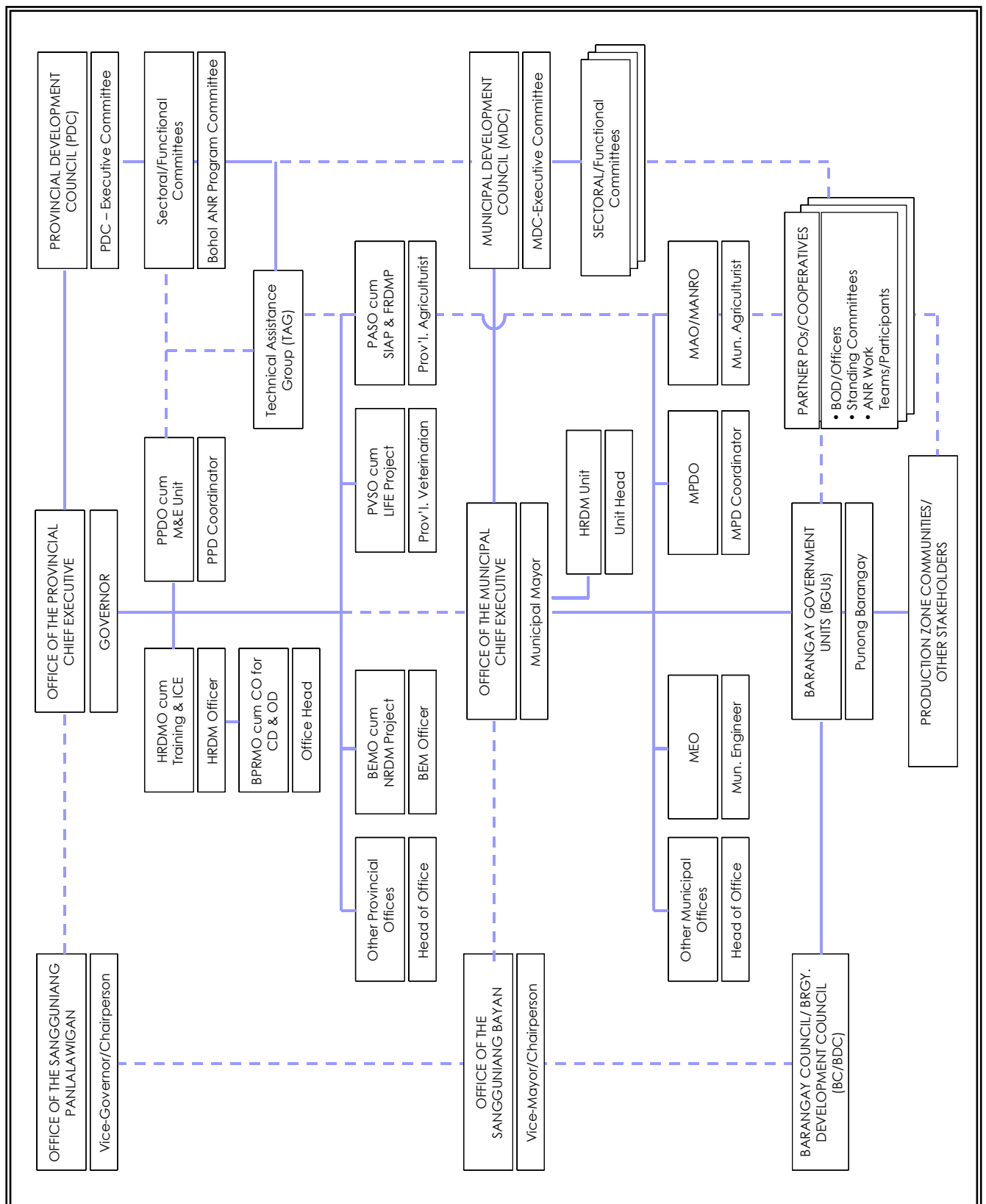
The organization structure for the delivery of agricultural and natural resource services, including the package of support services under the Bohol AMP, is shown in [Figure III-14](#). The activation by the province of the 1991 LGC functional provisions for the respective local policy making body and key line offices shall be focused at the Provincial Development Council (PDC), the Human Resource Development and Management Office (HRDMO) and at the four (4) line offices of Agriculture (PAS), Veterinary (PVS), Environmental Management (BEMO) and Poverty Reduction Management (BPRMO). The internal offices' operational restructuring is critical since the aforementioned body and offices will take the lead in the operationalization of the various components of the Bohol AMP.

As shown in [Figure III-5](#), similar process for activation of the Municipal Development Council (MDC) and the restructuring of the key line office of Agriculture (MAO) and/or Agriculture and Natural Resources (MANRO) among the participating municipal governments will be necessary. This will ensure the effective implementation of component projects' activities and, over the longer term, ensure sustainability of an integrated agriculture and natural resources development and management effort at the municipal and barangay/cluster barangay levels.

3.2.1 The PDC – Bohol Agriculture and Natural Resource (BANR) Program Committee

The BANR Program Committee shall be formed by the Provincial Development Council – Executive Committee (PDC – ExeCom) to assist them in the performance of their functions related to agriculture development and natural resources management. It shall serve as the policy making and oversight body for agriculture and natural resource development. This will be composed of the Governor, as the Committee Chairman, and the Vice-Chairman assumed by the Chairperson of the Provincial Agriculture and Fisheries Council (PAFC). The members are: the SP Committee Chairpersons for Agriculture, Environment, and Appropriations; Chairperson of the Provincial FARMC; President of the League of Municipal Mayors of Bohol; and the Heads of the Offices of Agriculture (PAS), Veterinary (PVS), Environment Management (BEMO), Poverty Reduction Management (BPRMO), Planning and Development (PPDO), and Human Resource Development and Management (HRDMO).

Figure III-14. Proposed Organizational Structure Integrating the Bohol Agriculture and Natural Resources Program into the LGUs Organization and Management System



Specifically, the BANR Program Committee shall exercise the following functions:

- Promulgate the Program policies and guidelines for approval by the PDC-Executive Committee;
- Provide the PDC-Executive Committee with data and information essential to the formulation of plans, programs and activities related to agriculture and natural resources management;
- Resolve issues and problems that need to be resolved at the policy making level;
- Conduct public hearings on vital BANR Program issues and concerns;
- Conduct periodic review of the BANR Program and component projects performance/progress and impacts; and
- Access for resource assistance from local and foreign funding institutions to support agriculture development and natural resources management.

The Program Committee shall hold regular meetings at least once per quarter. Special meetings may be called by the Chairman, or upon the request of at least three (3) members to address immediate concerns.

3.2.2 The Local Implementing Units

1) Provincial Agriculture Services Office (PASO)

The present Office of the Provincial Agriculturist (OPA) shall be restructured to integrate in its operation key functions for implementing two (2) major projects under the BANR Program. The PASO shall be the line implementing office for the Sustainable Integrated Agribusiness Project (SIAP). It will be lodged at the Crops Productivity Division (CPD), which will be appropriately mandated to spearhead and manage the implementation of the SIAP component activities. Detailed presentation on the implementation arrangement is provided in [Section 3.1.6](#) of the SIAP report.

The restructured PASO shall integrate in its operation the Fishery Resources Development and Management (FRDM) Project. Considering budgetary constraint, it would be wise to undertake this by creating a division for Fishery Resources Management (FSMD), headed by a Division Chief cum FRMD Officer. Other new positions shall be created without necessarily hiring new additional personnel. In its initial years of operation, the created positions shall be manned by selected existing technical staff of the restructured office, detailed staff from other divisions, and project-hired contractuels (refer [Section 3.3.6](#) of the FRDM Project report for detailed implementation arrangement).

2) Provincial Veterinary Services Office (PVSO)

PVSO shall be the line implementing office for the Livestock Integration for Food and Enterprise (LIFE) Project. The PVSO shall be responsible for the improvement of raising systems for ruminants, swine and poultry types, animal health and related support services. It will also spearhead the modified livestock and poultry dispersal schemes and the livestock – crops integration farming systems in coordination with the PASO and BEMO.

The detailed implementation arrangement is provided in [Section 3.2.5](#) of the LIFE Project report.

3) Bohol Environment Management Office (BEMO)

This is a line office with the appropriate mandate to respond to the demand of the tasks involving natural resources conservation, watershed rehabilitation, forest trees enterprise development and ecotourism. The BEMO shall be the implementing office for the Natural Resources Development and Management (NRDM) Project. [Section 3.4.2](#) of the NRDM Project report outlines the implementation arrangement of the project within the BEMO structure.

3.2.3 The Role of Other Provincial Units

The tasks requirement in support to the BANR Program shall be mainstreamed with the regular functions of concerned provincial offices in terms of providing technical, administrative and financial management support. These are as follows:

- 1) The **Bohol Poverty Reduction Management Office (BPRMO)** shall be involved in community social preparation and organizations development of the project participants and their POs. Detailed discussion on this role is provided in [Section 3.5.2](#): Component A – Community Social Preparation and POs/Cooperatives Development under the Local Social and Institutional Strengthening Project report.
- 2) The **Human Resource Development and Management Office (HRDMO)** shall be responsible for coordinating and managing the Training and Information, Communication and Education support for all the BANR Program component projects (refer [Section 3.5.2](#): Component B – Local Institutional Strengthening report). This arrangement appreciates the evolving functional scope of the HRDMO and, at the same time, providing the means to respond to the capability-building needs of project participants and stakeholders under the programs.
- 3) The **Provincial Planning and Development Office (PPDO)** shall be the monitoring and evaluation arm of the BANR Program. A discussion on this role is provided in [Section 4.3](#): Monitoring and Evaluation of this report. The PPDO shall also serve as the technical secretariat of the PDC – BANR Program Committee.
- 4) The **Finance and Administrative Office** of the province will have to integrate in their functions the financial management and administrative support services for the implementation of the BANR Program and component projects. These services are in terms of funds disbursements, equipment, materials and services procurements, financial reports, and other logistical support.

3.2.4 The Municipal Government Units

The implementation of specific project and/or package of projects within the context of the BANR Program shall be undertaken by the participating municipal government units. At this level, aside from the Office of the Municipal Chief Executive, the other most concerned units will be the Municipal Development Council thru its Executive Committee (MDC-ExeCom) and the line office of Agriculture (MAO).

Participating municipalities with at least 40% of its total land area within the delineated watershed and/or classified forestlands will be persuaded to restructure its present Municipal Agriculture Office (MAO), to integrate in its operation the natural resources management function. This shall be undertaken by creating within the restructured Municipal Agriculture and Natural Resources Office (MANRO), a second division for Natural Resources. The following shall be the NR Division's operational components:

- Natural resources management and protection;
- Soil and water, flora and fauna conservation;
- Extension services; and
- Inter-agency coordination for the development and protection of the natural resources with both government offices and NGOs.

A senior agriculturist cum Natural Resources Officer shall head the NR Division. Other new positions shall be created and initially manned by selected/existing technical staff of other divisions in MANRO, detailed staff from other municipal offices, and project-hired contractuels.

The MAO/MANRO shall be the line implementing office for the municipal-wide agriculture and natural resources development. Depending on the priority project or package of projects of the participating municipality, the MAO/MANRO shall be responsible for supervising the implementation of the crop commodities farming systems improvement, livestock and poultry enterprises development, fishery resources management, and natural resources rehabilitation, protection and management. Detailed presentation of the specific role and responsibilities of the MAO/MANRO are provided in each project component report.

3.2.5 The Partner People's Organizations (POs)

The project participants in the target rural communities shall be implementing and managing their resource-based economic activities with the assistance of their POs and/or cooperatives. Their POs shall be the microcredit fund retailers of lending institutions or donor agencies for the economic enterprises of stakeholders. These credit services shall be available only to POs who are duly registered with the CDA, DOLE, SEC or with any registering/accrediting agency. The POs service coverage shall not be limited to the barangay where they are based. They can extend to other barangays or cluster of barangays when deemed necessary. The POs, together with the demonstration farm cooperators, the Field Team (composed of two agricultural technologists and one CO for CD facilitator) and other extension services staff of the MAO/MANRO, shall promote

homelot biointensive gardening, appropriate farming/fishing systems, livestock and poultry raising technologies, and socially acceptable natural resources rehabilitation, protection and management strategies (refer to specific Project Component report for more detailed presentation of roles and responsibilities).

The Partner POs shall regularly consult and coordinate with existing institutions in the barangay such as the Barangay Council and Barangay Development Council (BC/BDC), the Barangay Agriculture and Fisheries Council (BAFC), Barangay Fisheries and Agriculture Resources Management Council (BFARMC), the Field Team and other agencies operating in the area or cluster barangays.

3.3 MONITORING AND EVALUATION

The monitoring and evaluation functions shall be the responsibility of the Provincial Planning and Development Office (PPDO), in close collaboration with the lead implementing offices of Agriculture (PASO), Veterinary (PVSO), Environment Management (BEMO), Poverty Reduction Management (BPRMO) and Human Resource Development and Management (HRDMO). These offices shall constitute a team to develop an M&E system that will cover both development services progress and benefits through a participative process involving their municipal counterpart units, the key actors and stakeholders in the agricultural development and natural resources management.

The output of the team will be a commonly agreed translation of the verifiable methods for the different indicators into data recording and collection procedures, and reporting schedules. It will include the appropriate formats for the integrated/consolidated periodic progress reports that will be submitted to the Governor, the SP, the PDC-Executive Committee, and the BANR Program Committee. Also included in the reporting requirements shall be the financing programs of local, national and external donors/institutions which shall be integrated into the monitoring system.

The M&E Team shall organize and structure the information so that it can come up with a consolidated physical and financial report and performance assessment (target outputs and activity schedules versus actual accomplishments and implementation period) at the end of a certain period, as the case maybe. The report format will have four (4) parts, namely: target outputs and activities for the month or quarter, actual accomplishments and shortfall in performance, implementation issues and concerns and actions taken/required, and priorities for the succeeding month/quarter or period.

At the end of each calendar year, the BANR Program Committee through the M&E Team will initiate a review of the program implementation, where the progress and issues will be examined and discussed in detail. This will be a participative review process where all project actors and stakeholders shall be represented. This should lead to the preparation of the Work and Financial Plan (WFP) for the succeeding year.

3.4 LOCAL INSTITUTIONAL STRENGTHENING

This intervention is designed to strengthen and sustain the capability of local institutions in providing support to the marginalized rural communities. Aside from the Provincial Government, the participating municipal government units, the NGOs and the POs, the local resource institutions and relevant national government agencies shall be tapped as partners in the implementation of on-site capability building activities. These include the conduct of relevant training practicum and information, communication and education (ICE) programs to respond to the identified performance gaps vis-à-vis knowledge, skills and attitudes requirement. The detailed presentation of this component is provided in Section 3.5 Local Social and Institutional Strengthening report.

The purpose of the training and ICE component is to increase the level of awareness and competencies of the LGUs, POs and communities to become effective partners in planning, implementing and managing program components designed to transform the rural production zone into self-propelled, self-reliant and environment conscious communities. The scope of the training and ICE includes generalized and specialized training courses such as natural resources development services levelling/orientation trainings for local officials; participative policy formulation, development planning and management; provision of support services at the municipal, barangay cluster and barangay governments' level; appropriate technology packages on resource management and sustainable development; rural enterprise management trainings for the POs and/or cooperatives; CO for CD and trainers training; and cross-visits/development exposure trips.

3.5 POLICY, LEGISLATIVE AND EXECUTIVE SUPPORT AND ENABLING INSTRUMENT

A coordinated support will have to be provided from the three (3) levels of the provincial government structure, to ensure the operational direction toward the agricultural development and natural resources management of Bohol.

3.5.1 Policy Support

The Provincial Development Council – Executive Committee (PDC-ExeCom) to craft policy resolutions for the following:

- Officially adopting the Bohol Agriculture Master Plan and as such shall be the guiding document for all agriculture resource development and natural resources management initiatives of both the private and government sectors; and
- Establish the Bohol Agriculture and Natural Resource (BANR) Program Committee within the PDC, as its policy making and oversight body for agriculture development and NR management.

3.5.2 Local Legislation

The Sanggunian Panlalawigan (SP) shall enact ordinances to provide for the following:

- Pursuant to the PDC policy resolution, to adopt the Bohol Agriculture Master Plan as the official plan document and as such shall be the guide for all agricultural resource development and natural resources management initiatives of private and government sectors.
- For Year 2006 to provide budgetary allocation for agriculture development and NR management based on the IRA 20% Development Annual Implementation Plan and other sources. This will be prepared by the concerned offices (e.g., PASO, PVSO, BEMO, BPRMO and HRDMO) in coordination with the PPDO;
- Approving a restructured Agriculture Office to include the functions of the fishery resources including coastal resource management, hence the Provincial Agriculture Services Office (PASO), with a newly created Fishery Resources Management Division (FRMD), and the creation of the manning positions and the corresponding salaries and grades;
- Approving the redefined functions and restructured organizations of the Provincial Veterinary Services Office (PVSO) and the Bohol Environment Management Office (BEMO).

3.5.3 Executive Orders

The Provincial Chief Executive to issue Executive Orders for the operationalization of the BANR Program to include the following:

- Enjoining the provincial and city/municipal officials and employees to support the Bohol Agriculture Master Plan initiative of the provincial government;
- Translation of the Bohol Agriculture Master Plan into component programs and their respective program of work and/or incorporation in the Year 2006 20% Development Annual Implementation Plan in coordination with the PPDO;
- Approving the redefined functions and restructured organizations of the PASO, PVSO and BEMO, and detailing of personnel.

3.5.4 Enabling Laws and Implementing Circular

1) Local Government Code of 1991

- Section 2. Declaration of Policy – the spirit of this policy focuses on, among others, toward transparency and participative governance through partnership with the city/municipal governments, non-government organizations (NGOs), and with the communities through their people's organizations (POs) – *The institutional operation principles of the BANR Program and its component projects are very consistent with the spirit of this policy.*

- Section 106. IRR Art. 2 – (1) the Local Development Councils may form sectoral or functional committees to assist them in the performance of their functions. *The activation of the Provincial Development Council – Executive Committee (PDC-ExeCom) and the forming/creation of the Bohol Agriculture and Natural Resources (BANR) Program Committee under the PDC-ExeCom falls under this guideline.*
- Section 17. Delivery of Basic Services and Facilities. *All the programs and projects under the Bohol Agriculture Master Plan and/or Bohol Agriculture and Natural Resources (BANR) Program are consistent with this mandate.*

2) Civil Service Commission: Local Government Organizational Models Guidebook for Provinces/Municipalities, 1983

- The redefined functions and restructured organizations of the PASO, PVSO and BEMO is consistent to the CSC aforementioned guidebook.
- The creation and integration of the Natural Resources Division in the MAO operation, hence a restructured Municipal Agriculture and Natural Resources Office (MANRO), is pursuant to the CSC Guidebook.

3) DILG Circular: Barangay Micro Enterprise Development, 2004

- This is a timely and responsive support mechanism to the BANR Program and component projects on-farm financing and rural enterprises development thrusts.

3.5.5 Enabling Instrument: The Memorandum of Agreement (MOA) with the NGAs, LRIs and NGOs/POs

Appropriate MOA or MOAs need to be executed between and among the Provincial Government of Bohol, the concerned NGAs (e.g., DA, PCA, FIDA, BFAR and DENR), local resource institutions and NGOs/POs. The MOA shall spell out and define their roles and support functions to the agriculture development and natural resources management; the mechanisms and guidelines for the implementation of component projects/subprojects; and the arrangement and conditions in the availment, utilization and liquidation of funding allocations for component subprojects or activities.

4.0 FINANCIAL PLAN

4.1 PROGRAM COST

The total cost for the implementation of the Bohol Agriculture and Natural Resources (BANR) Program is estimated at Php 880.65 million spread over a period of 10 years. The cost for the succeeding years 11 to 20 shall be determined during the program review and re-planning, which is recommended to be undertaken by the end of the 5th year of program implementation. The summary breakdown of the total cost by component project is presented below.

<u>Item/Component</u>	<u>Total Cost</u> <u>(P'000)</u>	<u>% to Total</u>
• Sustainable Integrated Agribusiness Project (SIAP)	49,632.00	6.0
• Livestock Integration for Food and Enterprise (LIFE) Project	349,211.00	40.0
• Fishery Resources Development and Management (FRDM) Project	423,432.00	48.0
• Natural Resources Development and Management (NRDM) Project	27,279.00	2.0
• Local Social and Institutional Strengthening (LSIS) Project	31,093.00	4.0
PROGRAM TOTAL	P880,647.00	100.0

Approximately Php 451.07 million, or 51% of the program investment cost, is estimated for the first five years, and Php 429.58 million for the succeeding Years 6 to 10. These investment costs are the program's direct costs comprising of the cost requirements for agricultural crops, livestock and poultry, fishery and natural resource development and management project, establishment of support infrastructure and facilities, training and equipment support, and hiring of incremental program staff.

The indirect investment costs shall be best determined during the detailed project implementation plan (PIP) preparation stage, ideally in collaboration with the Technical Working Group (TWG) of every participating municipality/city. Indirect costs will include the credit and/or grant financing component and the equity counterpart of project participants and their POs for resource-based farming systems and/or development modules and income generating enterprises.

[Table III-33](#) presents the Years 1-5 and Years 6-10 schedule of financial investments by project component for the direct investment cost. The detailed breakdown of cost by budget item and by year is provided in the project components' report.

Table III-33. Breakdown of the Direct Investment Cost (PhP '000) by Project Component/Key Activities, Year 1-5 and 6-10; Bohol Agriculture and Natural Resources (BANR) Program

Component/ Key Activities		Estimated Cost		Total Cost (10 Years)	% to Total
		Years 1-5	Years 6-10		
I.	Sustainable Integrated Agribusiness Project (SIAP)	22,853.00	26,779.00	49,632.00	6.0
	1.1 Civil Works	5,385.00	9,560.00	4,945.00	
	1.2 Transport & Equipment	2,587.00	2,397.00	4,984.00	
	1.3 Adaptive Research, Demonstration/Model Farms & Component Projects Development	1,945.00	2,430.00	4,375.00	
	1.4 Project Promotions & IEC	620.00	850.00	1,470.00	
	1.5 Training Support	3,120.00	2,000.00	5,120.00	
	1.6 Incremental Administration	7,118.00	7,108.00	14,226.00	
	1.7 Unallocated Contingency (10% of Items 1.1 to 1.6)	2,078.00	2,434.00	4,512.00	
II.	Fishery Resources Development and Management (FRDM) Project	283,705.00	139,727.00	423,432.00	48.0
	2.1 Organizational Development	1,510.00	2,050.00	3,560.00	
	2.2 Coastal Resources Management (Habitat) Plan Implementation	35,620.00	29,620.00	65,240.00	
	2.3 Responsible Fisheries Planning, Development and Management	28,200.00	13,500.00	41,700.00	
	2.4 Entrepreneurial Livelihood Development Support	132,000.00	72,500.00	204,500.00	
	2.5 Infrastructure & Facilities Support	50,000.00	-	50,000.00	
	2.6 Foreshore and Shoreline Management	15,020.00	6,700.00	21,720.00	
	2.7 Local Policies Support Formulation & Implementation	2,725.00	2,725.00	5,450.00	
	2.8 Fish Handling, Transport & Marketing System	1,180.00	1,180.00	2,360.00	
	2.9 Support Services on Local Capability & Capacity Building	2,200.00	2,200.00	4,400.00	
	2.10 Applied Research & Special Studies	15,250.00	9,250.00	24,500.00	
III.	Livestock Integration for Food & Enterprise (LIFE) Project	108,608.00	240,603.00	349,211.00	40.0
	3.1 Ruminant Development	51,185.00	24,505.00	75,690.00	
	3.2 Poultry Development	4,190.00	-	4,190.00	
	3.3 Swine Development	5,100.00	11,100.00	16,200.00	
	3.4 Exotic Animals Farming	210.00	-	210.00	
	3.5 Support Services	23,950.00	154,125.00	178,075.00	
	3.6 Detailed Planning, Monitoring and Evaluation	14,100.00	29,000.00	43,100.00	
	3.7 Unallocated Contingency	9,873.00	21,873.00	31,746.00	
IV.	Natural Resources Development and Management (NRDM) Project	20,520.00	6,759.00	27,279.00	2.0
	4.1 Watershed Development & Management	2,647.00	2,439.00	5,086.00	
	4.2 Production Forest Rehabilitation & Management	8,805.00	1,150.00	9,955.00	
	4.3 Detailed Watershed Studies (Resources Assessment & Management Planning)	2,570.00	-	2,570.00	
	4.4 Support Services and Facilities	6,498.00	3,170.00	9,668.00	
V.	Local Social and Institutional Strengthening (LSIS) Support	466,450.00	445,290.00	911,740.00	4.0
	5.1 Personal Services (CO or CD & Organizations Dev't)	6,572.00	6,903.00	13,475.00	
	5.2 Maintenance & Operating Cost	5,392.00	5,800.00	11,192.00	
	5.3 Equipment Support	2,020.00	1,580.00	3,600.00	
	5.4 Unallocated Contingency (10% of items 5.1 to 5.3)	1,398.00	1,428.00	2,826.00	
	PROGRAM TOTAL	451,068.00	429,579.00	880,647.00	100.0
	% of TOTAL	51.0	49.0	100.00	

4.2 SOURCES OF FINANCING

4.2.1 Approach and Strategy

A combination of financing options is recommended to respond to the magnitude of investment requirements of the BANR Program. The existing limited local capacity to generate resources requires consideration of financing from internal and external sources in the form of loans, grants, and/or co-financing assistance from other identified sources.

Largely, the sources of financing will come from the LGUs (province, city/municipality and barangay), the national government through its different line agencies, and the development financing programs of the national government and international agencies retailed through the banking institutions, i.e., the LBP and DBP. While several financing programs could substantially respond to the on-farm, livestock and poultry, and fisheries enterprise credit requirements of the project participants and their POs, the financing for other components such as institutional development, equipment and facilities support would be quite difficult to address since these components are traditionally direct costs borne by the LGUs.

However, a good analysis of the present and projected local fiscal situation (particularly with the incoming AusAID assistance on Local Finance Management) could reveal the viability for the LGUs to access internal financing to initially/partially fund the program. The fiscal projections could reveal that the province and most municipalities can comply with foreseeable contractual obligations without necessarily sacrificing their efficiency to deliver other basic services.

4.2.2 Financing the Program Implementation

The appropriate financing scheme to implement the projects under the BANR Program is anchored on the project's financial requirement, the types of financing to be obtained, the specific sources, and the terms for each type of financing. These considerations should be assessed based on the component projects' costs and its implementation phasing. The assessment should shed light on the participating LGU's capability to provide equity or service for borrowings, the resource availability and accessibility from capital markets and other financing sources of the national government and non-government organizations.

1) Sources of Financing

The financing for component projects implementation could come from both internal and external sources as discussed below.

Internal Sources. The Provincial Government of Bohol and participating municipal governments could mainstream some project costs in their budgetary allocations for local development projects, specifically the budget items for Personal Services, MOOE, and Capital Outlays. These development projects are funded largely by

the 20% Internal Revenue Allotment Development Fund, wherein its trend directions depends on the Internal Revenue Allotment (IRA) income.

For Bohol, the local fiscal capability over 10 years is expected to strengthen based on the projected annual increase in revenue where, in turn, will generate “free resources” or surplus for the succeeding years. The average annual growth rates of revenues and expenditures derived from a 5-year historical data are available at the offices of the Provincial Accountant and Treasury.

External Sources. Since the magnitude of financial investment for the program implementation is beyond the resource capability of the LGUs, the external sources will provide the bulk of financing. This refers to the availability and accessibility of resources from various programs of international agencies and national government, the banking institutions, and the private sectors.

Based on the guidelines and preferences by external financing sources, the eligible projects include projects for agriculture (crops, livestock and poultry, fisheries), environment and natural resources, health and social welfare, rural women and youth initiatives. Depending on the type and size of the projects, the nature of financing are largely drawn from loans, a small-grant component and other sources. Loans financing are essentially from the development financing programs of the international agencies and/or the national government retailed through the capital markets. Grants-and-Aids are commonly sourced out from congressional aids, NGOs and embassy-based mission funds.

2) Financing Scheme

A combination of financing schemes from various sources is the recommended option for the Provincial Government of Bohol in the light of the BANR Program financial requirements, type of projects/subprojects, and the prevailing financing sources, terms and conditions.

LGUs Project Loans from Government Financial Institutions. Many of the financing programs of the national agencies and those retailed by Banks, specifically the LBP and DBP anchor on the LGU's borrowing capacity and loan ceiling on its Internal Revenue Allotment (IRA) and locally generated income. The LBP, for instance, offers a loan ceiling of 20% of the 90% of LGU's IRA. Eligible projects that could be financed by this scheme are the construction of farm-to-market road and production facilities, acquisition costs of equipment commodities, and even for local training services.

Other National Service Agencies. The LOGOFIND, a project of the Department of Finance and funded by the World Bank provides long-term technical and financial assistance to LGUs. This loan portfolio is biased towards environmental projects that are located in public domain areas. Thus, the direct costs required for the implementation of the NRDM Project components could be financed by LOGOFIND. Its basic conditions and terms are as follows:

Program	- LOGOFINS/DOF
LGUs Loan Ceiling	- 20% of Project Cost
Grant Component	- 70% of Project Cost

LGU Equity	- 10% of Project Cost
Maturity	- 5 years with a grace period of 3 years on the principal.
Interest rate	- 14% per annum
Collateral	- IRA Intercept

The LGUs direct cost for implementing the coconut-based farming systems under SIAP, including coco-livestock integration under the LIFE Project, could be financed by the LBP under the PCA-Financing Incentives for Economic Livelihood Development Scheme for Small Coconut Farmers Organization (FIELDS-SCFO). The LGUs can secure low-interest loan to finance the establishment of demonstration/model farms, procurement of recurring farm supplies and materials, ruminants and farm equipment.

Project Participants and/or POs Loans. The project implementing units of the Provincial Government of Bohol and the participating municipalities through their MAOs or MANROs shall assist the project participants and/or their POs undertake their resource-based farming systems or development modules and rural enterprises by linking them with the appropriate financing programs. One of the numerous existing loan portfolio that can be tapped is given below:

Program	: Poverty Alleviation Funds for Direct Assistance to Farmers/Fishers/Livestock and Poultry Raisers (a special credit window for individuals or POs)
Conduit Agency	: Quedancor
Terms	: Maturity – To end borrowers not specified; interest rate shall be set by the ACPC.
Collateral	: Free/None