CHAPTER I AGRICULTURAL BACKGROUND

1.1 National and Regional Background

1.1.1 Agricultural Status

a) Land Use

In the Philippines, 13,371 thousand hectares or about 46 percent of total land are classified into the alienable and disposable land, where about 63 percent of the classified area or 9,034 thousand hectares are the existing farm area according to 1980 Agricultural Census.

The Philippines is administratively divided into 13 Regions. The proposed project area is a part of Region VII, also known as the Central Visayas Region. About 56 percent of the total land in the Region is classified into the alienable and disposable land. The existing farm area is equal to 62 percent of the classified area.

The said region consists of four provinces, namely Bohol, Cebu, Negros Oriental and Siquijor. The agricultural land use pattern of the concerned region and province are shown in the following table together with that of the Philippines.;

Agricultural Land Use in 1980

(Unit: 1,000 ha)

Item	Philippines	Region VII				
		Total	Bohol	Cebu	Negros Oriental	Siquijor
1.Total area	30,000	1,495	411	509	541	34
2.Classified area to alienable & disposable land	13,371	833	310	253	270	1/
3.Farm area	9,034	530	138	163	220	8
4.Rice land Excluding upland rice	2,305	59	46	3	9	1
5.Potential of irrigable area	3,000	51	31	6	14	-
6.Irrigated area	1,477	16	7	2	6	-
7.Average farm size (ha)	2.6	1.6	1.4	1.1	2.7	0.8
8.Cropping intensity (Rice land)	1.34	1.68	1.77	1.18	1.43	1.66

Note: 1/ Included in Negros Oriental
Source: 1981 Census of Agriculture
NEDA Philippine Statistical Yearbook

In the Region VII, the suitable agricultural land available for use by farmers is scarce. The area coverage of potential irrigable area and also the existing irrigation area are limited comparing to the national averages. Under the condition that 15 percent of the total area has slopes of less than 18 percent and no major river basins is existent. But very little forest has remained. The soils are of variable fertility and have been subjected to considerable soil erosion to a great extent.

Rice land in the region covers only 11 percent of the total farm land, which is less than the coverage of rice land in the Philippines at 26 percent. Seventy-eight percent of rice land in the region is located in Bohol province.

b) Gross Domestic Product and Labor Force

Labor Force

The agricultural sector inclusion of fishery employs 56.5 percent of the total gainfull workers in 1980 and 54.4 percent and 63.4 percent respectively in the Region VII and Bohol province.

Gross Domestic Product

The Gross Domestic Product (GDP) in the Philippines amounts for 100,125 million pesos (1972 constant price) in 1983 which increased in 1.78 times the GDP in 1972 (56,075 million pesos) with the average annual growth rate of 5.4 percent. In the same period the GDP of agriculture increased in 1.5 times with the average annual growth rate of 4.1 percent. The agriculture sector accounts for 24.8 percent of total GDP in 1983.

During the period from 1972 to 1983, the regional GDP increased in 2.0 times GDP in 1972 whereas the GDP of agriculture increased in only 1.5 times. The GDP of agriculture sector occupies relatively small share at 21 percent of the total GDP (1983) to compare with the share of GDP agriculture in the Philippines. The little or no growth has been registered in the

Gross Domestic Product in the Philippines

(Unit: million pesos)

Item	1972		1983			
	1972 Price	%	1983 Price	%	1972 Price	%
Total amount	56,075	100.0	380,821	100.0	100,125	100.0
Agriculture	16,040	28.6	82,084	21.5	24,845	24.8
Other industries	40,035	71.4	137,374	78.5	75,280	75.2
Per capita (total)	1,428		7,330		1,898	

Source: NEDA Statistical Yearbook

Following table shows the regional GDP and the share of agriculture GDP.

Gross Domestic Product in the Region VII

(Unit: million pesos, 1972 Price)

Item	1972	1978	1980	1981	1982	1983
Total amount	3,619	5,921	6,727	6,990	7,000	7,100
Agriculture	1,033	1,217	1,497	1,537	1,484	1,520
Agriculture (%)	28.5	20.6	22.2	22.0	21.2	21.4
Per capita GDP (total)	1,148	1,671	1,769	1,798	1,788	1,797

Source: NAS-NEDA, NEDA Region VII Estimates 1982

regional GDP agriculture for recent years. Thus overall rural productivity is believed to be actually declining, for instance, in Cebu and Siquijor provinces. About 936 thousand persons or 63 percent of the total employment were employed in agriculture in 1981 in the Region VII. The per capita GDP of agriculture is counted at ₱1,642 (1972 constant price) while that of the non-agriculture sector is ₱9,869. Therefore, the productivity per worker in agriculture is only one seventh of that in non-agriculture.

c) Trade of Agricultural Product

The total of the Philippine export earinings increased significantly from 1972 to 1982. But from 1982 to 1983 the agricultural commodities except coconut products, and fruit and vegetables decreased the earnings. The share of agricultural products inclusive of forest product decreased from 62 percent in 1972 to 31 percent in 1983 even though the annual increase is as high as 7.4 percent during the period.

Merchandise Export in the Philippines

(1972 Constant Price)

(unit: million US$)

Item	1972	1982	1983	Compound Annual Growth (1972-83,%)	Annual Growth (1982-83,%)
1. Total	1,168	5,021	5,005	14.1	- 0.3
2. Agricultural Products	721	1,622	1,575	7.4	- 2.9
(1) Coconut products	228	563	639	9.8	13.5
(2) Sugar products	216	396	282	2.4	-28.8
(3) Forest products	225	289	327	3.4	13.1
(4) Fruit and vegetables	52	374	327	18.2	-12.5
3. Mineral products	233	496	413	5.3	-16.7
4. Others	214	2,903	3,017	27.2	3.9

Source: NCSO Statistical Handbook of the Philippines 1984

The export earnings of sugar product showed the smallest growth rate from 1972 to 1983, and its largest decrease was recorded from 1982 to 1983.

As for import, the total expenditures for food and beverages cover 7 percent of the total import, which is equal to 42 percent of its export earning in 1983. The import expenditures of food and beverages increased in 3.0 times from 1972 to 1983, resulting in larger growth rate than that of export during the period from 1972 to 1983.

Merchandise Imports in the Philippines

(unit: million US$)

Item	1972	1982	1983	Compound Annual Growth (1972-83,%)	Annual Growth (1982-83,%)
1. Total import	1,334	7,667	7,487	17.0	- 2.3
2. Food and tobacco	173	600	515	10.4	-14.2
(1) Meat and meat products	4	20	13	11.1	-35.0
(2) Dairy products	46	167	128	9.8	-23.3
(3) Cereal and cereal preparations	84	242	249	10.4	2.9
(4) Fruits and vegetables	5	15	14	9.8	- 6.7
(5) Fish and fish preparations	20	38	7	- 9.1	-81.6
(6) Beverages and others	9	66	72	20.8	9.1
(7) Other food products	5	52	32	18.4	-38.4
3. Manufactures and others	1,161	7,067	6,972	17.7	- 1.3

Source: NCSO Statistical Handbook of the Philippines, 1984

d) Agricultural Production

Among the coverages to the total harvested area of respective crops in the Philippines, the food crops (cereals, root crops, vegetables and fruits and other food crops) maintained about 71, 72 percent from 1965 to 1975, but it decreased to 68 percent in 1980. On the other hand, the commercial crops (coconut, sugar cane and other industrial crops) increased the area coverage from 28, 29 percent until 1975 to 32 percent in 1980. The seven major crops in term of the area coverage are rice (30 percent of the total harvested area), corn (26 percent), coconut (26 percent), fruits (4 percent), root crops (mainly cassava and sweet potato, 4 percent), sugarcane (3 percent) and abaca (2 percent) in the Philippines. In these seven crops, three of coconut, root crops and corn increased to more than 150 percent of the harvested area from 1965 to 1980. The harvested area of fruits increased with the moderate rate to 129 percent. The remaining three crops recorded slow increase rates.

As shown in the following table, the total crop production (1983) in the Philippines increased in 1.8 times the total production in 1972 with the average annual growth rate of 5.3 percent. The increase rates of rice and corn are 3.3 percent and 3.4 percent respectively, which are over the population increase rate of 2.7 percent during the period. The increase rate of fruits and vegetables are highest, contributing to the high rates of fruits food crops. On the other hand, the increase rates of the commercial crops are lower than those of the all food crops.

In Region VII, the major crops in term of area coverage to the total harvested area (1982) are corn (52.6 percent of the total harvested area), coconut (17.5 percent), rice (12.4 percent), sugar cane (4.2 percent), sweet potato (3.7 percent), cassava 3.3 percent) and fruits (2.6 percent). The share in the harvested areas and production amounts of the respective crops in the Philippines are shown in the following table. Comparing the shares of the harvested area with these of the production amount, the latter is

Agricultural Production

Crop	1972	1982	1983	Compound Annual Growth (1972-83,%)	Annual Growth (1972-83,%)
Total	15,421	29,884	27,261	5.3	- 8.8
Food crops	10,629	22,436	20,117	6.0	-10.4
-Rice (rough rice)	5,325	8,108	7,731	3.4	-12.5
-Corn (shelled)	1,043	3,290	3,949	12.9	-20.0
-Fruits and vegetables	2,048	7,538	5,923	10.1	-21.4
-Others	2,408	3,500	2,514	0.4	-28.2
Commercial crops	4,792	7,448	7,145	3.7	- 4.1
-Coconut	2,044	3,786	3,494	5.0	- 7.7
-Sugar canes	2,554	3,403	3,433	2.7	0.9
-Others	194	259	218	1.1	0.8

Source: NEDA 1984 Statistical Yearbook

Crop Production in Region VII

(Average 1978--1982)

Crop	Philippines		Central Visayas			
	Harvested Area (1,000 ha)	Production (1,000 ton)	Harvested Area (1,000 ha)	Share (%)	Production (1,000 ton)	Share (%)
Corn	3,265.7	3,109.1	481.4	14.7	240.0	7.8
Coconut	3,082.8	4,231.6	158.4	5.2	162.2	3.8
Rice	3,543.5	7,676.0	112.9	3.2	166.4	2.2
Sugar cane	457.9	3,239.5	41.5	9.1	300.0	9.3
Cassava	202.8	2,112.8	33.2	16.4	90.8	4.3
Sweet potatoes	226.3	1,051.2	31.8	14.1	66.9	6.4
Fruits	532.0	6,623.4	16.4	3.1	162.1	2.5

Source: NEDA 1984 Philippine Statistical Yearbook

less than the former for the respective crops except sugarcane. This may show that the productivity of these crops are lower than the national average. Therefore, among the said major crops, it is considered that the productivity of fruit, rice and coconut is relatively high.

The proportion of the number of livestock and poultry in Region VII to the total number of head of these animals in the Philippines is shown in the following table. It presents that only cattle and goats have relatively large proportions.

Livestock and Poultry Population
in the Philippines and Region VII

(unit: 1,000 head)

Animal	Philippines (1978-1982) (A)	Region VII (1978-1982) (B)	(B)/(A) x 100
Carabao	2,878	178.0	6.2
Cattle	1,884	242.1	12.9
Swine	7,568	720.3	9.5
Chicken	55,681	5,165.7	9.3
Goat	1,590	270.3	17.0
Duck	5,023	62.9	1.3

Source: NEDA Five-year Development Plan (1983 - 87)

The region is encompassed by maritime municipalities with about 40 percent of the total population. From 1979 to 1982 the performance of the fishery which is belowed with the potential in the region were not fully developed. Recently, the inland fishery performed moderately well with a steady production increase but still low rate. The production share of inland fishery was about five percent of the total production in 1972. The inland fishery sector includes both fresh and brackishwaters but the former is hardly developed. A recent inventory of fish ponds (1981) show that there are 8,311 hectares of brackishwater fish pond while there are 1,848 hectares of developed area of fresh-water ponds

1.1.2 Food Supply and Demand Balance

a) Rice

In the Philippines, rice self-sufficiency was once attained. However, poor climatic conditions and crop disease caused extensive damages and resulted in rice shortage and increase of imports. From 1971 to 1976, annual rice imports reached 55 thousand tons to 450 thousand tons. Again, from 1978 to 1982 the restabilized rice production attained some surplus in the national rice balance. However, the estimated rice balance in table shows rice deficiency in the amount more than about five percent of the total demand from 1978 to 1982, where it is estimated

on the basis that 77 percent of the total population consumes rice with the per capata annual consumption at 200 kg of Palay (about 130 kg of milled rice). In the successive two years of 1983 and 1984, some 235 thousand hectares of drought damage (1983) and crop damages of two typhoons (1984) brought out the sharp decrease of rice production. The deficit amounts to approximately 13 percent of total demand in both years.

In Region VII, about 40 to 50 percent of total demand is deficient averagely for the past ten years (1978 - 84), where the demand is computed based on 32 percent of rice eating people with the annual consumption at 200 kg of paddy. Among the factors for rising rice demand, it is considered that the probably increase of rice eating people will affect the future demand.

b) Corn

The demand-supply balance of corn in the Philippines is estimated in TABLE G1-13, where it showed there is a large surplus for past ten years on the national level. However, about 40 percent to 50 percent of demand in Region VII is deficient for the past ten years.

1.1.3 Agricultural Development Plan

a) Philippine Five-year Development Plan

In the current years, the development based on the Five-year Development (1983 - 1987) is promoted by the Philippine Government. Initially, the Five-year Philippine Development Plan (1983 - 87) was issued in May 1982, which aims to increase per capita GNP from ₱1,907 (1982) to ₱2,023 (1983) with the growth rate of GNP at 6.5 percent during the planned period (1972 constant price). However, the actual GNP per capita in 1983 was ₱1,898. Responding to the recent domestic development and realities in the international economic environment, the up-dated plan was prepared and it was issued in September 1984. The projection of growth

rate of GDP was revised to 2.8 percent per annum.

In the up-dated Five-year Development Plan, the following targets of agricultural production are indicated;

Targets of Agricultural Production
in the Five-year Development Plan (up-dated)

Crop	Production (1,000 ton)		Annual Growth Rate (%)	
	Actual (1983)	Projection (1987)	Actual (1972-83)	Projection (1984-87)
Food crops				
Grains				
Rice	7,731	8,675	3.3	4.0
Corn	3,949	4,341	3.4	6.8
Other crops				
Coffee	88	110	N.A.	N.A.
Cacao	5	10	N.A.	N.A.
Sorghum	17	27	N.A.	N.A.
Beans, Seeds and Nuts	96	123	N.A.	N.A.
Fruits	7,038	6,815	7.2	1.9
Vegetables	858	968		2.2
Rootcrops	2,961	3,190		1.4
Commercial crops				
Sugar	2,000	1,861	3.4	-0.6
Coconut	2,010	2,273	-0.7	6.3
Tobacco	48	53	N.A.	N.A.
Rubber	75	83	N.A.	N.A.
Abaca	88	116	N.A.	N.A.
Cotton	12	32	N.A.	N.A.
Ramie	2	6	N.A.	N.A.
Livestock	1,033	1,232	N.A.	N.A.
Poultry	238	302	N.A.	N.A.
Fishery	1,607	2,040	2.9	4.0
Aquaculture	381	442	N.A.	8.1

Source: NEDA Up-dated Philippine Development Plan, 1984 - 87

As shown in the above table, the sustained production growth in rice production was targeted, where the annual growth rate is as high as 4.0 percent to compare with the average growth rate from 1972 to 1983. On the other hand, higher planned growth rate than that of rice area given for corn, coconut, sorghum and cotton, while the negative growth rate is targeted for sugarcane. For poultry and aquaculture, rather high rates of production increase are targeted.

b) Regional Five-year Development Plan

On regional level, Regional Five-year Development Plan (RFYDP) (1983 - 87) was issued. RFUDP aims at increase of the per average capita GDP from ₱1,789 in 1981 to ₱1,964 in 1987, respectively at 1972 constant price, with the annual growth rate of GDP at 3.5 percent. On the total, agriculture sector will constitute the biggest portion at 21 percent to total GDP in 1987 with maintaining the share of 22 percent in 1982.

The regional targets of agricultural production is planned in the Region VII Five-year Agricultural Indicative Plan (1983 - 87), which is prepared by the regional office of the Ministry of Agriculture and Foods. More than 100 thousand tons of rice production in the weight of palay is planned to be increased during the period. Related to the production target of rice, the following specific stragy for the agricultural development is proposed;

(i) During the planning period, specific areas suited for rice production, like in Bohol province shall be prioritized for development of rice production;
(ii) Large scale irrigation projects in Bohol province will be implemented.

c) Irrigation Development Plan

The irrigation development plan under the Five-year Development Plan (1983 - 87) is formulated to have such target that irrigation and related projects will generate an additional irrigation area of about 192,000 ha, and rehabilitate the existing systems covering 137,948 hectares.

On the other hand, the NIA Corporate Plan (1983 - 92) indicates the following physical targets of irrigation development.

(i) For the planned period, generation of irrigation area will be implemented in about 581,000 ha, which comprises 424,000 ha of the potential irrigble area for

national systems and 157,000 ha of that for communal irrigation systems

(ii) Rehabilitation will be undertaken in a total of about 405,000 ha for the improvement of national irrigation systems.

As a result, by 1987, the irrigation coverage will increase from 1,476,416 ha in 1983 to about 1,668,000 ha and by 1992 2,057,000 ha.

d) Central Visayas Regional Project (CVRP)

During the Five-year Development Plan, it is planned to implement CVRP, which is funded by the World Bank. This is a pilot project that addresses two important rural problems in Region VII; the declining productivity and nearshore areas due to continuing environmental degradation and the associated poverty of rural population. The Ipil river basin is identified as the pilot project of CVRP in Bohol province, where the following two items of programs are planned to implement.

(i) Upland Agricultural Programs: on-farm soil conservation through contour ditches and walls, tree crop planting, and off-farm reforestration of adjacent denuded slopes in the Ipil river basin.

(ii) Nearshore Fisheries: replanting of mangroves by municipal fisherman, construction of artificial reefs and protection of coral reefs in the Ipil river basin.

1.2 Provincial & Municipal Background

1.2.1 Agricultural Status

a) Land Use

The agricultural land use in Bohol province is shown in the following table. The crop land occupies about 129 thousand hectares while there are 310 thousand hectares of the classified area into the alienable and disposable land by the Bureau of Forest Development.

Land Use in Bohol Province (1979)

Land Use	Area (ha)	%
1. Crop land	129,400	31.5
-Rice land, irrigated	*11,800	2.9
-Rice land, non-irrigated	*27,800	6.8
-Coconut and fruit trees	62,500	15.2
-Other crops	27,300	6.6
2. Pasture/Shrubs/Grasses	188,000	45.7
3. Forestry	57,700	14.0
4. Inland fish ponds	1,900	0.5
5. Settlement and others	34,000	8.3
Total	411,000	100.0

Source: B.S/FAO Soil and Land Resources Appraisal and Training Project, Technical Report 4 (The figures on the land areas are rounded)

Note: * Different figures from that in Page 1 due to different data sources

b) Labor Force

According to 1980 Population Census data, the population in the rural area covers about 85 percent of total population. In the rural area, 51.9 percent of the total population or 208 thousand of private households population which is 15 years old and over is gainful workers. Crop production, animal husbandry, forest and fishing make up the biggest group of gainfull workers, covering 69.2 percent of total gainful workers, which is over the same figures of 62.2 percent in 1970. Out of 69.2 percent, 58.4

percent is covered by the gainful workers in crop production. This shows crop production is the main occupation in the province. Following to crop production, fishing has the next largest share in the total of gainful workers at 10.3 percent. 1981 Census of Fisheries reveals that 1,778 persons operate ponds with 3,072 hectares of the operated fishpond area in Bohol province.

According to the RDS-NEDA estimates the family income in Bohol province is ₱3,892/family in 1975 on the average, which consisting of ₱4,727/family in the urban area and ₱3,767/family in the rural area.

c) Agricultural Production

The area coverage to the total planted area in 1981 Census of Agriculture for the major crops in Bohol province and the project municipalities is as follows;

Cropping Area (1981)

Order	Bohol	%	Project Municipalities	%
1	Rice	46.6	Rice	61.2
2	Coconut	28.4	Coconut	25.7
3	Corn	13.5	Cassava	6.3
4	Cassava	4.1	Sweet potato	3.2
5	Sweet Potato	3.3	Corn	2.1
6	Gabi	1.0	Peanut	0.4
7	Leguminous crops	0.7	Gabi	0.3
8	Ubi	0.4	Leguminous crops	0.2
9	Peanut	0.3	Fruity Vegetables	0.1
10	Fruity vegetables	0.3	Ubi	0.1
11	Others	1.4	Others	0.4

Note: Coconut area includes the area planted to various kind of permanent crops

Source: *1981 Census of Agriculture, NCSO*

Rice, coconut, cassava, corn, sweet potato, peanut, leguminous crops and vegetables inclusive of gabi are major crops both in Bohol province and the project municipalities. Especially rice is the mainstay of crop production in Bohol province, covering 61 percent of the total cropping area. The production on each level from the provincial to the national level is shown in TABLE G1-4 to G1-11.

In Bohol province, the number of head of livestock and poultry has not increased for the latest seven years but has decreased in the latest two years, in 1981 and 1982. (See FIGURE G1-3)

Bohol has development potentials of fishery not only in the marine fishery but also in aqua-fishculture. According to 1983 Socio-Economic Profile of Bohol, about 5,640 hectares fishpond area is identified, where about 3,000 hectares has been developed. On the other hand 946 hectares were identified for freshwater fishponds and 730 hectares of fishponds were developed in 1983.

1.2.2 Food Supply and Demand Balance

In Bohol province supply of rice met the demand only in 1979 during the past ten years. About 89 thousand tons of rice in the weight of palay is estimated to be deficient due to the severe drought year in 1983. In the following year of 1984, rice deficit also occurred due to the damage of typhoons. Corn supply in the province has been also deficient every year during the past ten years. (See TABLE G1-12 to G1-14)

In the supply-demand balance of other crops, there are deficits of such crops as mungbean, peanut and vegetables.

1.2.3 Agricultural Development Plan

a) Provincial Agricultural Development Plan

On the provincial level, the Provincial Development Council Development Plan (1983 - 1987) has established the following major goals in the sector of agriculture development during the planned period;

(i) To ensure rice self-sufficiency and rice growing farmers' income through increase of yield per hectare by 25 percent, expansion of rice land area and provision of irrigation water in the full potential irrigable area.
(ii) To increase corn production through yield increase

at 2.0 tons per hectare in the programed area of yield increase project.

(iii) To increase cassava and other root crops production by 75 percent of present production, especially for the development of cassava agro-industry.

(iv) To promote production of the non-traditional commercial crops of black pepper (100 ha of target area), coffee (5,000 ha) and cacao (5,000 ha).

(v) To improve production technology of leafy vegetables and fruit tree crops in the programed area for markting and also for encouragement in establishing of fruit processing.

(vi) To increase coconut productivity per hectare by 25 percent through introduction of high yielding varieties in the existing area and also the new planting area.

(vii) To develop agro-forestry in 10,000 hectares (250 hectares per municipatility) and to conserve the remaining mangrove areas.

(viii) To develop livestock and poultry production of cattle and hog through improvement of production technology, planting of pasture and forage and establishment of feed mill processing factories.

(ix) To increase fish production through improvement of production technology and development of fish culture.

In the said development plan, the fully irrigation water supply in the 31,791 hectares of total potential irrigable area is planned in the national irrigation project of Wahig-Pamacsalan and also ten new communal irrigation projects.

The provincial Five-year Agricultural Development Plan (1983 - 87) has the production targets of agricultural production for the year of 1987 and 2000 as shown in TABLE G1-17. The formulation of the provincial targets are based on the proposed provincial land use plan as shown in the following table;

Proposed Land Use Plan

(unit: '000 ha)

Land Use	1979		1987		2000	
Crop land	72	(17.5)	100	(24.3)	112	(27.3)
(Rice land only)	(40)	(9.8)	(49)	(11.9)	(80)	(19.5)
Coconut & fruit trees	53	(12.9)	53	(12.9)	53	(12.9)
Pasture land	34	(8.3)	50	(12.2)	75	(18.2)
Forestry	58	(14.1)	71	(17.3)	120	(29.2)
Inland fishponds	2	(4.9)	18	(4.4)	19	(4.6)
Settlement	5	(1.3)	12	(2.9)	12	(2.9)
Openland	187	(41.0)	107	(26.0)	20	(4.9)
Total	411	(100.0)	411	(100.0)	411	(100.0)

Source: 1979 ..... See Table
1987, 2000 ..... Five-year Agricultural Development Plan (1983 - 87), Bohol. Provincial Development Staff.

The rice land is planned to expand to 49 thousand hectares in 1987 and 80 thousand hectares in 2,000 respectively. In order to enhance ecology, the ratio of 42:58 for the forest area inclusive of the permanent tree crops to the non-forest area was targeted in the proposed land use. The expansion of pasture land and fishpond area are also targeted in the Plan for the expected development of livestock and inland fisheries.

The Province of Bohol has been formally adopted by the National Counsil on Integrated Area Development as an area where the integrated development approach shall be utilized. The Project Support Staff for the Bohol Integrated Area Development (BIADP) was officially created in 1983. BIADP is envisioned to integrate the various components into a unified development framework and to coordinate the planning and implementation of such projects.

The Japanese Government has been extending assistance to BIADP. The Master Plan formulated in 1980 was prepared with the participation of JICA. Two of the high priority components recommended in the Master Plan are already on-going projects assisted by Japanese Government. The Bohol Agricultural Promotion Center (APC) whose function is to generate and diffuse agricultural technology appropriate to the condition of Bohol's a recipient of technical and grant-in-aid assistance from JICA. Another one is Phase I of the Bohol Irrigation Project, which was an extended

OECF loan to implement the project from 1985 to 1991.

b) Municipal Agricultural Development Plan

Resently Human Settlements Regulatory Commission (HSRC) has undertaken the formulation of the Comprehensive Development Plan in the project municipalities of San Miguel, Trinidad and Ubay in the corporation works between HSRC and the municipal development staff. By April 1984, the plan of Trinidad was approved to issue while the plan of San Miguel was under approval by the Mayor and the plan of Ubay is under preparation. The planning period in these plans is set to a ten-year period (1980 - 1990). The long term agricultural development is also included in the said plans: The long term agricultural development plan in Trinidad is formulated on the basis of the following proposed general land use;

Existing and Proposed General Land Use in Trinidad

(Rural Land Use Area)

(unit: '000 ha)

Land Use	1979	1990	1990/1979
Built-up area	84	122	1.45
Industrial	24	996	41.50
Cropland	5,184	11,785	2.27
Forests	1,888	-	-
Agro-forest/pastures	-	5,262	-
Pastures	3,500	-	-
Swamps and marshes	587	45	0.1
Fishponds	274	1,400	5.11
Idle lands	8,069	-	-
	19,610	19,610	

Source: HSRC and Trinidad, Comprehensive Development Plan, 1984

As shown in the above table, the cropland will be expanded by 2.27 times the existing area of cropland. In the cropland, an intensive crop cultivation to rice, corn, coconut, vegetables and root crops is recommended.

The proposed land use in the Plan for San Miguel placed an emphasis in the maximum utilization of the existing cropland

through implementation of Wahig-Pamacsalan Irrigation Project because the existing cropland is utilized very extensively with a large area coverage of fallow area.

TABLE G1-1 NUMBER, AREA AND AVERAGE SIZE OF FARMS

Area	Phisical Area (1,000 ha)	Number of Farm 1971 (1,000)	Number of Farm 1975 (1,000)	Number of Farm 1980 (1,000)	Area of Farm 1971 (1,000 ha)	Area of Farm 1975 (1,000 ha)	Area of Farm 1980 (1,000 ha)	Average Farm Size 1971 (ha)	Average Farm Size 1975 (ha)	Average Farm Size 1980 (ha)
Philippines	30,000	2,355	3,354	3,439	8,493	8,553	9,034	3.61	2.54	2.64
Central Visayas	1,495	221	323	342	479	554	530	2.16	1.72	1.55
Bohol	411	61	92	101	142	144	138	2.32	1.57	1.38

Source: 1981 Census of Agriculture

TABLE G1-2 CROP AREA HARVESTED BY KIND OF CROP
(PHILIPPINES)

(unit: 1000 ha)

Crop	1965	1970	1975	1980	1980/1965
Philippines (Total)	8,251.7	8,946.4	10,800.8	12,133.0	147.0
Food crops	5,995.2	6,406.3	7,670.1	8,222.1	137.1
Rice	3,199.7	3,113.4	3,632.5	3,636.8	113.7
Corn	1,922.8	2,419.6	3,009.9	3,201.1	166.5
Fruit & nuts except citrus	372.0	380.3	378.2	491.2	132.0
Citrus	28.6	21.3	20.1	24.9	87.1
Rootcrops	273.6	252.4	351.2	486.3	177.7
Vegetables except onions & potatoes	45.8	51.1	55.1	53.0	115.7
Onions	4.8	7.4	12.8	5.9	122.9
Ginger	-	1.3	4.2	5.8	-
Irish potatoes	2.5	3.0	3.3	4.1	164.0
Drybeans & peas	56.0	50.0	55.2	66.6	118.9
Coffee	44.3	54.0	65.4	101.8	230.0
Cacao	9.6	8.4	6.6	4.7	49.0
Peanuts	24.1	32.4	54.8	55.1	228.6
All other food crops	11.4	11.7	20.8	84.9	74.5
Commercial crops	2,256.5	2,540.1	3,130.7	3,910.9	173.3
Coconut	1,604.7	1,883.9	2,279.5	3,125.9	194.8
Sugarcane	350.5	366.1	536.0	424.6	121.1
Abaca	199.3	173.0	179.7	235.9	118.4
Tobacco: Native	47.3	54.0	48.7	24.4	51.6
Virginia	28.8	33.4	36.0	36.7	127.4
Ramie	3.1	2.4	1.4	0.3	9.6
Rubber	17.0	21.8	45.4	54.1	318.2
Maguey	2.7	2.8	2.5	3.3	122.2
Kapok	3.0	2.7	0.9	0.7	23.3
Cotton	0.1	-	0.3	4.2	420.0
Castorbean	-	-	0.3	0.8	-

Source: NCSO, Statistical Handbook of the Philippines, 1984

TABLE G1-3 SHARE OF HARVESTED AREA BY KIND OF CROP, 1980
(TOTAL AREA IN THE PHILIPPINES=100%)

Crop	Philippines Area	Philippines %	Central Visayas Area	Central Visayas %	Bohol Area	Bohol %
All crops	12,133.0	100.0	923.4	7.6	142.4	1.2
Food crops	8,222.1 (1,606.0)	100.0	719.0 (33.7)	8.7	137.8 (18.2)	1.7
Rice	3,636.8	100.0	144.8	3.2	90.0	2.8
Corn	3,201.1	100.0	485.7	15.2	26.0	1.4
Fruit & nuts except citrus	491.2	100.0	14.5	3.0	N.A.	N.A.
Citrus	24.9	100.0	9.3	37.3	0.1	0.3
Root crops	486.3	100.0	81.1	16.7	19.0	6.9
Vegetables except onion & potatoes	53.0	100.0	2.8	5.3	0.8	1.7
Onions	5.9	100.0	0.3	5.1	N.A.	N.A.
Ginger	5.8	100.0	0.2	3.4	N.A.	N.A.
Irish potatoes	4.1	100.0	0.1	2.4	N.A.	N.A.
Beans & peas	66.6	100.0	1.5	2.2	1.3	2.3
Coffee	101.8	100.0	1.0	1.0	N.A.	N.A.
Cacao	4.7	100.0	-	-	N.A.	N.A.
Peanuts	55.1	100.0	4.0	7.3	0.6	2.5
All other food crops	84.9	100.0	3.7	4.4	N.A.	N.A.
Commercial crops	3,910.9	100.0	204.4	5.2	4.6	N.A.
Coconut	3,125.9	100.0	161.5	5.2	4.3	0.3
Sugarcane	424.6	100.0	38.8	9.1	0.1	N.A.
Abaca	235.9	100.0	0.4	0.1	0.1	N.A.
Tobacco: Native Virginia	24.4 36.7	100.0	2.6	4.3	0.1	0.2
Ramie	0.3	100.0	-	N.A.	N.A.	N.A.
Rubber	54.1	100.0	-	N.A.	N.A.	N.A.
Maguey	3.3	100.0	1.0	N.A.	N.A.	N.A.
Kapok	0.7	100.0	0.1	N.A.	N.A.	N.A.
Cotton	4.2	100.0	-	N.A.	N.A.	N.A.
Castorbean	0.8	100.0	-	-	N.A.	N.A.

Note: The figures in the parenthesis show the irrigated area under rice.

Source: BAEcon

TABLE G 1-4 CROP PRODUCTION, PALAY

Year	Philippines			All Visayas			Central Visayas			Bohol		
	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)
1. 1974	3,436,800	1.63	5,594,134	661,210	1.49	985,763	79,620	1.50	119,280	63,270	1.59	100,515
2. 1975	3,558,840	1.60	5,660,046	705,770	1.45	1,021,865	84,820	1.35	114,140	67,760	0.86	58,520
3. 1976	3,579,320	1.72	6,159,472	719,530	1.56	1,123,742	89,600	1.43	128,256	70,910	1.35	95,605
4. 1977	3,547,500	1.82	6,456,075	742,700	1.70	1,260,530	88,000	1.51	132,430	68,160	1.41	95,835
5. 1978	3,601,700	2.00	7,198,775	718,550	1.72	1,238,860	81,350	1.67	135,710	60,330	1.56	93,920
6. 1979	3,560,700	2.11	7,514,785	732,630	1.38	1,016,835	75,900	1.73	131,195	54,870	1.68	92,320
7. 1980	3,636,810	2.15	7,835,795	841,910	1.94	1,630,085	114,810	1.50	171,855	84,930	1.57	133,160
8. 1981	3,459,130	2.23	7,722,750	870,530	2.05	1,781,905	157,630	1.52	239,820	98,519	1.15	113,401
9. 1982	3,459,130	2.36	8,121,725	809,140	2.03	1,640,865	130,630	1.28	167,585	90,120	1.16	104,455
10. 1983	3,239,630	2.39	7,730,525	738,810	1.84	1,358,315	85,720	1.42	121,555	42,962	1.00	42,042
11. 1984	3,140,670	2.50	7,840,935	741,410	2.34	1,738,550	105,270	1.59	167,715	60,392	1.43	99,482
Mean	3,472,818	2.04	7,075,818	724,733	1.81	1,345,364	99,395	1.49	148,140	70,111	1.33	93,569

Source: BAEcon, Quezon City

TABLE G 1-5 RICE PRODUCTION IN THE PROJECT MUNICIPALITIES

Municipality	Year	Total				January to June				July to December			
		Planted Area (ha)	Harvested Area (ha)	Yield (kg/ha)	Prduction (ton)	Planted Area (ha)	Harvested Area (ha)	Yield (kg/ha)	Production (ton)	Planted Area (ha)	Harvested Area (ha)	Yield (kg/ha)	Production (ton)
San Migul	1982		Not Available				Not Available			1,347	1,300	1.93	2,515
	1983	1,560	1,242	1.99	2,471	48	48	0.69	33	1,512	1,194	2.04	2,438
	1984	3,445	2,560	1.00	2,526	1,232	1,114	1.68	1,877	2,213	1,412	0.46	649
	Mean	2,330	1,883	1.50	2,822	640	581	1.64	955	1,690	1,302	1.43	1,867
Trinidad	1982		Not Available				Not Available			3,504	2,215	0.95	2,124
	1983	2,773	2,379	1.71	4,064	663	288	0.72	210	2,110	2,091	1.93	4,043
	1984	3,583	3,167	0.82	2,599	1,515	1,499	0.95	1,422	2,068	1,668	0.70	1,177
	Mean	3,178	2,885	1.10	3,170	1,089	894	0.91	816	2,561	1,991	1.23	2,448
Ubay	1982		Not Available				Not Available			3,361	3,300	1.18	3,895
	1983	3,367	2,872	1.18	3,394	908	626	0.63	397	2,459	2,246	1.33	2,997
	1984	5,956	5,566	0.59	3,302	2,329	2,329	0.75	1,743	3,627	3,237	0.48	1,559
	Mean	4,662	8,438	0.79	6,696	1,619	1,478	0.72	1,070	3,149	2,928	0.96	2,817
Total	1982		Not Available				Not Available			8,212	6,815	1.25	8,534
	1983	7,700	6,493	1.56	10,118	1,619	962	0.67	640	6,081	5,531	1.71	9,478
	1984	12,984	8,834	0.76	6,684	5,076	2,613	1.26	3,299	7,908	6,221	0.54	3,385
	Mean	10,748	7,977	1.14	9,102	3,348	1,788	1.10	1,970	7,400	6,189	1.15	7,132

Source: BAEcon, Tagbilaran City

TABLE G 1-6 CROP PRODUCTION, MUNGBEAN

Year	Philippines			All Visayas			Central Visayas			Bohol		
	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)
1. 1974	37,500	0.40	16,100	Not Available			750	0.51	381	Not Available		
2. 1975	39,300	0.60	21,700	"			940	0.51	484	"		
3. 1976	43,300	0.60	24,400	"			970	0.50	482	"		
4. 1977	43,800	0.60	25,300	"			970	0.46	448	"		
5. 1978	45,100	0.58	26,177	18,500	0.34	6,350	1,090	0.42	456	"		
6. 1979	47,870	0.61	29,011	18,710	0.35	6,558	1,100	0.47	520	"		
7. 1980	50,350	0.65	32,791	19,490	0.38	7,146	1,060	0.50	520	"		
8. 1981	51,840	0.65	33,534	20,510	0.37	7,499	1,060	0.49	515	903	0.44	406
9. 1982	52,190	0.66	34,264	18,740	0.36	6,846	1,100	0.46	495	Not Available		
10. 1983	32,820	0.77	25,165	6,890	0.44	3,017	1,160	0.40	464	"		
Mean	44,407	0.60	26,844	17,140	0.36	6,236	1,020	0.47	476			

Source: BAEcon, Quezon City

TABLE G 1-7

CROP PRODUCTION, PEANUT

Year	Philippines			All Visayas			Central Visayas			Bohol		
	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)
1. 1974	35,700	0.61	21,583	7,170	0.52	3,764	3,180	0.46	1,453	Not Available		
2. 1975	54,790	0.66	36,181	6,910	0.51	3,489	3,280	0.50	1,648	"		
3. 1976	60,620	0.67	40,842	7,760	0.48	3,703	4,190	0.48	1,994	"		
4. 1977	42,720	1.08	46,181	7,500	0.52	3,903	3,830	0.54	2,072	"		
5. 1978	47,900	0.79	37,756	6,430	0.77	4,925	3,870	0.56	2,116	"		
6. 1979	53,830	0.92	49,246	6,400	0.75	4,789	3,780	0.43	1,625	"		
7. 1980	55,140	0.91	49,841	9,880	0.53	5,329	4,050	0.43	1,822	570	0.34	193
8. 1981	38,700	0.76	29,597	9,990	0.52	5,199	4,270	0.45	1,870			
9. 1982	56,500	0.86	48,590	9,819	0.48	4,713	4,140	0.41	1,703	Not Available		
10. 1983	48,540	0.74	35,818	7,070	0.47	3,249	2,920	0.40	1,080	"		
Mean	49,444	0.80	39,564	7,893	0.55	4,306	3,751	0.46	1,738			

Source: BAEcon, Quezon City (the data source for 1980 Bohol province is 1981 Census of Agriculture.)

TABLE G 1-8 CROP PRODUCTION, CORN (SHELLED)

Year	Philippines			All Visayas			Central Visayas			Bohol		
	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)
1. 1974	2,763,000	0.83	2,288,700	Not Available			415,560	0.53	219,706	Not Available		
2. 1975	3,062,400	0.84	2,568,400	"			447,630	0.50	223,380	20,690	0.89	18,385
3. 1976	3,579,320	0.77	2,766,805	832,750	0.58	478,710	475,730	0.51	244,050	21,230	0.95	20,095
4. 1977	3,320,600	0.85	2,843,420	867,030	0.59	511,820	484,560	0.50	241,435	19,500	0.99	19,215
5. 1978	3,158,070	0.89	2,796,085	862,120	0.60	425,095	504,030	0.50	252,605	18,830	0.98	18,415
6. 1979	3,252,430	0.95	3,090,255	718,780	0.60	432,620	499,130	0.50	248,925	19,150	1.01	19,405
7. 1980	3,318,670	0.96	3,176,165	884,840	0.64	567,700	485,730	0.59	241,135	26,027	0.71	18,436
8. 1981	3,238,690	0.96	3,109,685	732,320	0.62	452,920	470,970	0.48	223,795	20,080	1.03	20,605
9. 1982	3,360,700	0.98	3,290,175	765,780	0.66	507,165	487,860	0.49	241,045	24,590	1.10	26,970
10. 1983	3,157,480	1.00	3,125,885	723,570	0.66	475,611	463,100	0.53	245,395	29,044	0.49	14,244
11. 1984	Not Available			Not Available			430,390	0.50	216,497	23,247	0.42	9,716
Mean	2,888,673	0.81	2,346,105	798,399	0.60	481,455	431,627	0.55	236,179	22,239	0.83	18,549

Source: BAEcon, Quezon City

TABLE G 1-9 CROP PRODUCTION, CASSAVA (TUBER)

Year	Philippines			All Visayas			Central Visayas			Bohol		
	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)
1. 1974	Not Available			Not Available			25,730	2.10	53,965	Not Available		
2. 1975	"			"			25,870	3.29	85,224	"		
3. 1976	"			"			23,920	3.63	86,929	"		
4. 1977	"			"			28,570	3.25	92,758	"		
5. 1978	181,770	9.80	1,781,961	63,140	3.80	239,820	28,570	3.32	94,811	"		
6. 1979	192,360	11.72	2,253,824	66,240	4.18	277,059	29,630	3.93	116,472	"		
7. 1980	204,190	11.14	2,275,645	70,570	3.93	277,157	30,730	2.91	89,482	"		
8. 1981	211,370	10.67	2,265,115	77,430	3.53	273,053	38,030	2.00	75,273	7,991	6.00	47,946
9. 1982	224,350	8.86	1,987,457	81,240	3.40	276,097	39,150	2.00	78,209	Not Available		
10. 1983	207,710	8.00	1,661,767	75,310	2.83	213,034	34,920	1.75	61,243	"		
Mean	203,625	9.99	2,035,961	72,321	3.59	259,370	30,512	2.73	83,437			

Source: BAEcon, Quezon City

TABLE G 1-10 CROP PRODUCTION, SWEET POTATO

Year	Philippines			All Visayas			Central Visayas			ohol		
	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)
1. 1974	Not Available			Not Available			33,260	1.65	54,981	Not Available		
2. 1975	"			"			33,320	2.44	81,300	"		
3. 1976	"			"			27,850	1.89	52,712	"		
4. 1977	"			"			34,270	2.04	70,047	"		
5. 1978	227,590	4.56	1,036,976	95,450	3.42	326,684	34,010	2.04	69,386	"		
6. 1979	237,980	4.72	1,122,879	106,610	3.53	376,371	34,490	2.30	79,222	"		
7. 1980	235,880	4.44	1,048,231	105,650	3.36	355,421	34,360	1.75	60,019	"		
8. 1981	220,880	4.51	1,010,298	92,800	2.86	265,401	28,080	2.68	75,273	6,363	5.00	30,542
9. 1982	209,330	4.96	1,037,527	84,670	3.59	304,145	28,090	1.79	50,374	Not Available		
10. 1983	182,790	4.73	864,410	73,320	2.93	214,781	22,490	1.54	34,729	"		
Mean	219,075	4.66	1,020,056	93,083	3.30	307,134	31,022	2.02	62,805			

Source: BAEcon, Quezon City

TABLE G 1-11 CROP PRODUCTION, COCONUT (COPRA)

Year	Philippines			All Visayas			Central Visayas			Bohol		
	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)	Harvested Area (ha)	Yield (t/ha)	Production(ton)
1. 1974	2,993,000	0.57	1,702,700	Not Available			157,140	0.87	136,263	Not Available		
2. 1975	3,130,400	0.55	1,718,500	"			147,230	0.94	137,698	"		
3. 1976	2,521,190	1.41	3,557,049	625,780	1.58	985,762	129,230	1.87	241,655	"		
4. 1977	2,713,960	1.42	3,844,948	582,160	1.35	784,282	141,230	1.05	388,331	"		
5. 1978	2,956,900	1.56	5,187,629	589,040	1.59	477,809	140,220	0.97	140,285	"		
6. 1979	3,063,560	0.95	2,882,285	631,940	0.78	494,045	156,300	0.82	128,575	"		
7. 1980	3,125,920	1.46	4,569,987	624,540	0.95	590,680	161,540	0.81	130,640	29,043	5.11	148,425
8. 1981	3,105,320	1.04	3,231,338	586,480	0.81	471,950	158,220	0.86	135,826	Not Available		
9. 1982	3,162,290	0.87	2,738,494	621,950	0.75	466,961	158,220	0.86	135,400	"		
10. 1983	3,209,440	1.09	3,493,983	632,010	1.14	719,343	157,770	1.79	280,668	"		
Mean	2,998,100	1.10	3,292,691	611,736	1.02	623,854	136,510	1.36	185,534			

Source: BAEcon, Quezon City

TABLE G 1-12 SUPPLY, DEMAND AND BALANCE, PALAY

(Unit: '000 ton)

Year	Philippines			All Visayas			Central Visayas			Bohol		
	Supply	Demand	Balance	Supply	Demand	Balance	Supply	Demand	Balance	Supply	Demand	Balance
1. 1974	5,594	7,106	-1,512	986	1,425	-439	119	237	-118	100	118	-18
2. 1975	5,660	7,304	-1,644	1,022	1,458	-436	114	243	-129	59	120	-61
3. 1976	6,159	7,497	-1,338	1,123	1,488	-365	128	248	-120	96	122	-26
4. 1977	6,456	7,696	-1,240	1,260	1,518	-258	132	254	-122	96	123	-27
5. 1978	7,199	7,902	-703	1,239	1,545	-306	136	259	-123	94	124	-30
6. 1979	7,515	8,109	-594	1,017	1,576	-559	131	265	-134	92	125	-33
7. 1980	7,836	8,329	-493	1,630	1,612	18	172	272	-100	133	128	+5
8. 1981	7,723	8,496	-773	1,782	1,641	141	240	281	-41	113	130	-17
9. 1982	8,122	8,672	-550	1,641	1,665	-24	168	285	-117	104	132	-28
10. 1983	7,731	9,014	-1,283	1,358	1,693	-335	121	289	-168	42	132	-89
11. 1984	7,841	9,198	-1,357	1,738	1,705	33	168	294	-126	100	133	-33
Mean	7,076	8,120	-1,044	1,311	1,575	-230	148	266	-118	94	126	-32
(P) 1987		9,805			1,795			305			136	
(P) 2000		11,329			2,012			317			143	

Note: (1) P: Projected
(2) Rice eating population: Philippines 77%, Visayas 64%, Central Visayas 32%, Bohol 70%
(3) Demand: Per capita consumption 200kg/year for rice eating people.
Includes wastage (6% of total consumption), seed (50kg/ha) & other usage (4%)
Source: Supply...Computed form BAEcon production data, Demand...Computed from NCSO population data

TABLE G 1-13 SUPPLY, DEMAND AND BALANCE, CORN (CORN GRITS)

(Unit: '000 ton)

Year	Philippines			All Visayas			Central Visayas			Bohol		
	Supply	Demand	Balance	Supply	Demand	Balance	Supply	Demand	Balance	Supply	Demand	Balance
1. 1974	2,288	1,637	651	Not Available			219	387	-168	Not Available		
2. 1975	2,568	1,690	878	"			223	396	-173	18	39	-21
3. 1976	2,766	1,739	1,027	478	641	-163	244	405	-161	20	39	-19
4. 1977	2,843	1,781	1,062	511	654	-143	241	414	-173	19	40	-21
5. 1978	2,796	1,825	971	425	667	-242	252	425	-173	18	40	-22
6. 1979	3,090	1,875	1,215	432	678	-246	248	433	-185	19	40	-21
7. 1980	3,176	1,926	1,250	567	693	-126	241	443	-202	18	41	-23
8. 1981	3,109	1,965	1,144	452	703	-251	223	453	-230	20	41	-21
9. 1982	3,290	2,007	1,283	507	716	-209	241	462	-221	26	42	-16
10. 1983	3,125	2,085	1,040	475	728	-253	245	471	-226	14	43	-29
Mean	2,905	1,853	1,052	481	685	-204	238	429	-191	19	41	-22
(P) 1987		2,225			780			495			45	
(P) 2000		2,622			874			567			47	

Note: (1) P: Projected
(2) Corn eating population: Phippines 23%, Visayas 36%, Central Visayas 68%, Bohol 30%
(3) Demand: Per capita consumption: 130kg/year for corn eating people.
Includes wastage (3% of total consumption), seed (15kg/ha) & other usage (27%)
Source: Supply...Computed from BAEcon production data, Demand...Computed from NCSO population data

TABLE G 1-14 SUPPLY-DEMAND BALANCE OF MUNGBEAN, PEANUT AND VEGETABLES IN 1980

Crop	Bohol			Region VII		
	Supply	Demand	Balance	Supply	Demand	Balance
1. Mungbean						
	Area=903ha	Population=806,000		Area=1,020ha	Population=3,787,000	
	Yield=0.44ton/ha	Consumption=1.6kg/year		Yeild=0.47ton/ha	Consumption= 1.6kg/year	
	Production=406ton	Demand=1,290ton	-884ton	Production=476ton	Demand=6,059ton	-5,583ton
2. Peanut						
	Area=570ha	Population=806,000		Area=3,751ha	Population=3,787,000	
	Yield=0.34ton/ha	Consumption=0.7kg/year		Yield=0.46ton/ha	Consumption=0.7kg/ year	
	Production=193ton	Demand=564ton	-371ton	Production=1,738ton	Demand=2,651ton	-913
3. Vegetables						
	Area=757ha	Population=806,000		Area=2,830ha	Population=3,787,000	
	Yield=7ton	Consumption=34.5kg/year		Yield=2.58	Consumption=34.5kg/year	
	Production=5,299ton	Demand=28,087ton	-22,508ton	Production=7,290ton	Demand=130,651	-123,311ton

Note: 1/ Leafyand yellow vegetables and fruity vegetables only

Source: Supply...BAEcon (1980), 1980 Agricultural Census
Demand...MOA Regional Consumption Patterns for Major Food, 1974-76

TABLE G1-15 REGIONAL TARGET OF CROP PRODUCTION (1987)

Crop		Unit	Actual (1978-1982)		Target (1987)	Increase Rate (Actual to Target)
1. Rice	Area	1,000 ha.	112.9		147.8	5.5%/year
	Production	1,000 ton	166.4		277.5	10.8%/year
2. Corn	Area	1,000 ha.	481.4	1/	348.3	
	Production	1,000 ton	240.0	2/	368.4	
3. Cassava	Area	1,000 ha.	33.2	3/	21.1	
	Production	1,000 ton	90.8	3/	217.2	
4. Sweet potatoes	Area	1,000 ha.	31.8		35.6	1.6%/year
	Production	1,000 ton	66.9		218.4	26.7%/year
5. Mungbean	Area	1,000 ha.	1.1	3/	3.6	26.8%/year
	Production	1,000 ton	0.5	3/	3.8	50.0%/year
6. Peanut	Area	1,000 ha.	3.8	3/	3.7	
	Production	1,000 ton	1.6	3/	4.9	
7. Mango	Area	1,000 ha.	N.A.		2.7	
	Production	1,000 ton	N.A.		42.3	
8. Cacao	Area	1,000 ha.	N.A.		0.7	
	Production	1,000 ton	N.A.		3.1	
9. Coffee	Area	1,000 ha.	1.1		2.2	
	Production	1,000 ton	2.1		0.4	
10. Coconut	Area	1,000 ha.	158.4		181.9	2.8%/year
	Production	1,000 ton	162.2		N.A.	
11. Vegetables	Area	1,000 ha.	2.8		8.7	25.5%/year
	Production	1,000 ton	7.6		51.3	46.5%/year

Note: 1/ Programmed area only, including yellow corn of 21.1 thousand hectares.

2/ Programmed area only, including yellow corn of 12.4 thousand tons.

3/ Targets in the programmed area only.

Source: MAF Region 7 Five-year Agricultural Indicative Plan

TABLE G1-16 REGIONAL TARGET OF LIVESTOCK PRODUCTION (1987)

Animal	Unit	Actual (1978-1982)	Target 1983	Target 1987
1. Carabao	1000 head	178.0	184.7	196.4
2. Cattle	"	242.1	253.9	285.5
3. Swine	"	720.3	727.5	777.9
4. Chicken	"	5,165.7	5,841.7	7,303.0
5. Goat	"	270.3	N.A.	N.A.
6. Ducks	"	62.9	N.A.	N.A.

Source: MAF Region VII

TABLE G1-17 PROVINCIAL TARGET OF CROP PRODUCTION (1987)

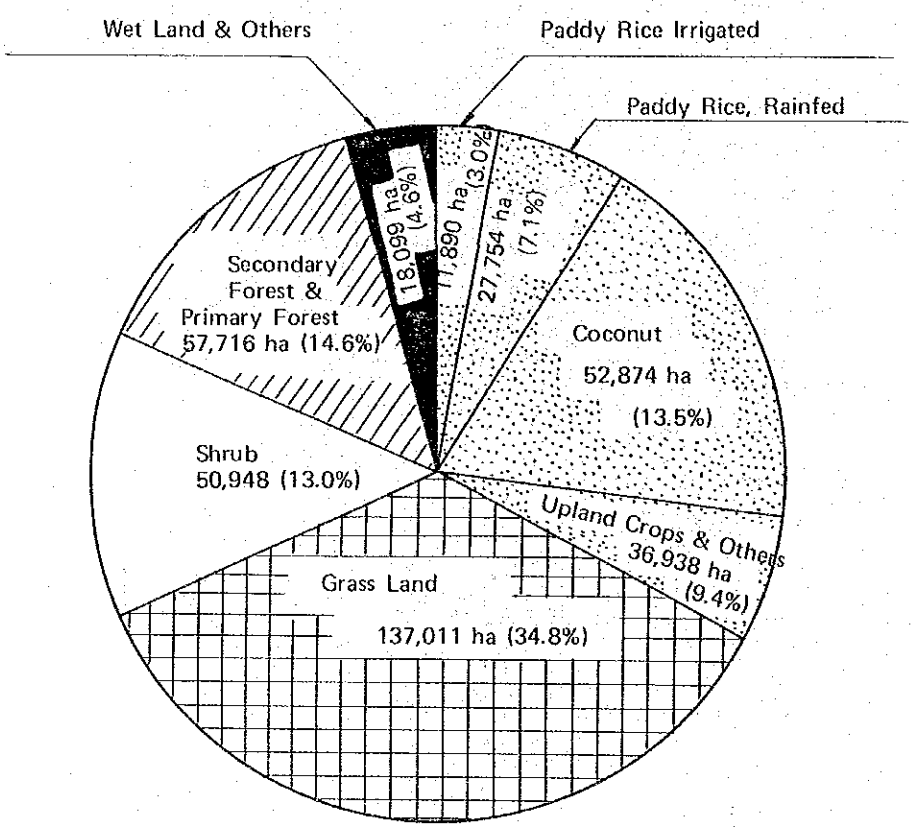
Crop		Unit	Actual (1978-1982)	Target (1987)	Remarks
1. Rice	Area	1,000 ha.	74.3	48.7	80,000 ha. in 2,000
	Production	1,000 ton	97.1	219.2	360,000 ton in 2,000
2. Corn	Area	1,000 ha.	23.9	* 7.8	14,600 ha. in 2,000
	Production	1,000 ton	19.9	* 19.5	36,500 ton in 2,000
3. Cassava	Area	1,000 ha.	8.0	16.0	20,000 ha. in 2,000
	Production	1,000 ton	48.0	320.0	400,000 ton in 2,000
4. Sweet potato	Area	1,000 ha.	6.4	* 4.6	
	Production	1,000 ton	32.0	* 29.2	
5. Ubi	Area	1,000 ha.	N.A.	1.6	
	Production	1,000 ton	N.A.	8.3	
6. Mungbean	Area	1,000 ha.	0.9	1.0	
	Production	1,000 ton	0.4	2.2	
7. Peanut	Area	1,000 ha.	0.6	1.0	
	Production	1,000 ton	1.1	1.5	
8. Mango	Area	1,000 ha.	** 0.6	0.9	
	Production	1,000 ton	** 4.5	32.7	
9. Cacao	Area	1,000 ha.	** 0.5	0.6	
	Production	1,000 ton	** 0.4	0.6	
10. Coffee	Area	1,000 ha.	** 0.4	0.6	
	Production	1,000 ha.	** 0.4	19.6	
11. Vegetables	Area	1,000 ha.	** 1.3	2.0	
	Production	1,000 ton	** 20.1	28.2	
12. Sugarcane	Area	1,000 ha.	** 0.5	0.8	
	Production	1,000 ton	N.A.	3.3	
13. Coconut	Area	1,000 ha.	29.0	N.A.	
	Production	1,000 ton	N.A.	N.A.	

Note: * Targets in the programmed of production area only

** Production data in 1984

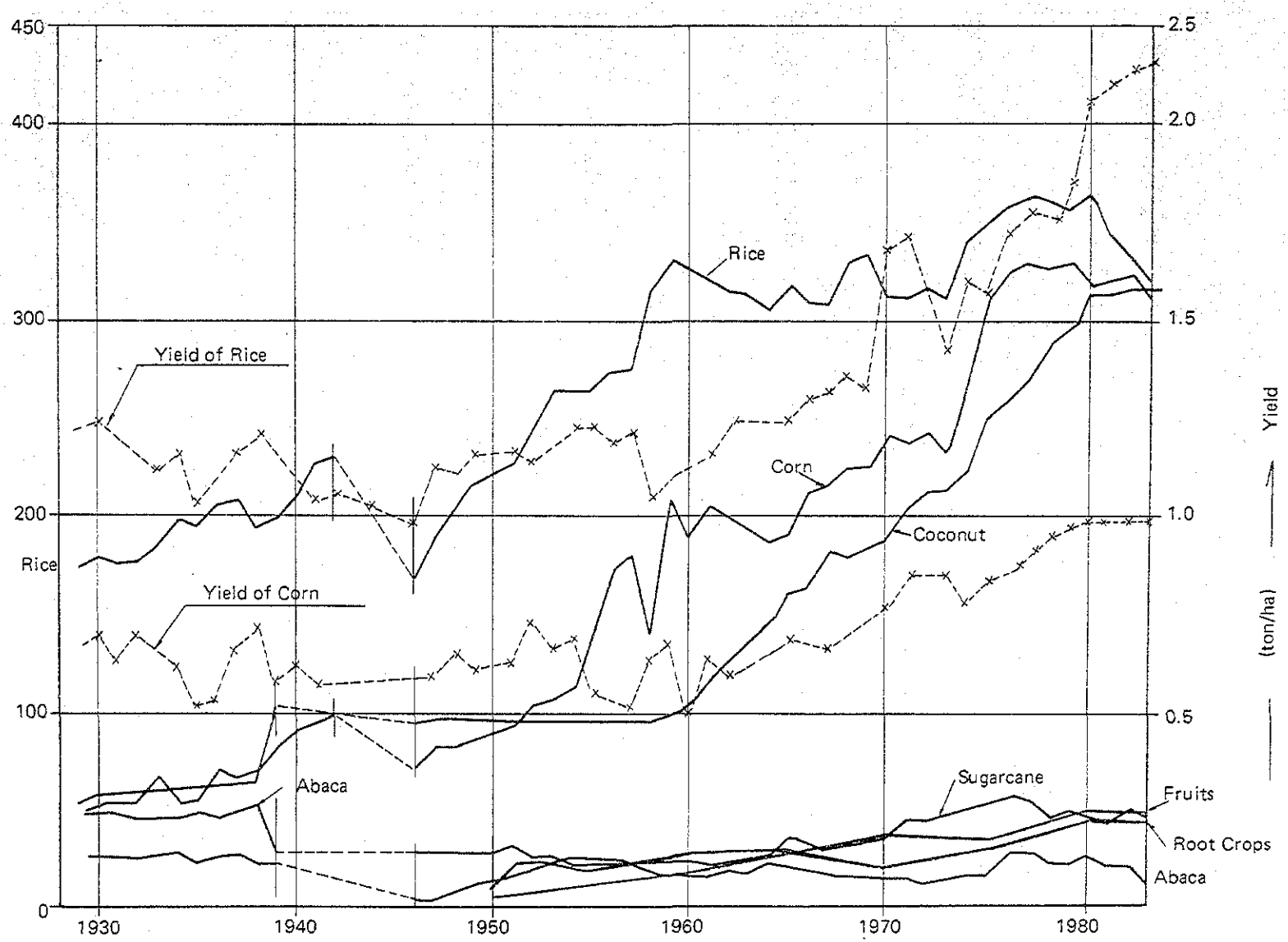
Source: Bohol province Agricultural Five-year Development Plan (1983-87)

FIGURE G1-1 LAND USE IN BOHOL PROVICE (1979)



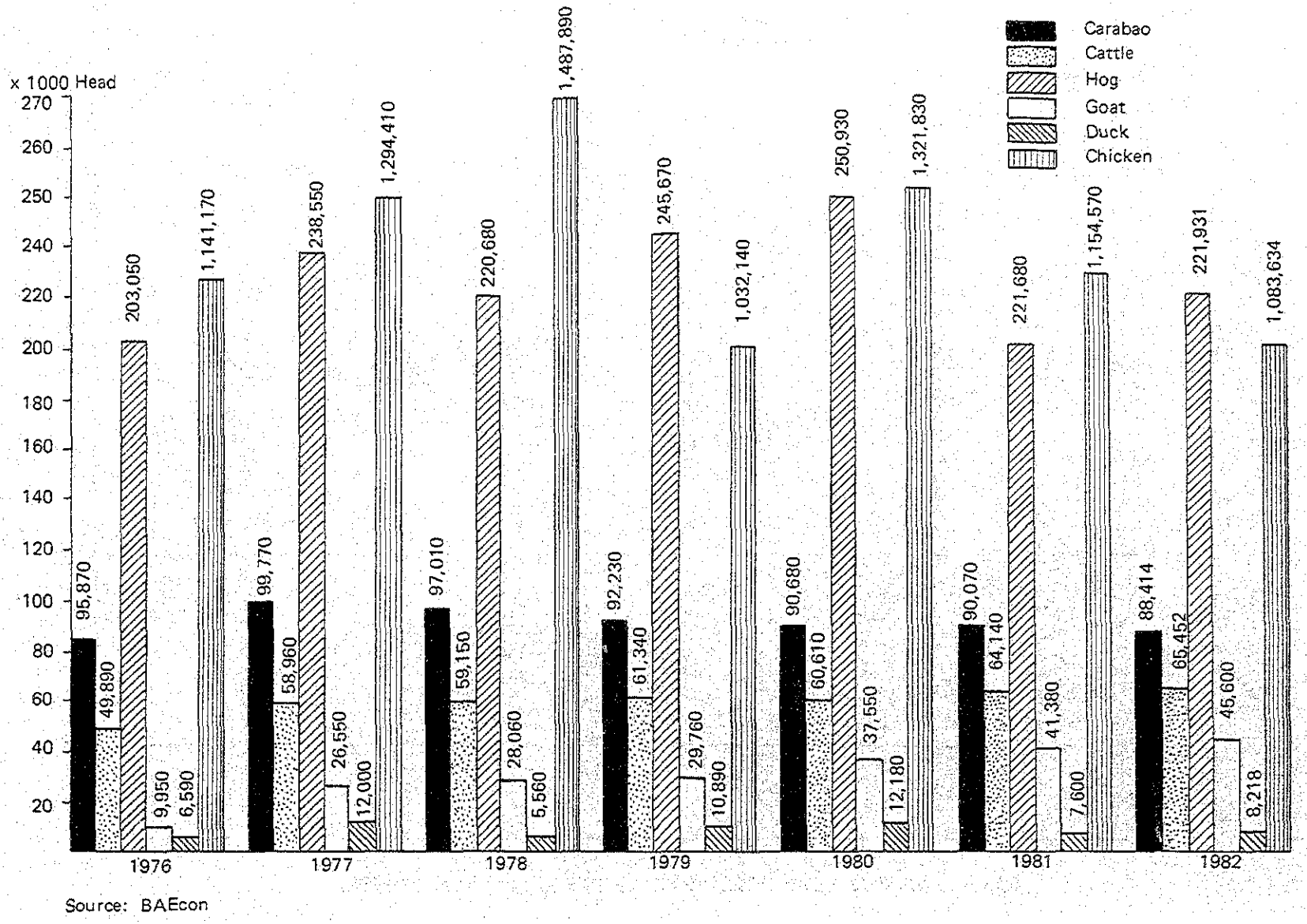
Source: B.S/FAO Soil and Land Resources Appraisal and Training Project, Technical Report No. 4 (1980)

FIGURE G1–2 TREND OF HARVESTED AREA AND UNIT YIELD



Source: NEDA, Statistical Year Book

FIGURE G1–3 LIVESTOCK AND POULTRY POPULATION IN BOHOL PROVINCE



Source: BAEcon

CHAPTER II PRESENT AGRICULTURE

2.1 Agricultural Conditions

2.1.1 Location

The project area is located in the north eastern part of Bohol island and about 100 km far from Tagbilaran. Administratively, the project area belongs to three municipalities of San Miguel, Trinidad and Ubay. The latter two municipalities are faced on sea. The project area consists of 82 Barangays in three municipalities, of which 22 Barangays are located in the proposed irrigation service area. (See TABLE G2-1)

In order to execute the Bohol Integrated Agricultural Development Plan and Program prepared by the Ministry of Agriculture and Foods (MAF), Bohol province is devided into five districts. All of the project municipalities belong to district III.

2.1.2 Human Resources

The population in the project municipalities increased at a relatively high rate of about two percent per year on the average from 1970 to 1980. On the other hand, the population of 15 years old and above increased only at a rate of 0.7 percent annually during the same period. This is quite less than that for Bohol province of 2.4 percent. This may explain that a large number of workable population, especially new graduates of schools, have migrated out. The literacy rate in the project municipalities is 75.9, which is comparatively lower than the national (Philippines) rate of 82.7. (See TABLE G2-1, 2)

According to 1980 Census of Population, about 81 percent of male population (15 years old and above) and 22 percent of the female population had gainful occupations in the project municipalities. About 53 percent of the gainful workers of both sexes are engaged in the crop production. (See TABLE G2-3)

2.1.3 Land Resources

The project municipalities occupy about ten percent of the total area in Bohol province whereas the area of the arable land in the project municipalities occupies about 16 percent of the total arable area in Bohol province. There is about 3,200 hectares of idle land or un-used land in the project municipalities, or about eight percent of the total area according to the 1981 Census of Agriculture (See TABLE G2-3). The main reason for such vast lands being idle or un-used may be, (i) lack of moisture, (ii) unfavorable soil conditions like high acidity, shallow depth of top soils and relatively low content of phosphorous and cation bases.

The growing population needs to acquire farm land. There are so many settlers with limited means of livelihood who have to find new farm land. However, there is limited area except for the said idle lands which may not be suitable lands for traditional agricultural practices, if the new agricultural production technology under an irrigation system is not introduced. Therefore, the agricultural development by means of irrigation accompanied by soil revitalization is a pressing need in the project area.

2.1.4 Climate

Rainfall is more or less evenly distributed throughout the year except for two dry months of March and February, which is characteristic of the climate Type IV. However, heavier rainfall is usually expected from August to January. When the monthly rainfall amounts are taken in the specific years, they vary year by year. During the past 12 years, the most severe drought year happened in 1982/1983 and another drought year is recorded in 1977/1978. Moreover, there are dry spells frequently, for example, in 1976, and 1974. The erratic rainfall pattern combining with the prevailing shallow top soils brings severe drought damages.

2.2 Land Use

The rice land lies generally on the hilly foot area with a slender shape along streams and rivers. Farmers have cultivated

the rice field, leveling a land on hilly foot with some slopes and providing high dikes to keep rain water under rainfed condition.

The present cultivation lands in the project service area of 7,100 ha are estimated as follows in accordance with the land use survey.

Rice Field	1,780 ha	(25.1%)
Upland Field	1,900 ha	(26.8%)
Grass Lands	3,420 ha	(48.1%)
Total	7,100 ha	(100%)

In the land classification surveyed by the Study Team, the whole rice fields are classified into 2R land (second class land for rice cultivation). The upland fields and the grass land are classified as follows;

Land class	Upland field	Grass land
Class I	1,600 ha	2,420 ha
II	300 ha	1,000 ha
III	-	-
IV	-	-
Total	1,900 ha	3,420 ha

2.3 Household and Population

Total population of the 22 barangays in the project area is 10,870 or 16.7 percent of that of the three municipalities with 2,117 households, which is estimated on the basis of area coverage in the project area for the partially involved barangays (See TABLE 2-5). Out of 2,117 households, the farm households are 1,826, corresponding to 86.3 percent of total households. The difference between the former and the latter figures, 291 households or 13.7 percent of the total households may mean the combined number of non-farm households and land-less farm laborer households according to information collected in the project barangays (See TABLE G2-6). The number of non-farm households is estimated at five percent of total households. Thus the combined number of the farm households and the farm laborer households is estimated at 95 percent of the total households or 2,011 households. The population of the 2,011 households is also estimated at 95 percent of total population or 10,320 persons.

2.4 Farm Size and Land Tenure

2.4.1 Farm Size

According to 1981 Census of Agriculture, the average farm size in the three municipalities is 2.6 hectares, which is comprised of 1.2 hectares planted to temporary crops, 0.4 hectares of fallow land, 0.8 hectares planted to permanent crops and 0.2 hectares of pasture land. The area of lowland rice field is a part of the area planted to temporary crops. (See TABLE G2-7)

In the proposed service area, the average farm size in 1984 is estimated as follows;

- Rice field	0.9 ha
- Upland field	1.0 ha
- Coconut	0.6 ha
Total	2.5 ha

Note: Above figures are estimated from the total number of farm exclusive of landless farm laborer households in 1984, that is, 1972 farms (1,826 farms x 1.08).

2.4.2 Land Tenure

The number of full-owners occupies comparatively larger portion of total farmers in three municipalities concerned with the project.

NIA made sampling survey on the land ownership in 4,275 ha managed by 1,613 farmers living in three municipalities. Average size is estimated at 2.65 ha per farm household.

The composition by type of land ownership is classified as follows;

- Full-Owner	68.9%
- Share Tenant	16.4
- Lease Holder	3.4
- Part-Owner-Share Tenant	6.5
- Lease Holder-Part Owner-Shared Tenant	1.1
- Part Owner-Lease Holder	3.7

The information on the land tenure in the three municipalities is similar to the above figures according to 1981 Census of Agriculture (See TABLE G2-8).

2.5 Agricultural Production

2.5.1 Crops and Cropping Pattern

The major crops planted in the project area are rice, cassava and sweet potato, according to the NIA agro-economic survey, conducted in 1985.

The rice cultivation is prevailing in the wet season and also in the dry season under the rainfed condition, expecting residual soil moisture and uncertain rainfall. The rice harvesting areas have been changed considerably year by year in accordance with the rainfall condition of the year. However, based on the rice production data for past 11 years in Bohol province, the average planted and harvested ratio to the total of physical rice field is as follows;

Average Area of Rice Planted and Harvested by Season

(Unit: %)

Season	Physical Rice Field	Planted Area	Harvested Area
Wet	100	90	76
Dry	100	75	64
Total	200	165	140

Source: Rice production data for past 11 years prepared by BAEcon, Bohol

The above figures present that the farmers are not able to cultivate fully their land due to a shortage of irrigation water.

Naturally, the rice cropping calendar varies in the range of two to three months according to the rainfall patterns, while land preparation followed by transplanting of wet season rice starts at the onset of rainy season, usually in May to June, and the rice is harvested about three months after transplanting. The dry season rice is transplanted immediately after harvesting of the wet season rice so far as enough water is available.

The sweet potato and cassava can be planted at any time, but the prevailing cropping season of sweet potato is from late rainy season to March or April, and the cassava is planted mainly in May and June in parallel with the harvesting of rice in the late dry season. The present cropping pattern is shown in FIGURE G2-1. The cropping intensity of paddy field is estimated at 165 percent. And also it is estimated that 430 ha (23.0 percent of the total upland field) is cultivated with sweet potato, and 570 ha (30.0 percent) with cassava. The remaining 900 ha is left temporarily as fallow land (See TABLE G2-9).

The farmers in the project service area prefer to plant rice so far as the lands are topographically suitable for rice growing, because rice is a suitable crop for marketing and is easily grown than upland crop due to prevalent poor soil conditions like acidic soils, low content of available nutrients, thin top soils, etc.

2.5.2 Cultivation Method

The paddy fields have to be prepared within a short period, about one to three days after rainfall simultaneously among the farmers, because rainfall is unpredictable and often insufficient to saturate the fields during land preparation, requiring more labor and animal power intensity to have all fields prepared. Almost of all the fields are plowed one to two times using carabaos, followed by two to three times of puddling. The nursery of flat wetbed is applied to raise seedlings. With unpredictable rainfall, the seedlings are raised extensively with low quality seeds, usually for a long time more than 25 days, resulting from the poor tilling capability of the seedlings. These aged seedlings are not transplanted cross-wise and such cares of daily water management in the fields and weeding are not taken by the most of farmers in the project service area.

Hill planting with negligible amount of fertilizers is generally applied to grow sweet potato. The weeding operation is very extensively applied. Cassava is planted with the furrows providing the distance of about 75 to 100 cm in hill areas without applying enough amount of fertilizers.

Few farm machines are introduced in the project municipalities. So farm operation is mostly dependent upon animal power and man power. (See TABLE G2-11 to 12)

2.5.3 Crop Production

The crop production in the project area is estimated as shown in TABLE G2-9. The average yield of wet season rice on the basis of harvested area is estimated at 1.33 ton/ha and 1.26 ton/ha in the dry season. The total paddy production in the project service area is about 3,290 tons. The total production of cassava and sweet potato is respectively estimated at about 2,680 tons with a yield of 4.72 ton/ha and 870 tons with a yield of 2.02 ton/ha.

The yield of rice in the project area is as low as about 65 percent of the national average and at the same time about 89 percent of the average yield in Region VII. The yields of sweet potato and cassava are also as lower as 50 percent of the national average for both crops.

Following problems for the present crop production are identified during the field survey;

i) Severe drought occurred in last 1983 brought in the poor harvest of rice, cassava and other crops;
ii) Two typhoons hit the island in the following year, 1984 and damaged almost all agricultural crops inclusive of fruit crops;
iii) In succession to the typhoon damages, rats and lizards attacked rice and other crops, thus the production of crop drop down considerably, and
iv) Significant correlation between rainfall and rice production in Bohol province is identified. The rice production varies to a great extent year by year, depending upon rainfall amount. (See FIGURE G2-2)

Under the humid climatic condition of almost even distribution of rainfall except for a few dry months, upland crops are easily

suffered from crop disease, which is one of the problems of upland crop cultivation in Bohol province. As for rice disease, Agricultural Promotion Center (APC) has observed that even such resistant varieties to the tungro virus like IR-42 and IR-36 are very or moderately infested in the areas nearby the project area, whereas recently more than five tons of paddy per hectare are attained with new varieties like IR 53, 60, 62 at Ubay experimental farm of APC in 1985.

The yield of wet season rice has the range from 2.0 ton/ha to 0.8 ton/ha, while that of dry season rice has the range from 1.8 ton/ha to 0.6 ton/ha during the past three years according to the NIA's agro-economic survey, 1985. The major reasons for the minimum yield are lack of water for both season rice and typhoon occurrence for dry season rice. (See TABLE G2-14)

The Masagana 99 has sustained only technical support of farmers in the locality whose rice fields are highly productive to attain three to four ton of paddy per hectare. Use of chemical fertilizers and other chemical inputs is very below in comparison to the farms in the other municipalities because of the prohibitive cost of these inputs in the unstable and less productive cultivation of rainfed rice fields. (See TABLE G2-15)

2.5.4 Crop Budget

The crop budgets of respective crops are estimated on the basis of farm-economic survey as follows;

Present Crop Production Cost and Return

Item	Rice		Cassava	Sweet Potato
	Wet Season	Dry Season		
1. Production Cost (₱)	1,935	1,713	1,176	1,079
2. Gross Income (₱)	3,945	3,629	5,652	3,232
3. Net Income (2-1)	2,010	1,916	4,476	2,153
4. Percent of Net Income (3/2 x 100%)	51	53	79	67

Source: See ANNEX K

2.5.5 Animal Husbandry

As shown in the following table, about 67 percent of the total farms raise averagely 2.0 heads of carabao and also about 31 percent of the total farms raise 1.9 heads of cattle.

Number of Farms to Raise Livestock and Poultry and Number of Head per Farms

(Number of Sample Farms = 88)

Animal	Raising Farm (%)	No. of Head/ Farm (Head/Farm)
Carabao	66.1	2.0
Cattle	30.7	1.9
Hogs	59.1	3.7
Goat	6.8	4.7
Chicken	84.1	24.9
Ducks	4.5	9.5

Source: NIA Agro-Economic Survey, 1985

According to 1983's Agricultural Census, the proportion of working carabaos and cattle in the total heads are respectively 53 percent and 12 percent. Few cattle are for working purpose. The cattle for milking are only 59 heads in the three project municipalities. The area coverage per one working carabaos and cattle are about two hectares. (See TABLE G2-16 to 19)

Few areas of pasture are developed to feed the carabao and cattle by farmers. Under this condition, the carabao and cattle are generally fed on the natural grasses. However, the feeding capacity of the grass lands are estimated at as low rate as 0.7 heads of carabao or cattle per hectare. This low rate is due to the poor vegetation caused from the soil acidity and so on, according to the APC extension specialist.

2.5.6 Farm Labor and Draft Power Balance

1) Farm Labor Force

The available farm labor force for the project area in 1984 is estimated as follows;

Projected Farm Labor Force (1984)

Item	1980	1984 2/
1. No. of farm households and landless farm laborer households	2,011 1/	2,172
2. Farm labor force 3/		
- Male	2,661	2,874
- Female	1,998	2,158
Total	4,659	5,032

Note: 1/ See ANNEX G, TABLE G2-5
2/ Projected on the basis of annual population increase at 2.0 percent
3/ Converted to man power

As shown in the above table, the labor force per household is estimated at 2.3 in 1984.

2) Farm Labor Balance

Based on the above said available farm labor force, the labor force per month in the project area is estimated at 125 thousand man-days (5,032 thousand man x 30 days x 25 days/30 days).

The total number of working carabao in the project area is estimated at about 1,450 heads. Thus the available draft animal power per month is counted at 44 thousand heads.

The total farm labor force requirement is calculated on the basis of existing cropping pattern and number of raised livestock and poultry. The peak labor force requirement occurs at transplanting time of wet season rice in June with a rate of 53 percent of the total available labor force. The peak draft animal power requirement occurs in June with a rate of 56 percent of total available draft animal power.

2.5.7 Fishculture

In the two municipalities, Trinidad and Ubay, brackishwater fishculture has become popular, whereby bangus, sgpo, etc. are raised in about 860 ha of fishponds. Further expansion of the fishponds is planned in the long term development in two municipalities. For instance, the Trinidad Comprehensive Development Plan formulates a target that the fishpond area would be expanded from 274 ha in 1979

to 1,400 ha in 1990. (See TABLE G2-23, 24)

2.6. Agricultural Supporting Service

2.6.1 Agricultural Research Works

There are three agricultural research institutions in and around the project area, namely the BPI Bohol Experiment Farm, the BS Soil Water Research and Demonstration Project Farm and the BAI Ubay Stock Farm and Agricultural Promotion Center (APC).

The Bohol Experiment Station is located in the project area, established in 1974. This station aims to conduct specific research works for promotion of agricultural development in Bohol province, especially the north-eastern area of Bohol province where the project area is located. The past and also current research activities are almost limited to the rainfed agriculture. However, the station is currently strengthened to initiate the research activities for the irrigated agriculture in the newly developed experimental farm by APC. The total area of the station and the number of researchers are 100 ha and ten persons respectively (For the further detail, see TABLE G2-25).

The Soil-Water Research and Demonstration Project Farm has been established for the research activities and demonstration on the soil-water development and management. A reservoir by earth dam was constructed with the storage capacity of 0.22 MCM to irrigate 100 ha under the project. But the dam is able to irrigate 20 ha due to the collapse of the dam intake gate.

The main works of Ubay Stock Farms are breeding of pure stock of cattle and carabao, extension activities on the livestock production and breeding, selection and propagation of newly introduced forage.

APC was established in 1985 to promote agricultural development through the generation and diffusion of the technology suited to Bohol condition. APC is located in Tagbilaran having experiment

farms in three locations namely Dao, Bilar and Ubay. The Ubay experiment farm is described in the above. The research activities in the Ubay experiment field were just initiated in 1985. (See TABLE G-26)

2.6.2 Agricultural Extension Services

Extension services to the farmers in the project area are very limited due to lack of extension staff. Presently, one extension staff member covers about eight barangays or 900 farm households, of which the head of agricultural extension office and one plant protection officer are included. The area coverage of farm per extension staff member is about 1,800 ha (area planted with temporary and permanent crops). This staffing is far from the standard which is 1,000 ha or 500 farm households per extension staff member at largest (See TABLE G2-26).

In the Region VII Five-year Development Plan (1983 - 1987), it is planned that at least one extension technician and one livestock inspector will be distributed in every three barangays throughout the region.

2.6.3 Farmer's Organization

The farmer's organizations in the Philippines are generalized as marketing cooperative, Samahang Nayon, compact farm, irrigation association etc.

In the project municipalities, Samahang Nayon, farm marketing cooperative and communal irrigation system have been organized.

As for the major existing farmer's organization, there are 15 of Samahang Nayons and 13 of Farmer's Association in the project area. Main functions of Samahang Nayon are i) to guarantee the amortization with land transfer on land reform movement, ii) to build up the capital in rural area, iii) to educate farmers on cooperative movements and iv) to channel the basic service to farmers. Only minority farmers in the project area are members of the Samahang Nayon, and the activity has been stagnant in the most organizations.

Recently, some of members in 12 Samahang Nayon belonging to the San Miguel municipality have established the farm marketing cooperative in 1983, and Trinidad has the plan to establish a farm marketing cooperative in 1986. Ubay has no farm marketing cooperative but a fishery marketing cooperative. (See TABLE G-27)

The farm marketing cooperative of San Miguel is organized by 259 stockholders. Main functions are marketing contract, crop insurance and credit.

There are 466 Farmers' Associations, 36 Anak Bukid, 78 Rural Improvement Clubs, 1979 Balikatans and 809 Home Makers Clubs in the project area (See TABLE G2-28).

2.6.4 Processing

a) Rice and Corn

Three municipalities concerned with the project have rice mills of 27 units including one unit in both use for rice or corn and warehouses of 13 units respectively. Capacity of 27 mills per day is 165 tons or about nine percent of total capacity in Bohol province. Warehouses are owned by dealer or miller. Total capacity of 12 warehouses is 43,140 bags or 2,157 tons. (See TABLE G2-29, 31)

The number of rice and corn retailers/warehouses in the three municipalities amounts to 54 units for retail only, eight units for warehouse only and 66 units for wholesale/retail. (See TABLE G2-30, 31)

b) Cassava

A large portion of cassava production in Bohol province is collected for the processing of starch and glucose at the factory of the Philippine Starch Industrial Corporation.

The Philstarch was constructed in 1983. Its office and mill

is located in Carmen. The designed capacity is about 800 tons of fresh tubers per day or 200 tons of cassava starch per day with a requirement of about 300,000 tons of fresh cassava tubers per year. The products are cassava starch and glucose. These are supplied by an independent and/or contract farmers with an aggregate area of about 4,000 ha (averaging 1 to 2 ha/farmer) producing about 80,000 tons cassava tubers. These areas are sporadically located in twelve (12) municipalities, including Ubay, Trinidad, San Miguel and others. The final target area of about 20,000 ha was scheduled by MA and NFAC's Bohol Cassava Production Program (BCAPP) to be in 1988.

A farmer-borrower must be a member of an association/organization duly accredited by the Farm Systems Development Corporation (FSDC) in order to avail a cassava loan. The loan ceiling of about ₱3,000 per hectare may be extended to a farmer-borrower through the Rural Bank under the Administration of Central Bank.

Today the mill/factory is operating 10% to its designed capacity. Fresh and newly uprooted/harvested cassava tuber is required to be processed/milled within three days. The Philstarch is presently extending loans to contract farmers.

TABLE G.2-1 ADMINISTRATIVE DIVISION OF THE PROJECT AREA

Area	Area (km^2)	Density	No. of Cities	No. of Municipalities	No. of Barangay	Population (1980) ('000)	Population Rural Portion (%)	No. of Household (1980) ('000)	Average Household Size(1980)	Literate Ratio (%)
1. Central Visayas	14,951.5	253	9	122	2,972	3,787.4	68.0	698.1	5.4	76.1
- Bohol	4,117.5	196	1	46	1,101	806.0	84.9	147.1	5.5	77.6
- Cebu	5,088.4	N.A	5	48	1,181	2,091.6	N.A	N.A	N.A	N.A
- Negros Oriental	5,402.3	N.A	3	22	556	819.4	N.A	N.A	N.A	N.A
- Siquijor	343.5	N.A	-	6	134	70.4	N.A	N.A	N.A	N.A
2. Project Municipalities	(117.1) 393.4	167	-	-	(22) 82	(10.9) 65.6	91.3	(2.1) 11.8	5.6	75.9
- San Miguel	(37.2) 191.6	133	-	-	(5) 18	(2.9) 12.2	88.9	(0.5) 2.2	5.5	82.5
- Trinibad	(19.3) 94.3	160	-	-	(6) 20	(2.2) 15.1	87.9	(0.5) 2.8	5.4	73.0
- Ubay	(60.6) 205.6	184	-	-	(11) 44	(5.8) 38.3	93.3	(1.1) 6.8	5.6	75.0

Note: The figures in the parenthesis mean the data for the Project Area.

Source: NCSO...Statistical Handbook of the Philippines, 1984
(The data at the regional and provincial level are as of 1981)

TABLE G2-2 ACTUAL AND PROJECTED POPULATION

(Unit: 1000)

Area	Actual								Projected		Annual Increase of Proudction (%)	
	1903 (Mar.)	1918 (Dec.)	1939 (Jan.)	1948 (Oct.)	1960 (Feb.)	1970 (May)	1975 (May)	1980 (May)	1987	2000	1970-1980	1980-2000 (P)
1. Project Municipalities												
(1) San Miguel 1/	-	-	-	-	-	10.0	11.1	12.2	13.4	14.5	2.0	0.9
(2) Trinidad 2/	-	-	-	14.2	16.4	11.5	13.9	15.5	17.8	20.7	2.9	1.5
(3) Ubay	7.3	3/ 8.3	3/ 21.2	30.0	34.1	32.7	34.2	38.3	42.5	46.9	1.6	1.0
Total	7.3	8.3	21.2	44.2	50.5	54.2	59.2	66.0	73.7	82.1	2.0	1.1
2. Bohol Province	269.2	358.4	491.6	553.4	592.2	663.3	759.4	806.0	865.5	909.7	1.7	0.6
3. Central Visayas	1,124.4	1,486.0	1,954.4	2,112.0	2,522.8	3,032.7	3,387.3	3,787.4	4,287.0	4,852.0	2.2	1.2
4. Visayas*	2,863.1	3,810.8	5,590.1	6,414.6	7,642.1	9,032.5	10,133.4	11,147.0	12,592.0	14,135	2.2	1.2
5. Philippines	7,635.4	10,314.3	16,000.3	19,234.2	27,087.7	36,684.5	42,070.7	48,098.5	56,800.0	69,885	2.7	1.9

Note (1) * Western, Central and Eastern Visayas (P): Projected

(2) 1/ Created Municipality in March 1961; taken from Trinidad and Ubay

(3) 2/ Part of Talibon and Ubay in 1918 and 1939

(4) 3/ Includes Barangay Guinobatan of the former Municipality of Ipil

Source: Population Census 1980

TABLE C2-5 NUMBER OF GAINFULL WORKERS BY OCCUPATION

(Unit; '000)

Year/Sex	Population		Number of Gainfull Workers by Occupation								
				Agriculture, Forest and Fishery							
	Total	15yeats Old and Above	Total	Total	Crop Production	Production of Livestock, Poultry & Others	Forestly & Logging	Fishing	Mining & Quarrying	Manufac-turing	All Other Occupations
1. Bohol (Total)											
			(100.0)	(56.7)	(49.4)		(0.5)	(6.8)	(0.2)	(15.7)	(27.6)
1970 Both Sex	683.3	384.3	224.3	127.2	110.7		1.2	15.3	0.5	35.3	61.3
			(100.0)	(72.8)	(62.5)		(0.7)	(9.6)	(0.3)	(5.5)	(21.4)
Male	333.8	181.8	149.4	108.8	93.4		1.0	14.4	0.4	8.2	32.0
			(100.0)	(24.6)	(23.1)		(0.3)	(1.2)	(0.1)	(36.2)	(39.1)
Female	349.5	202.5	74.9	18.4	17.3		0.2	0.9	0.1	27.1	29.3
			(100.0)	(63.5)	(52.7)	(0.5)	(0.5)	(10.2)	(0.1)	(12.4)	(24.0)
1980 Both Sex	806.0	475.9	245.0	155.8	129.2	1.3	0.4	24.9	0.3	30.6	58.5
			(100.0)	(78.7)	(65.1)	(0.1)	(0.0)	(12.8)	(0.1)	(4.1)	(17.2)
Male	399.3	229.6	188.1	148.3	122.4	1.3	0.4	24.2	0.3	7.7	32.1
			(100.0)	(13.2)	(12.0)	(0.0)	(0.0)	(1.2)	(0.0)	(40.2)	(46.4)
Female	406.7	246.3	56.9	7.5	6.8	0.0	0.0	0.7	0.0	22.9	26.4
2. Bohol (Rural)											
			(100.0)	(62.2)	(54.8)		(0.5)	(6.9)	(0.2)	(18.1)	(19.4)
1970 Both Sex	586.6	203.3	189.4	117.9	103.8		1.0	13.1	0.4	34.3	36.8
			(100.0)	(78.4)	(68.0)		(0.6)	(9.7)	(0.2)	(4.5)	(16.9)
Male	286.8	145.7	128.6	100.8	87.5		0.8	12.5	0.3	5.8	21.7
			(100.0)	(28.1)	(26.8)		(0.3)	(1.0)	(0.2)	(46.9)	(24.8)
Female	299.8	57.6	60.8	17.1	16.3		0.2	0.6	0.1	28.5	15.1
			(100.0)	(69.3)	(58.4)	(0.5)	(0.0)	(10.3)	(0.0)	(13.6)	(13.7)
1980 Both Sex	683.1	399.6	207.5	143.8	121.1	1.1	0.2	21.4	0.2	28.2	28.4
			(100.0)	(84.1)	(70.5)	(0.6)	(0.1)	(12.8)	(0.1)	(3.9)	(12.0)
Male	339.5	193.5	162.8	136.9	114.8	1.0	0.2	20.9	0.2	6.3	19.6
			(100.0)	(15.4)	(14.1)	(0.2)	(0.0)	(1.1)	(0.0)	(49.0)	(19.0)
Female	343.6	206.1	44.7	6.9	6.3	0.1	0.0	0.5	0.0	21.9	8.8
3. Project Municipalities (Total)											
1970 Both Sex	54.2	27.8	16.2	9.2	8.0		0.1	1.1	0.6	2.5	4.5
Male	26.8	13.4	11.0	8.0	6.9		0.1	1.0	0.0	0.6	2.4
Female	27.8	14.4	5.2	1.2	1.1		0.0	0.1	0.0	1.9	2.1
1980 Both Sex	66.0	29.8	15.3	9.8	8.1	0.1	0.0	1.6	0.0	1.9	3.6
Male	33.0	14.8	12.0	9.4	7.8	0.1	0.0	1.5	0.0	0.5	2.1
Female	33.0	15.0	3.3	0.4	0.3	0.0	0.0	0.1	0.0	1.4	1.5

Note : (1) The figures in the parenthesis show the percentage to the total gainfull workers.
(2) The figures for the number of gainfull workers by occupation in the Project municipalities are estimated in the basis of the percentage to the total gainfull workers by occupation in the total Bohol.

Source : Census of Population, NCSO.

TABLE G 2-4

PRESENT LAND USE

(Unit: ha)

Area	Ground Total	Farm Area									Non-farm Area
		Total	Arable Land			Other Farm Area					
			Sub-total	Planted to temporary crops	Lying Idle	Sub-total	Planted to permanent crops	permanent meadows & posture	Under Covered with forest	All other land	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1. Project muniripalities	39,338	23,696	14,395	11,171	3,224	9,301	7,278	1,396	171	478	15,642
(1) San Miguel	9,156	6,407	4,224	3,164	1,060	2,183	1,394	379	71	339	2,749
(2) Trinided	9,427	8,123	4,484	3,421	1,063	3,639	2,688	735	99	117	1,304
(3) Ubay	20,755	9,166	5,687	4,586	1,101	3,479	3,196	282	1	22	11,589
2. Bohol Province	411,726	15,929	91,443	76,131	15,312	63,486	54,774	6,948	1,764	4,341	256,797

Source: Agricultual Census, 1981

TABLE G 2-5 POPULATION, NUMBER OF HOUSEHOLD AND NUMBER OF FARM HOUSEHOLDS

Municipality/ Barangay	No. of Household	Population	No. of Farm Household
SAN MIGUEL			
(1) Bayongan 1/	62	327	62
(2) San Vicente	112	619	95
(3) Corazon	93	494	84
(4) Cambangay Norte	153	786	150
(5) Bugang	120	652	120
Subtotal	540	2,878	511
TRINIDAD			
(1) Mahagbu 1/	110	88	101
(2) La Union 1/	158	897	120
(3) Catoogan	102	521	87
(4) Soom 1/	42	229	36
(5) Guinobatan 1/	65	363	49
(6) Tagum Sur 1/	19	117	17
Subtotal	496	2,215	410
UBAY			
(1) Bulilis 1/	70	233	70
(2) Gabi 1/	36	202	32
(3) Hambabauran	84	433	80
(4) Pagasa	95	521	94
(5) Bayang	129	756	116
(6) Tubog	80	429	71
(7) Camalian	120	287	56
(8) Tuburan	231	662	95
(9) Casate	53	1,236	166
(10) Calanggaman	129	721	80
(11) Camambugan 1/	53	297	45
Subtotal	1,081	5,777	905
TOTAL	2,117	10,870	2/ 1,826

Note: 1/ Aside from above 11 Barangays, a part of Lumangog Barangay is included in the study area, but it is not included in the proposed irrigation area.
2/ A part of Barangay is included in the Project area.
3/ No. of farm households inclusive of landless farm laborer is estimated at 95 percent of total households, namely 2,117 household x 95% = 2,011 household.

Source: NCSO 1980 Census of Population, 1981 Census of Agriculture

TABLE G.2-6 NUMBER OF FARM OPERATORS/SELF EMPLOYED IN AGRICULTURE

(Unit: ha)

Barangay	No. of Household	No. of Operators/ Self-employed in Agriculture		Area of Farm			Physical Area Devoted to Selected Crops		
		Total	Farm Operator	Total	Area Devoted to Crops	Area under Permanent Pasture	Rice	Corn	Permanent Crops
1. San Miguel									
(1) Bayongan	121	121	121	985	985	-	109	26	204
(2) San Vicente	102	102	95	204	204	-	110	11	69
(3) Corazon	85	85	84	649	649	-	136	4	27
(4) Cambangay Norte	150	150	150	283	283	-	166	29	85
(5) Bugang	124	125	124	221	221	-	124	34	55
Subtotal	582	583	574	2,342	2,342	-	645	104	440
2. Trinidad									
(1) M. Roxas	140	140	140	291	289	-	115	19	99
(2) Mahagbu	130	129	127	335	335	-	162	3	90
(3) La Union	120	120	120	272	272	-	131	16	102
(4) Catoogan	90	90	87	218	218	-	106	10	78
(5) Soom	114	112	104	240	238	-	116	-	54
(6) Guinobatan	148	148	145	191	190	-	92	5	84
(7) Tagum Sur	100	97	93	248	248	-	104	9	110
Subtotal	842	836	816	1,795	1,790	-	826	62	617
3. Ubay									
(1) Bulilis	(Bulilis was established after 1980 Census)								
(2) Gabi	115	114	103	156	144	14	94	21	29
(3) Lumangog	166	156	148	189	167	16	117	20	24
(4) Hambabauran	83	85	80	164	134	34	70	36	24
(5) Pag-asa	99	98	94	162	152	11	91	24	37
(6) Bay-ang	127	127	116	158	143	14	96	19	28
(7) Tubog	71	71	71	152	152	-	77	2	73
(8) Camalian	59	57	56	72	54	17	37	10	7
(9) Tuburan	102	102	95	114	108	4	84	2	22
(10) Casate	225	200	166	208	194	11	155	1	38
(11) Calangaman	108	104	80	89	89	-	65	-	24
(12) Camambugan	211	195	180	344	297	49	173	20	102
Subtotal	1,366	1,309	1,189	1,808	1,634	170	1,059	155	408
Total	2,790	2,728	2,549	5,945	5,766	170	2,530	321	1,465

Source: 1980 Census of Agriculture, NCSO.

TABLE G2-7 AVERAGE FARM SIZE IN THE PROJECT MUNICIPALITIES

Municipality	Total	Planted to Temporary Crops	Fallow	Planted to Permanent Crops	Under Pasture	Others
San Miguel	3.0	1.5	0.5	0.7	0.2	0.1
Trinidad	3.3	1.4	0.4	1.1	0.3	0.1
Ubay	2.0	1.0	0.2	0.7	0.1	0.0
Total	2.6	1.2	0.4	0.8	0.2	0.0

Source: 1981 Census of Agriculture, NCSO

TABLE G2-8 NUMBER OF FARMS BY TYPE OF TENURE

(Unit: %)

Type of Tenure	Total	San Miguel	Trini-dad	Ubay
1. Farm operated under one form of tenure	(79.7)	(81.3)	(85.2)	(86.8)
-Owned or held in owner like possession	67.3	70.3	76.2	61.2
-Rented or leased from others	16.2	11.0	8.6	22.5
-Rented free	1.5	-	-	2.8
-Other single form of tenure	0.1	-	-	0.2
2. Farms operated under more than one form of tenure	(14.8)	(18.7)	(14.8)	(13.2)
-Owned and rented or leased from others	13.2	18.2	10.9	12.3
-Other combination of the form of tenure	1.6	0.4	3.8	0.9
Total	100.0	100.0	100.0	100.0

Note: (1) Owned ..... with a title of ownership
(2) Owner like possession .... without a title of ownership

Source: 1981 Census of Agriculture, NCSO

TABLE G.2-9 PRESENT CROPPING PATTERN AND CROP PRODUCTION

Land/Crop	Physical Area	Cropping Intensity	Planted Area	Harvested Area	Yield	Production
	(ha)	(%)	(ha)	(ha)	(ton/ha)	(ton)
1. Paddy field	1,780	165	2,930	2,490	1/ 1.33	3,286
-Wet season rice	-	90	1,600	1,350	1/ 1.37	1,850
-Dry season rice	-	75	1,330	1,140	1/ 1.26	1,436
2. Upland field	1,900	53	1,000	1,000		3,554
-Cassava	-	30	570	570	3/ 4.71	2,685
-Sweet potato	-	23	430	430	2/ 2.02	869
Total	3,680	107	3,930			6,840

Note: The planted area and the harvested area are estimated on the basis of the following figures (phisical area = 100%)

Crop	Planted area	Harvested area	Referred data
Wet season rice	90%	76%	BAE con crop production data in Bohol (1974-84)
Dry season rice	75%	64%	do
Sweet potato	23%	23%	NIA Farm Agro-economic Survey, 1985
Cassava	30%	30%	do

Source: 1/ BAEcon crop production data (Bohol, 1974-84)
2/ BAEcon crop production data (Central Visayas, 1974-83)
3/ NIA Farm Management Survey, 1985

TABLE G.2-10 NUMBER OF WORKING ANIMALS AND TRACTOR (1980)

Municipality	Working Animals		Tractor	No. of Farm	Area Planted to Temporary Crop
	Carabao	Cattle			
1. San Miguel	(2,778)	(1,916)	19	2,071	3,164
	1,500	77			
2. Trinidad	(3,055)	(2,153)	4	2,477	3,421
	1,650	21			
3. Ubay	(5,977)	(2,052)	3	4,644	4,586
	3,100	0			
Total	6,250	98	26	9,192	11,171

Note: The figures in the parenthesis show the total head of carabao and cattle including non-working heads.

Source: 1981 Census of Agriculture.

TABLE G.2-11 TYPE OF POWER USED FOR AGRICULTURE

Municipality	Total		Human Power Only		Mechanical Only		Animal Power Only		Mechanical & Animal	
	No.of Farm 1/	Area 2/	No. of Farm	Area	No. of Farm	Area	No. of Farm	Area	No.of Farm	Area
Total	9,192	11,171	624	542	23	99	5,627	7,190	2,918	3,340
1. San Miguel	2,071	1,295	193	286	21	96	1,317	1,869	540	913
2. Trinidad	2,477	3,421	91	74	-	-	2,325	3,280	61	67
3. Ubay	4,644	2,545	340	182	2	3	1,985	2,041	2,317	2,360

Note: 1/ Number of farms reporting
2/ Area under temporary crops

Source: Census of Agriculture, 1980

TABLE G.2-12 NUMBER OF FARM EQUIPMENT/MACHINERY IN THE PROJECT MUNICIPALITIES

Farm Equipment/Machinery	Total			San Miguel			Trinidad			Ubay		
	No. of Farm	No. of Machinery Owned	No. of Machinery Used	No. of Farm	No. of Machinery Owned	No. of Machinery Used	No. of Farm	No. of Machinery Owned	No.of Machinery Used	No. of Farm	No. of Machinery Owned	No. of Machinery Used
1. Plow	8,366	8,563	9,519	1,990	2,018	2,346	2,281	2,459	2,731	4,095	4,086	4,442
2. Harrow	7,406	7,378	8,272	1,262	1,182	1,327	2,266	2,369	2,739	3,928	3,827	4,206
3. Cultivator & Weeder	948	1,222	1,245	16	17	20	91	71	95	841	1,134	1,130
4. Fertilizer Distributor	298	324	347	11	1	11	-	-	-	287	323	336
5. Sprayer & Duster	2,009	983	2,085	170	141	182	805	284	845	1,034	558	1,058
6. Harvester Thresher	208	168	220	152	134	164	34	23	34	22	11	22
7. Thresher (Engine Operated)	1,119	453	1,224	227	158	281	221	25	224	671	270	719
8. Copra Dryer	52	54	54	3	5	5	7	7	7	42	42	42
9. Paddy Dryer	-	-	-	-	-	-	-	-	-	-	-	-
10. Tractor	23	16	26	16	8	19	4	5	4	3	3	3
11. Power Producing Machine	2	3	2	-	-	-	1	1	1	1	2	1
12. Car, Jeep & Truck	14	3	15	14	3	15	-	-	-	-	-	-

Note: Number of all farms: 2,061, 2,477 and 4,644 respectively in San Miguel, Trinidad and Ubay

Source: Census of Agriculture, 1980

TABLE G.2-13 RELATIONSHIP BETWEEN RAINFALL AMOUNT AND PADDY PRODUCTION

Year	Rainfall Amount *		Total	Paddy Production	Paddy Revised Production **	
	December to March	August to November				
	(mm)	(mm)	(mm)	('000ton)	('000ton)	
1974	307.4	303.6	611.0	100.5	110.6	(1.10)
1975	211.5	195.8	407.3	58.5	63.8	(1.09)
1976	214.1	560.5	774.6	95.6	103.2	(1.08)
1977	239.2	385.1	624.3	95.8	102.5	(1.07)
1978	184.1	315.4	499.5	93.9	99.5	(1.06)
1979	106.2	266.9	373.1	92.3	96.9	(1.05)
1980	182.6	398.6	581.2	133.2	138.5	(1.04)
1981	140.1	403.0	543.1	113.4	116.8	(1.03)
1982	238.5	243.2	481.7	104.4	106.5	(1.02)
1983	59.6	152.5	212.1	42.0	42.4	(1.01)
1984	385.0	318.2	703.2	99.5	99.5	(1.00)

Note: * Monthly rainfalls at Tagbilaran Station are accumulated. (When the monthly rainfall amounts are less than 50 mm and more than 200 mm, they are counted as 0 and 200 mm respectively.)

** Revised by the assumed production increase at 1.0% per year. (The figures in the parenthesis show the corresponded rate for each year)

Source: Rainfall ... Tagbilaran Station, PAGASA

Paddy Production ... Bohol Province, BAEcon

TABLE G.2-14 REASON OF MAXIMUM AND MINIMUM YIELD OF RICE AT PRESENT
(FARM MANAGEMENT SURVEY)

Reason	Wet Season		Dry Season	
	No. of Answer	Percent	No. of Answer	Percent
1. Maximum Yield	(2.0 ton/ha)		(1.8 ton/ha)	
a) Proper control of pest and disease	15	15.6	25	14.8
b) Use of high yielding varieties	10	10.4	19	11.2
c) Proper crop management	55	57.3	95	56.2
d) Availability of farm inputs	10	10.4	18	10.7
e) Sufficiency of irrigation water	1	1.0	4	2.4
f) Availability of credit facilities	5	5.3	8	4.7
Total	96	100.0	169	100.0
2. Minimum Yield	(0.8 ton/ha)		(0.6 ton/ha)	
a) Occurrence of pests and diseases	15	12.6	26	12.4
b) Low rate of fertilizer	4	3.4	6	2.8
c) Drought	30	25.2	56	26.7
d) Typhoon occurrence	28	23.5	48	22.8
e) High cost of farm inputs	1	0.8	1	0.5
f) Lack of water	37	31.1	67	31.9
g) Lack of credit facilities	4	3.4	6	2.9
Total	119	100.0	210	100.0

Source: NIA Farm Management Survey, 1985

TABLE G.2-15 ATTAINED RICE PRODUCTION UNDER MASAGANA 99 PROGRAM

Phase	San Miguel					Trinidad					Ubay				
	No. of Farms	Planted Area (ha)	Harvested Area (ha)	Unit Yield (ton/ha)	Production (ton)	No. of Farms	Planted Area (ha)	Harvested Area (ha)	Unit Yield (ton/ha)	Production (ton)	No. of Farms	Planted Area	Harvested Area	Unit Yield	Production
XIX	70	100	100	2.82	297	60	70	70	3.75	263					
XX	88	105	105	2.82	297	62	87	87	3.75	326	No Program				
XXI	70	105	105	2.82	297	62	72	72	3.94	284					
XXII	70	105	105	2.82	297	60	70	70	3.74	262					
XXIII	150	110	110	3.10	342	150	175	175	4.02	704					
XXIV	150	110	110	3.10	342	150	138	138	4.34	600					

Source: Municipal Agricultural Officer, San Miguel, Trinidad and Ubay

TABLE G.2-16 POPULATION OF LIVESTOCK AND POULTRY

Kind		Total		San Miguel		Trinidad		Ubay	
		No. of Farm	No. of Head	No. of Farm	No. of Head	No. of Farm	No. of Head	No. of Farm	No. of Head
1. Carabao	1970	4,861	10,054	1,315	2,538	1,221	2,428	2,325	5,088
	1980	6,848	11,810	1,560	2,778	1,815	3,055	3,473	5,977
2. Cattle	1970	979	5,648	371	972	214	1,594	394	3,082
	1980	2,657	6,121	843	1,916	908	2,153	906	2,052
3. Pigs	1970	4,369	11,311	1,285	3,319	1,075	2,511	2,009	5,481
	1980	6,016	12,617	1,527	2,899	1,849	4,395	2,640	5,323
4. Goat	1970	691	2,050	195	546	50	133	446	1,371
	1980	704	1,628	178	402	191	399	335	827
5. Duck	1970	54	781	17	123	6	30	31	628
	1980	131	842	27	138	47	319	57	385
6. Chicken	1970	5,371	104,978	1,455	23,673	1,449	31,592	2,467	49,713
	1980	8,381	128,278	1,803	28,205	2,412	46,091	4,166	53,982

Source: Census of Agriculture

TABLE G.2-17 NUMBER OF CARABAO

Municipality	No. by Age Group					Proportion to All Age (%)			
	All Ages	Under 3 Years	3 Years & Over	For Working	Females 3 Years & Over	Under 3 Years	3 Years & Over	For Working	Females 3 Years & Over
1. San Miguel	2,538	806	1,732	1,380	640	32	68	54	25
2. Trinidad	2,428	827	1,601	1,305	747	34	66	54	31
3. Ubay	5,088	1,541	3,547	2,649	1,243	30	70	52	24
Total	10,054	3,174	6,880	5,334	2,630	32	68	53	26

Source: Census of Agriculture, 1971

TABLE G.2-18 NUMBER OF CATTLE

Municipality	No. by Age Group							Proportion to All Age (%)					
	All Ages	Under 2 Years	2 Years & Over	For Working	For Beef	Cows 2 Years & Over	Milk Cows	Under 2 Years	2 Years & Over	For Working	For Beef	Cows 2 Years & Over	Milk Cows
1. San Miguel	972	373	599	39	20	351	-	38	62	4	2	36	-
2. Trinidad	1,594	386	1,208	18	1	906	-	24	76	1	0	57	-
3. Ubay	3,082	1,220	1,862	11	18	843	59	40	60	0	0	27	2
Total	5,648	1,979	3,669	68	39	2,100	59	35	65	12	0	37	1

Source: Census of Agriculture, 1971

TABLE G.2-19 NUMBER OF LIVESTOCK AND POULTRY (1984)

Municipal/Barangay	Carabao		Cattle		Big		Chicken		Horse	Goat
	Male	Female	Male	Female	Male	Female	Male	Female		
1. San Miguel										
(1) Bayongan	59	120	57	160	60	115	478	1,440	8	124
(2) San Vicente	29	80	15	62	37	68	397	1,425	0	38
(3) Corazon	23	78	18	48	20	67	325	1,470	4	27
(4) Cambangay Norte	31	88	24	93	37	98	540	1,960	7	36
(5) Bugang	23	64	17	65	26	74	478	1,600	5	48
Sub-total	165	430	131	428	180	422	2,218	8,195	24	273
2. Trinidad										
(1) M. Roxas	42	88	32	61	45	72	705	910	3	35
(2) Mahagbu	43	95	35	55	46	69	600	820	2	33
(3) La Union	40	119	37	50	30	60	710	840	1	28
(4) Catoogan	41	81	29	38	38	56	571	692	0	32
(5) Soom	48	121	31	52	48	85	861	1,110	0	35
(6) Guinobatan	51	120	28	62	60	90	1,200	1,750	0	29
(7) Tagum Sur	48	76	26	48	41	73	995	1,153	0	25
Sub-total	313	700	218	366	308	505	5,642	7,255	6	207
3. Ubay										
* (1) Bulilis	40	74	18	22	11	70	300	150	0	0
(2) Gabi	23	92	73	51	153	200	1,200	1,400	0	0
* (3) Lumangog	130	160	2,000	2,417	1,682	862	920	721	10	0
(4) Hambabauran	97	112	58	7	81	121	706	904	1	0
(5) Pagasa	31	69	32	18	126	96	1,030	831	0	0
(6) Bayang	133	70	200	21	120	113	1,131	1,761	0	0
(7) Tubog	52	59	27	33	41	58	434	688	0	0
(8) Camalian	21	48	91	23	122	93	1,340	900	0	0
(9) Tuburan	23	36	33	39	102	300	11,020	2,050	0	0
(10) Casate	151	203	72	56	133	214	1,200	2,400	0	0
(11) Calangaman	60	50	80	70	50	30	200	100	0	0
(12) Camambugan	120	72	200	192	282	438	1,800	2,450	0	0
Sub-total	881	1,045	2,884	2,949	2,903	2,595	21,281	14,305	11	0
Total	1,359	2,175	3,233	3,743	3,391	3,522	29,141	29,755	41	480

Source: Municipal Agricultural Offices

Note: Barangay with asterisk is located in the outside of the project area

TABLE G.2-20 POPULATION BY AGE AND SEX, 1980

Municipality		Total	Male					Female				
			Sub Total	0~14	15~19	20~59	60~	Sub Total	0~14	15~19	20~59	60~
1. San Miguel	Population	12,220	6,179	2,631	569	2,462	517	6,041	2,383	542	2,600	516
	Ratio	1.000	0.506	0.215	0.047	0.201	0.043	0.494	0.195	0.044	0.212	0.043
2. Trinidad	Population	15,501	7,659	2,560	769	3,931	399	7,842	3,830	625	2,959	428
	Ratio	1.000	0.494	0.165	0.050	0.253	0.026	0.506	0.247	0.040	0.191	0.028
3. Ubay	Population	38,289	19,143	8,781	1,811	7,479	1,072	19,146	8,497	1,937	7,548	1,164
	Ratio	1.000	0.500	0.229	0.047	0.195	0.029	0.500	0.222	0.051	0.197	0.030
Total	Population	66,010	32,981	13,972	3,149	13,872	1,988	33,029	14,710	3,104	13,107	2,108
	Ratio	1.000	0.500	0.217	0.048	0.210	0.030	0.500	0.223	0.047	0.199	0.032

Source: NCSO, 1980 Population Census

TABLE G.2-21 POPULATION OF SCHOOL ATTENDANCE

Municipality	Male					Female				
	Overall Population	School Attendance				Overall Population	School Attendance			
		Total	High School (4th year)	College	Academic Holder		Total	High School (4th year)	College	Academic Holder
1. San Miguel										
15~19 years old	569	65	39	26	-	542	115	50	65	-
20~59 years old	2,462	12	-	12	-	2,600	7	-	7	-
2. Trinidad										
15~19 years old	769	68	58	10	-	625	14	15	28	-
20~59 years old	3,981	14	-	14	-	2,959	354	-	14	-
3. Ubay										
15~19 years old	1,811	264	142	122	-	1,937	354	191	163	-
20~59 years old	7,479	89	-	89	-	8,497	156	-	156	-
Total	(100.0)	(12.6)	(7.6)	(5.0)		(100.0)	(16.5)	(8.3)	(8.2)	
15~19 years old	3,149	397	239	158	-	3,104	483	259	256	-
	(100.0)	(0.8)		(0.8)		(100.0)	(1.3)		(1.3)	
20~59 years old	13,922	115	-	115	-	14,056	517	-	177	-

Note: The figures in the parenthesis show the percent of school attendance population

Source: NCSO 1980 Census of Population

TABLE G.2-22 ESTIMATED FARM LABOR FORCE (1980)

Item	Total	Male				Female			
		Sub Total	15~19	20~59	60~	Sub Total	15~19	20~59	60~
(1) Ratio of population by age group (Total=1.000) 1/	0.566	0.288	0.048	0.210	0.030	0.278	0.047	0.199	0.032
(2) Population in the Project Area (Farm and Farm Labore H. H only)	5,851	2,983	495	2,178	310	2,869	485	2,054	330
(3) Estimated Enrollment 2/	-	-	12.6%	0.8%	-	-	16.5%	1.3%	-
(6) Percent of labor force (100-(3))	-	-	87.4%	99.2%	-	-	83.5%	98.7%	-
(7) Estimated labor force ((2)x(6))	5,665	2,903	432	2,161	310	2,762	405	2,027	330
(8) Efficiency net labor force	-	-	0.7	1.0	0.5	-	0.5	0.7	0.5
(9) Estimated net labor force ((7)x(8))	4,404	2,618	302	2,161	155	1,786	202	1,419	165

Source: 1/ Total population (1.000); 10,320 = 10,870 (See TABLE G2-5) x 95%, Respective ratio are shown in TABLE G2-20
2/ See TABLE G2-21

TABLE G.2-23 TOTAL AREA OPERATED AND NUMBER OF OPERATORS OF FISHPOND AND QUANTITY OF HARVEST (1980)

Municipalities	No. of Operators	Area Operated (ha)	Quantity of Harvest by Kind (ton)							
			Total	Bangus	Hipon	Sugpa	Alimanga	Tilapia	Hito/Dalag	Others
Trinidad	9	104.5	13.2	13.0	-	0.2	-	-	-	-
Ubay	66	758.6	238.6	237.4	0.1	1.0	-	0.1	-	-
Total	75	863.1	251.8	250.4	0.1	1.2	-	0.1	-	-

Source: Census of Fisheries, 1981, NCSO

TABLE G.2-24 NUMBER OF PERSONS EMPLOYED IN FISHPOND OPERATION

Municipalities	Total Persons Employed	Operator's Household Members	Non-Operators' Household Members		
			Manager/Supervisor	Fishing Workers	Others
Trinidad	48	13	-	35	-
Ubay	576	284	-	261	31
Total	624	297	-	296	31

Source: Census of Fishries, 1981, NCSO

TABLE G.2-25 RESEARCH INSTITUTIONS COVERING THE PROJECT AREA

Institution	Establi-shed Year	Facilities and Staff		Objectives/Activities
1. BPI Bohol Experiment Station (Gabi, Ubay)	1974	1. Area (ha)		1. Objectives: To conduct research/trials on crop production under the rainfed condition and to make seed production for major crops.
		(1) Total	100ha	
		(2) Area for research	18	
		- Upland field	5	
		- Orchard	10	
		- For Agricultural Promotion Center (APC)	3	
		(3) Area for seed multiplication		2. Activities: Research on varieties under field conditions and on crop production technology for corn, soybean, cassava, mungbean, peanut, sweet potato, Ubi and fruit trees.
		- Rice	10	
		- Corn	10	
		- Mungbean	4	
		- Soybean	2	
		- Peanut	2	
		- Sorghum	1	
		- Cassava	5	
		- Sweet potatoes & others	14	
		2. Staff		
		- Superintendent	1	
		- Vice-superintendent	1	
		- Researchers	8	
		- Other permanent staff	18	

TABLE G.2-25 RESEARCH INSTITUTIONS COVERING THE PROJECT AREA (Cont'd)

Institution	Establi-shed Year	Facilities and Staff	Objectives/Activities
2. B.S Soil and water Research and Demonstration Station (Calangaman, Ubay)	1957	1. Research field: 15.68 hectares, 72 plots of rice terrace and 10.5 hectares of upland field. 2. Staff: Three(3) researchers in soils and two(2) permanent staff. Note: A reservor type of earth dam was constructed 1979 and rehabilitated in 1982. It was designed to irrigate 100 ha, with storage capacity at 0.22 MCM, height of dam at 16 m. The irrigated area as of February, 1985, are 20 hectares.	1. Objectives: To conduct research on soils and water on rice and upland crops. 2. Activities: (1) Varietal trials and field studies on soil-water management; (2) Fertilizer trials and trials on water management at on-farm level; (3) Azolla propagation; (4) Extension work.

TABLE G.2-25 RESEARCH INSTITUTIONS COVERING THE PROJECT AREA (Cont'd)

Institution	Established Year	Facilities and Staff	Objectives/Activities
3. Agricultural Promotion center (APC) A joint undertaking between the Japanese Government represented by JICA and the Philippine Government through the Bohol Integrated Area Development Project (NACIAD-BIADP)	1985	1. Area of experimental field (1) Dao ... One(1) hectares of upland crops and one and half (1 1/2) hectares orchard. (2) Bilar ... Two(2) hectares of lowland rice field. (3) Ubay ... Two(2) hectares of lowland rice field and one(1) hectare of upland field. 2. Staff: - Team leader - One(1) rice specialist - One(1) upland crop specialist - One(1) soils specialist - One(1) livestock/extension specialist - One(1) vegetable specialist and Philippine counterparts in each field	1. Objectives: To promote agricultural development through the generation and diffusion of technology of Bohol conditions. 2. Activities: (1) Varietal trials, field studies demonstrations, aiming at improvement of agricultural techniques at the farm level; (2) Enhancement in production of high quality seeds through research training and demonstration on seed production techniques; (3) Technology transfer of agricultural extension work; (4) Training of technical personnels and farmer leaders; (5) Distribution of farm inputs such as fertilizers and agricultural chemicals etc. and renting farm machineries to farmers' cooperatives and/or associations in/around the leading Extension Areas and (6) Information services for the transfer of packaged technology.

TABLE G.2-25 RESEARCH INSTITUTIONS COVERING THE PROJECT AREA (Cont'd)

Institution	Established Year	Scale and Staffing	Objectives/Activities
4. BAI Ubay Stock Farm	N.A	Superintendent (1) - Animal Production Section (10) - Pasture/Forage Section (2) - Research Section (1) - Extension Section (3) - Administration Section (10) Total area of the Farm is about 3,600 ha; out of which about 3,500 ha is pasture land (2,400 ha and 1,100 ha with and without fence, respectively). About 100 ha is planted to different forage, that is for trials and researches activities. The total animal is 509 head; 370 head are cattle, 120 head are carabao and 19 head goat. All of these are pure bred/crosses.	(1) To up-grade cattle and working animal through cross breeding of pure stock to native animal. (2) Selection and propagation of newly introduced forage to the locality and improvement of existing pasture lands. (3) Researches on resistant animal to local conditions and adaptability. (4) Introduction of natural and artificial breeding to Municipalities.

TABLE G.2-26 NUMBER OF FIELD TECHNOLOGIST IN THE PROJECT MUNICIPALITIES

Municipality	No. of Barangay	No. of Farm	Physical Area Planted (ha)	No. of Field Technologist	Coverage per Field Technologist		
					No. of Barangay	No. of Farm	Physical Area Planted (ha)
1. San Muguel	18	2,071	4,558	1/ 4	4.5	518	1,140
2. Trinidad	20	2,477	6,109	3	6.7	825	2,036
3. Ubay	44	4,644	7,782	3	14.5	1,548	2,594
Total	82	9,192	18,449	10	8.2	919	1,845

Note: 1/ Including Plant Post Control Officer

Source: 1981 Census of Agriculture and 1983 Bohol PDS (Provincial Development Staff) Socio-economic Profile

TABLE G.2-27 NUMBER AND MEMBERSHIP OF SAMAHANG NAYON

Barangay	Date Organized	Date Registered	No. of Member	Remarks
1. San Miguel				
(1) Bayongan	1974	1974	(20) 55	Established Farmers
(2) San Vicente	1974	1974	(54) 64	Marketing Corporative. The
(3) Corazon	1975	1975	(4) 35	figures in the parenthesis
(4) Cambangay Norte	1975	1975	(18) 37	show its members.
(5) Bugang	Split from SN of Corazon		(1) 25	
Sub-total			(97) 216	
2. Trinidad				
(1) M. Roxas **	1974	1974	38	*
(2) Mabagbu	1974	1974	45	*
(3) La Union	-	-	-	
(4) Catoogan	1974	1974	25	*
(5) Soom	1974	1974	70	*
(6) Guinobatan	-	-	-	
(7) Tagum Sur	1974	1974	28	*
Sub-total			206	
3. Ubay				
(1) Bulilis	1973	1974	56	Receiving CRBBI credit service
(2) Gabi	-	-	-	
(3) Lumangog **	-	-	-	
(4) Hambabauran	-	-	-	
(5) Pag-asa	1973	1974	35	*
(6) Bay-ang	-	-	-	
(7) Tubog	1975	1976	42	Distribution of fertilizers
(8) Camalian	-	-	-	
(9) Tuburan	1974	1974	29	*
(10) Casate	1974	1974	31	Receiving CRBBI credit service
(11) Calangaman	-	-	-	
(12) Camambugan	1974	1974	35	*
Sub-total			228	
Total			650	

Note: * Activity is stagnant
** These Barangays are located outside of the Project Area
CRBBI; Cooperative Rural Bank Bohol Institute

Source: Municipal Agriculture Office, San Miguel, Trinidad & Ubay

TABLE G.2-28 NUMBER OF FARMERS' ORGANIZATION/ASSOCIATION
(As of 1984)

Barangay	Farmers' Association	Anak Bukid	Rural Improvement Club	Balikatan	Home Markers Club
1. San Miguel					
(1) Bayongan	54	-	-	28	28
(2) San Vicente	68	36	43	43	43
(3) Corazon	32	-	-	25	25
(4) Cambangay Norte	64	-	35	35	35
(5) Bugang	25	-	-	28	28
Sub-total	243	36	78	159	159
2. Trinidad					
(1) M. Roxas	30	-	-	30	-
(2) Mabagbu	28	-	-	35	-
(3) La Union	27	-	-	30	-
(4) Catoogan	25	-	-	45	-
(5) Soom	32	-	-	31	-
(6) Guinobatan	26	-	-	30	-
(7) Tagum Sur	25	-	-	20	-
Sub-total	193	-	-	221	-
3. Ubay					
(1) Bulilis	-	-	-	120	70
(2) Gabi	-	-	-	150	50
(3) Lumangog	-	-	-	130	75
(4) Hambabauran	-	-	-	125	75
(5) Pag-asa	-	-	-	115	50
(6) Bay-ang	-	-	-	140	75
(7) Tubog	-	-	-	155	50
(8) Camalian	-	-	-	124	50
(9) Tuburan	-	-	-	140	75
(10) Casate	-	-	-	135	50
(11) Calangaman	30	-	-	136	50
(12) Camambugan	-	-	-	121	75
Sub-total	30	-	-	1,599	750
Total	466	36	78	1,979	909

TABLE G.2-29 NUMBER OF RICE MILLERS AND MILLING CAPACITY (1984)

Municipality	Rice	Corn	Rice/corn	Total	Capacity (ton/day)
1. San Miguel	7	-	-	7	42.5
2. Trinidad	7	1	-	8	44.2
3. Ubay	12	-	-	12	78.6
Total	26	1	-	27	165.3

Source: NFA Region VII Cebu City

TABLE G.2-30 NUMBER OF RICE AND CORN RETAILERS /WHOLESALERS (1982)

Municipality	Retail Only		Wholesale Only		Wholesale/Retail	
	Persons	Units	Persons	Unit	Persons	Units
1. San Miguel	6	7	4	5	16	16
2. Trinidad	7	14	1	1	8	9
3. Ubay	31	33	2	2	33	41
Total	44	54	7	8	57	66

Source: NFA, Tagbilaran City

TABLE G.2-31 NUMBER OF WAREHOUSEMEN, WAREHOUSES & STORAGE CAPACITIES (1982)

Municipality	No. of Warehousemen	No. of Warehouse		Paddy/Rice Capacity (bag)
		Bonded	Non-bonded	
1. San Miguel	2	-	2	15,480
2. Trinidad	2	-	2	2,160
3. Ubay	8	-	9	25,500
Total	12	-	13	43,140

Source: NFA, Tagbilaran City

TABLE G.2-32 STOCK AND DISTRIBUTION OF PALAY SEED

Municipality	Year	Unit	Stock			Distribution			Balance	Variety
			Total	Carried Over	Purchase	Total	Within MCPT	Other MCPT		
1. San Miguel	1982	Cav.(50 kg)	30	-	30	30	30	-	0	
	1983		80	-	80	80	80	-	0	
	1984		15	-	15	15	15	-	0	
2. Trinidad	1982	Cav.(50 kg)	50	-	50	50	50	0	0	IR36, IR42
	1983		75	-	75	75	75	0	0	IR56, IR36, IR42
	1984		55	-	55	55	55	0	0	IR36, IR42, IR60
3. Ubay	1982	Cav.(50 kg)	- Not Available -			- Not Available -				
	1983		35	-	35	35	35	-	0	
	1984		10	-	10	10	10	-	0	

Source: Municipal Agricultural Offices
Note: MCPT .... Municipality

TABLE G.2-33 FARMERS' OPINION ON FARM MANAGEMENT WITH IMPLEMENTATION OF IRRIGATION PROJECT

Question	No. of Reply	% (N=25, 100%)
1. Coverage of any existing irrigation systems	0	0
2. Shortage of rain/water for crop production	25	100
a) For rice cultivation (affected farmers)	25	100
b) For diversified crops cultivation (affected farmers)	25	100
3. Drainage problems affection to crop production (affected farmers)	0	0
4. Rice variety selection with implementation of irrigation project		
a) HYV	11	44
b) Other varieties	2	8
c) Mixture of both local varieties and HYV	3	12
5. Holding of any idle land to be developed to irrigated land with implementation of irrigation project	3	12
6. Availability of capital for development of idle land with implementation of irrigation project, if such lands are available		
a) Available	2	8
b) Not available	23	92
7. Ability to bear full amount of development cost		
a) Yes	1	4
b) No	24	96
8. Reason of no ability to bear full amount of development cost		
a) Lack of fund	14	56
b) Others	11	44

Question	No. of Reply	% (N=25, 100%)
9. Problems to join IRRIGATORS' ASSOCIATION (IA)		
a) Dearth of knowledge on IA's operation	12	48
b) IA requires too much contribution	-	-
c) Unawarness of IA benefits	1	4
d) Lock of field organizers	12	48
e) Others	-	-
10. Suggestions to overcome such problems		
a) To intensify program campaign	9	36
b) To provide adequate manpower support	11	44
c) To provide necessary incentives to IA	5	20
d) To relax on memberships requirements	-	-
e) Others	-	-
11. Opinion on the important role of IAs		
a) Proper maintenance of irrigation terminal facilities	3	12
b) Proper operation in the equitable water	18	72
c) Implementation of agricultural development program	4	16
d) Collection of O & M fee and other obligations	2	8
e) Resolution of conflicts among members	-	-
12. Necessity of the active participation of IA to irrigation project		
a) Yes	25	100
b) No	0	0
13. Opinion on what stage of project implementation stage to participate		
a) Planning stage	13	52
b) Construction stage	-	-
c) Post-construction stage	12	48
14. Appropriate time to organize IAs		
a) Before start of construction work	7	28
b) Along with the construction work	-	-
c) After project construction	18	72
d) No interest	-	-

Question	No. of Reply	% (N=25, 100%)
15. Agreement to pay O & M fee		
a) "Yes"	25	100
b) "No"	0	0
16. Who provide guidance of farming technology		
a) Ministry of Agriculture and Food	23	92
b) Others	2	8
17. General assessment of the agricultural extension service by government agencies		
a) Satisfactory	0	0
b) Needs improvement (Ex. more technician, supervision of services)	25	100
18. Problems encounted in the villages		
a) Farm to market roads	8	32
b) Water supply of drinking water	4	16
c) Water supply of other domestic water	1	4
d) Water supply of livestock water	-	-
e) Quality seed supply	5	20

Source: NIA Farm Management Survey, 1985

TABLE G.2-34 FARMERS' SELECTION OF CROPPING PATTERN IN CASE OF "WITH IRRIGATION PROJECT"

Pattern	No. of Willingness	Percent
1. Rice - Rice	74	84
2. Rice - Corn	-	-
3. Rice - Other diversified crops	14	16
4. Sugarcane	-	-
5. Coconut	-	-
6. Others	-	-
Total	88	100

Source: NIA Farm Management Survey 1985

TABLE G.2-35 REASON IN SELECTION OF THE CROPPING PATTERN IN TABLE

Pattern	No. of Willingness	Percent
1. Easier cultural practices	16	18
2. Higher yields	70	80
3. Higher price/more profitable	1	1
4. Sufficient knowledge	1	1
5. Better market prospect	-	-
6. Others	-	-
Total	88	100

Source: NIA Farm Management Survey 1985

FIGURE G2–1 PRESENT CROPPING PATTERN IN THE AREA

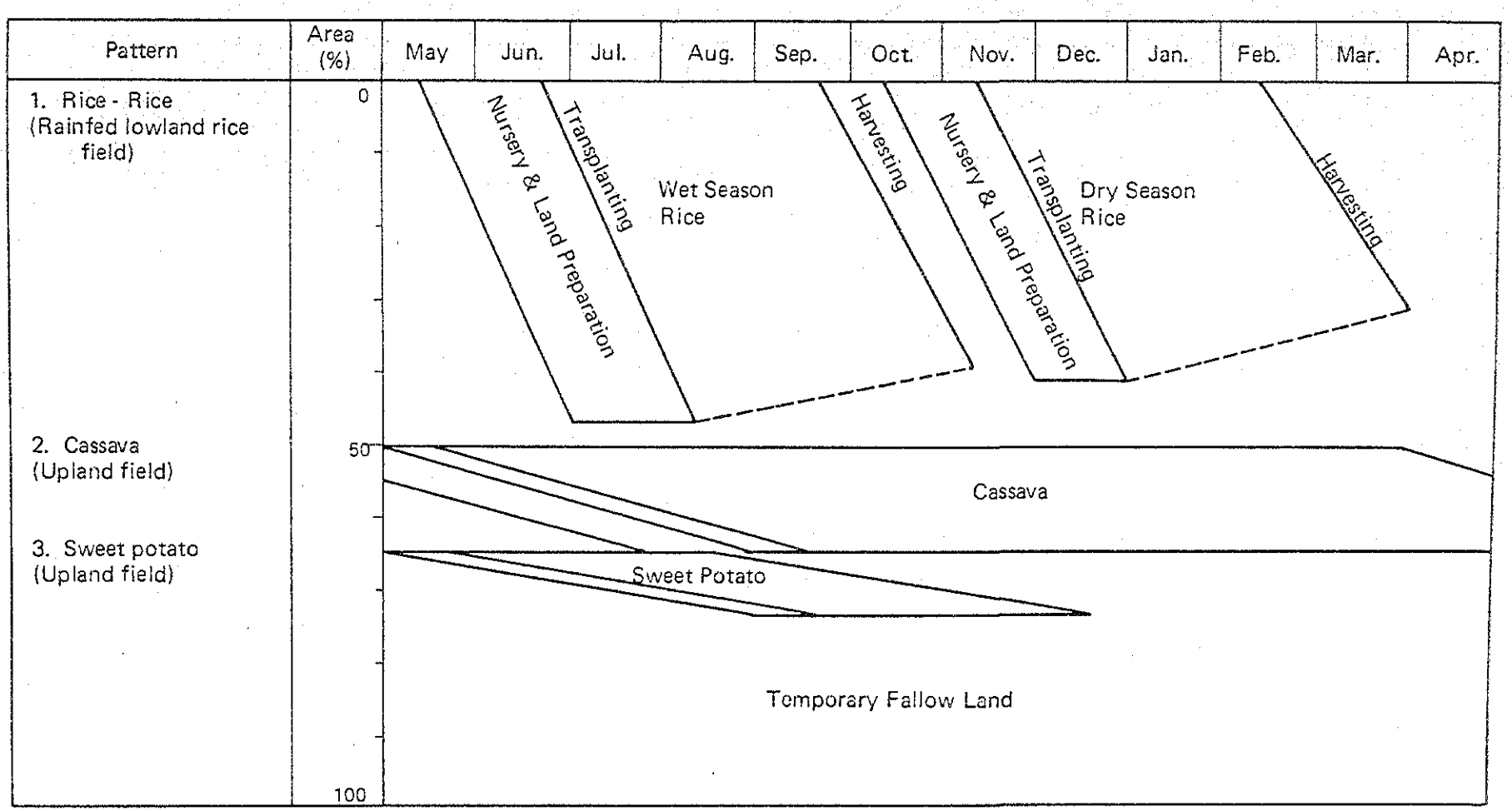
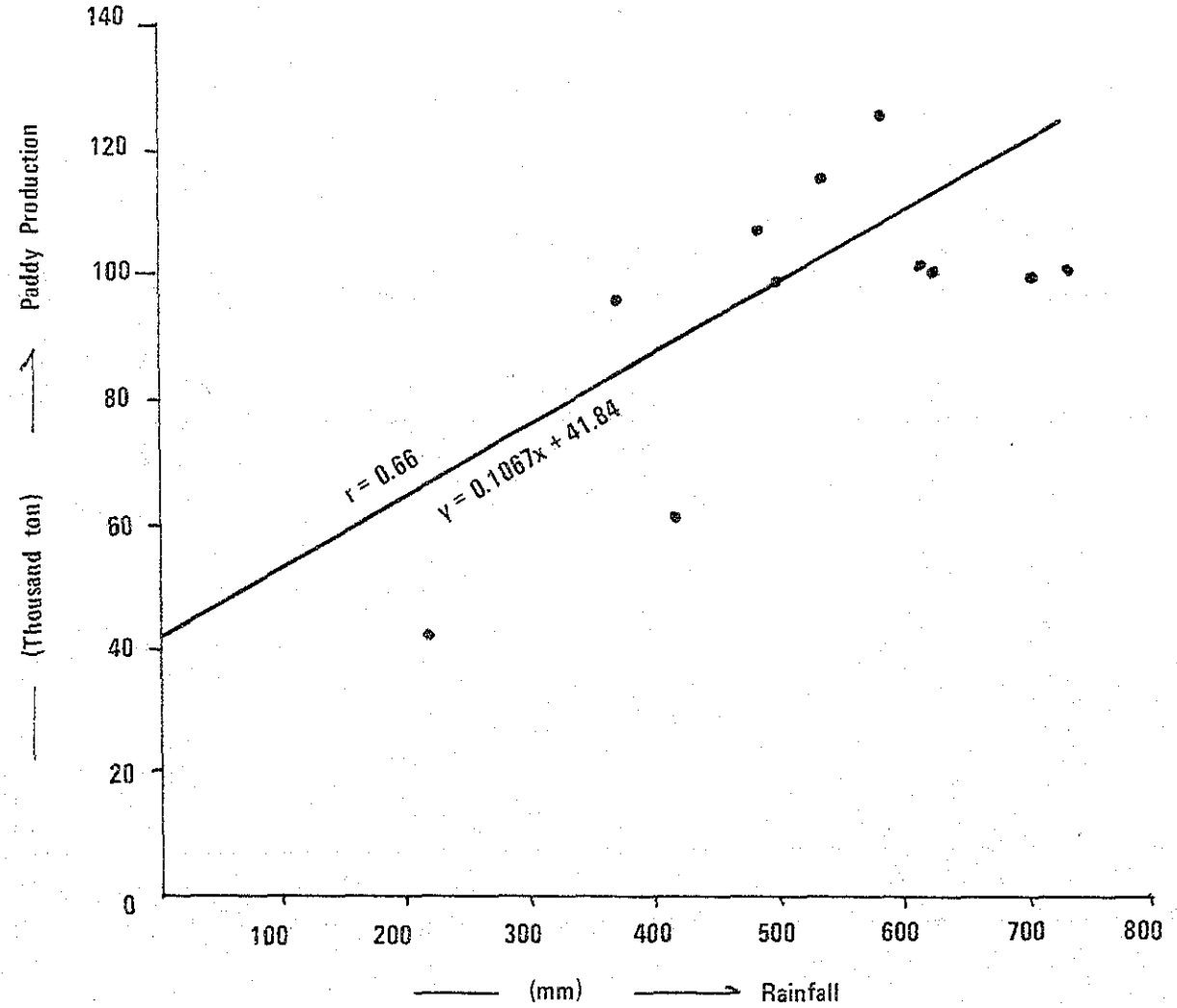


FIGURE G2–2 CORRELATION BETWEEN RAINFALL AND PADDY PRODUCTION



Source : See TABLE G.2-13

FIGURE G2–3 FARM LABOR BALANCE WITHOUT PROJECT

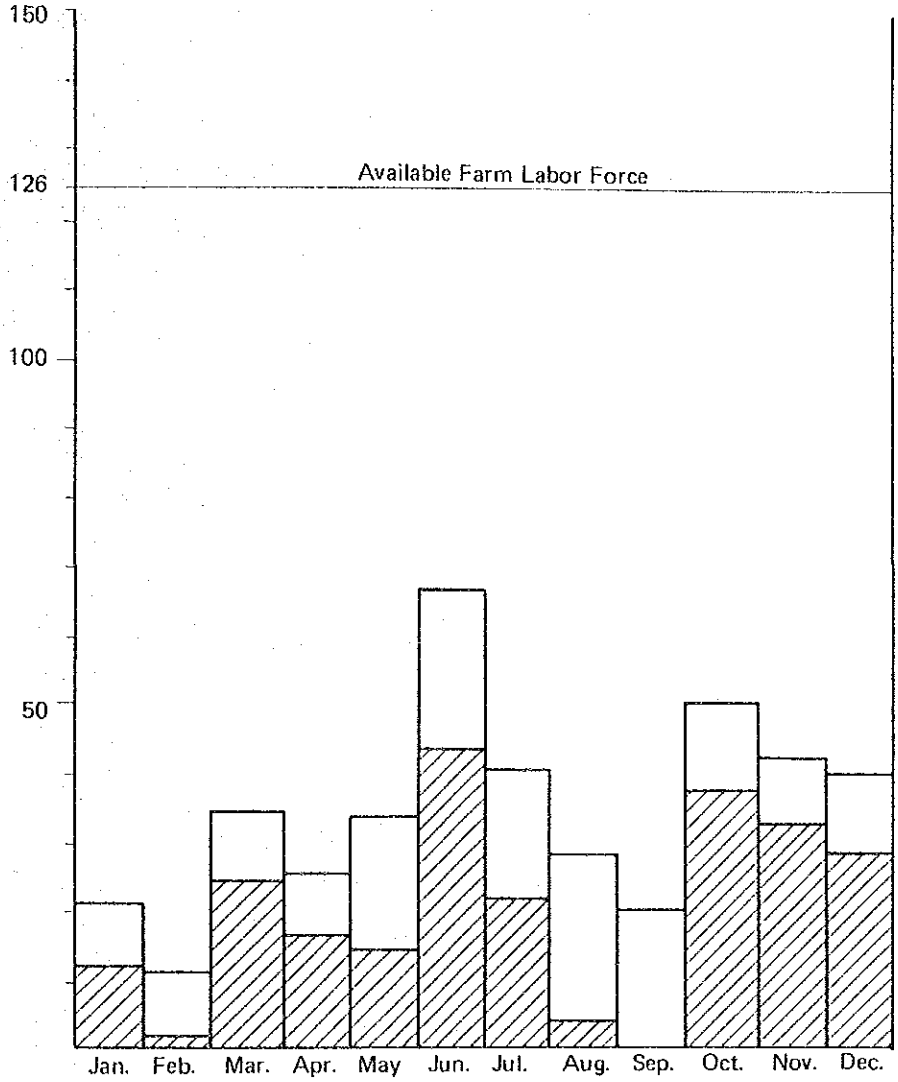
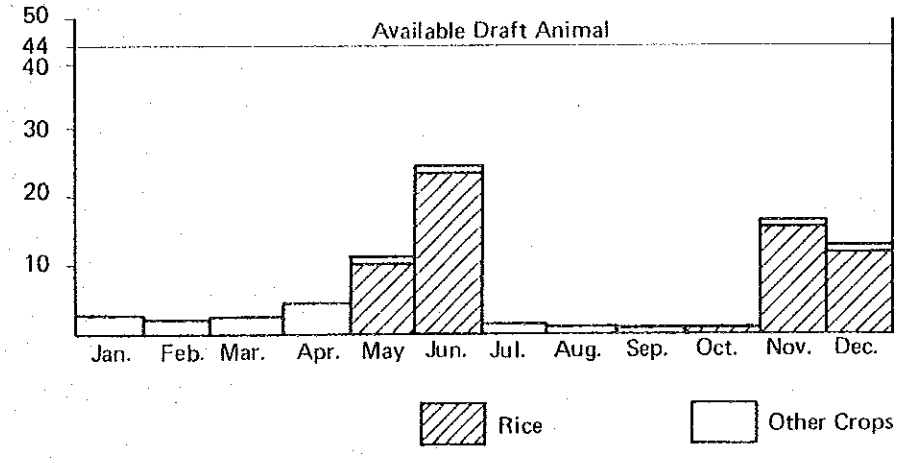


FIGURE G2–4 ANIMAL POWER BALANCE WITHOUT PROJECT



CHAPTER III AGRICULTURAL DEVELOPMENT PLAN

3.1 Crop Production

3.1.1 Crop Selection

Rice is selected as the basic crop for the irrigation service area while such diversified crops as bean , peanut, corn and feed grains, and fruit crops/vegetables are selected as the major diversified crops planted in the dry season after harvest of wet season rice in the rice field.

The proposed crops are selected mainly based on (i) soil suitability (ii) marketability (iii) farmers' interest and (iv) availability of irrigation water resources.

The following are the more detailed explanation of the crop selection;

a) Rice

Rice will be the main crop in the project Area, considering the following items;

(i) It is considered that rice is the most suitable crop in regard to the climatic and soil conditions;

(ii) Bohol is only one of the potential areas for attainment of the rice self-sufficiency in the Central Visayas. In the estimated rice supply-demand balance on the regional level, the expected increase of rice production after the project implementation inclusive of Phase II will not meet the existing deficit as shown in detail later.

b) Bean

Mungbean is a representative crop of beans. As mentioned previously, there is a need to increase mungbean production on

the provincial and regional levels. Moreover, leguminous crops have wide soil adoptability and effect of soil amendment.

c) Corn and Feed grains

Corn is taken as a representative crop. A nation-wide promotion of feed grains production is undertaken with a great effort because of the large-scaled shortage of feed grains like yellow corn and sorghum. Therefore there will be no problem in regard to marketability.

d) Vegetables

Vegetable production in Bohol province is limited and various vegetables are imported at a considerably large amount from outside the island , mainly Cebu. In order to improve these marketing conditions in Bohol province and also to supply sufficient vegetables for home consumption, vegetable production should be promoted especially in the dry season because the vegetables are scarce.

As for the crops in the rainfed upland fields, the existing major crops of sweet potato, cassava will be grown.

3.1.2 Cropping Pattern without Project

There are no available statistical data in regard with the time-series cropping pattern in the project area or even on the project municipality level. However, very small change of the cropping pattern in the project area for the past 15 years from 1970 to 1985 is estimated from the topography / land use maps prepared on the basis of 1970 aerial photograph and the similar maps prepared in 1985 by the Study Team in the two sample areas. Therefore, it is assumed that negligibly small change in cropping pattern will occur under the condition of without project in future.

3.1.3 Proposed Cropping Pattern with Project

Two cropping patterns are proposed for the irrigated rice

fields, these are (i) rice double croppings in wet and dry seasons (ii) wet season rice followed by diversified crops in dry season. The scale of annual cropping intensity is dependent upon the water availability in the proposed irrigation systems. As described in the former, the annual cropping intensity of 177 percent (83 percent in the wet season plus 94 percent in the dry season) is proposed for the average year from the viewpoint of irrigation water availability, while 200 percet of cropping intensity is attainable with the frequency of 22 years during the past 28 years. (See TABLE G3-1)

Hereinafter, the crop-land relationship and the area allotment in the proposed cropping pattern are shown on the basis of the above 177 percent annual cropping intensity;

a) Rice - Rice

The application of rice double cropping will be concentrated on the existing rice fields or the depressed portions of the conversion lands to new rice fields where drainage conditions are inferior to that of other elevated rice fields. The combined area of the existing rice field (1,700 hectares) and the more or less half of the conversion area (1,600 hectares) may correspond to this category land.

b) Rice - Diversified Crops

This type of cropping pattern will be applied to the remaining area of the irrigated rice fields (2,000 hectares) where the drainage conditions may be comparatively unfavorable to grow such proposed diversified crops, namely, bean (mungbean etc.), peanut, corn and feed grains (corn etc.) and fruit crop/vegetables (watermelon etc.). It is planned that each of the proposed diversified crops will have equal share in area allotment in this pattern.

The same cropping intensity of 177 percent, namely, 83 percent in the wet season rice and 94 percent in the dry season will be applied in both land category areas. (See TABLE)

The proposed cropping calendar of above-said patterns are prepared on the basis of the proper growth period of recommendable varieties of rice and other crops (See TABLE G3-2). As for rice cropping calendar, direct seeding is included. The proportion of transplanting area to the direct seeding area is estimated at 80:20 for the wet season cropping and at 70:30 for the dry season cropping respectively. (See TABLE G3-1)

From the viewpoint of the economical disease control to get the optimum yields of diversified crops, it is planned that these crops are planted in the late wet season and they are harvested from the late wet season to the early dry season as a general.

In the rainfed upland field, the same cropping pattern to the existing one will be applied.

3.1.4 Proposed Crop Production

a) *Farming Practices and Farm Inputs*

The proposed improvement of the existing farming practices and usage of farm inputs are as shown in TABLE G3-3 to TABLE G3-11. The proposed farming practices of rice include sowing 50 kg of the certified seeds/quality seeds in 400 square meters of stripped wet seedbed per one hectare of transplanting area and sowing directly 100 kg of quality seeds in case of direct-seeded method. Both rice cultivation methods of transplanting and direct seeding require fertilizers application of 60-40-0 and 70-40-0 per hectare, respectively in the wet and dry seasons. The avoidance of any side effect of agrochemicals to fish culture has to be taken into account because use of insecticides and herbicides on the minimum level would be inevitable. It is considered that such chemicals in the above table would be used safely, but further careful study would be needed.

b) Crop Yield and Production

The yearly yield increase of the existing crops in case of

without project is projected for eight years after project construction, where the increase rates are estimated at 0.4 percent, 0.7 percent and 0.2 percent respectively for rice, sweet potato and cassava from the increase trend of the past yeild.

On the basis of the attained yields for the respective props in the farmers' fields and experimental farms in the project area or its vicinity, the target yield of rice in the full development year is estimated at 4.2 ton/ha for the wet season crop and 4.5 ton/ha for the dry season crop. No significant difference of yields between transplanted and direct seeded rice would be expected. The target yeilds of the diversified crops are estimated at 1.0 ton/ha for mungbean, 1.7 ton/ha for peanut, 2.7 ton/ha for corn and 8.9 ton/ha for vegetables respectively. On the other hand, the target yields of the rainfed upland crops of cassava and sweet potato are estimated at 14.2 ton/ha and 10.8 ton/ha respectively.

Full development year is set up at the fifth year after project construction in the existing cultivation area and the eighth year after project construction respectively. A total of the rice production in the full development year is projected at about 33,400 tons per year, which is about 10.2 times the estimated production without project.

The process of yield estimation on the rice is as follows;

1) Estimation of Potential Yield

The following is the experimental data on paddy yield at the three national experiment stations inclusive of Visayas Rice Experiment Station.

Experimental Yield

Season	Nitrogen Application (kg/ha)				
	0	30	90	120	150
Wet	3.3	3.9	4.5	4.2	-
Dry	3.5	-	4.7	5.3	5.4

Note: (1) Unit of yield: ton/ha
(2) Experimental yield: Average yield for the latest 6 HYVs at three national experiment stations BPI, 1975

The quadratic equations of regression between yield (y) and nitrogen application (x) are shown as follows:

Wet season crop: $y = 3.28 + 0.025x - 0.00014x^2$
Dry season crop: $y = 3.50 + 0.029x - 0.00011x^2$

The curves of the equations are shown in FIGURE G3-3.

2) Attained Paddy Yield in the Project and Its Vicinity

From the collected data, following yield is obtained as the representative yields. These are attained in the fields where irrigation and drainage conditions are similar to the proposed facilities for the project;

	Yield (ton/ha)	Nitrogen Application (kg/ha)
Wet season crop 1/	4.4	90
Dry season crop 2/	4.7	90

Note: 1 See TABLE G3-12
2 See TABLE G3-13

These yield data are substituted for above mentioned regression equations of experimental yields. As a result, following equations are obtained.

Wet season crop: $y = 3.28 + 0.025x - 0.00014x^2$
Dry season crop: $y = 3.00 + 0.029x - 0.00011x^2$

These equations are assumed as the yield curves which express the yield of "after project". The figure of the curves are shown in FIGURE G3-3.

3) Yield at Optimum Amount of Nitrogen Application

Optimum amount of nitrogen application and their yields

are computed as follows:

Wet season crop:

$$\text{Opt. nitrogen (kg/ha)} = \frac{0.025Py - Pn}{2(0.00014xPy)} = 72 \text{ kg}$$

Yield at the nitrogen application = 4.4 ton/ha

Dry season crop:

$$\text{Opt. nitrogen (kg/ha)} = \frac{0.029Py - Pn}{2(0.00011xPy)} = 110 \text{ kg}$$

Yield at the nitrogen application = 4.9 ton/ha

Where Py = ₱2,880 (Paddy price per ton)
Pn = ₱13.8 (Nitrogen price per kg)

4) Estimation of the Yield at Different Land Classes

The yields at optimum amount of nitrogen application are regarded as the yield of land class 2R according to the Land Class Map in the project area. Then the potential yields and the yields at the different land classes are estimated as follows;

Yield at Different Land Classes

Land Class	Range of Productivity	Average Productivity Rating	Estimated Yields (ton/ha)	
			Wet Season	Dry Season
Potential Yield	100	100	5.18	5.76
1R	90 - 100	95	4.9	5.5
2R	80 - 90	85	4.4	4.9
3R	70 - 80	75	3.9	4.3

5) Target Yield

The land class of rice field is classified into 2R (second class for rice cultivation) throughout the project area according to the Land Class Map. As shown in the above, 4.4 tons/ha of the wet season rice and 4.9 tons/ha of the dry season are attainable with application of optimum amount of fertilizers. However, it is considered that these optimum amounts of fertilizers are too high for the project farmers to apply. Therefore, the corresponded yields to the nitrogen application of 60 kg/ha and 70 kg/ha, namely 4.2 tons paddy/ha and 4.5 tons of paddy/ha are set up as the target yields. These target yields are expected to be attained within five

years after project construction in the existing paddy fields and the eighth years after project construction in the newly developed rice fields.

6) Total Amount of Paddy Production

The total amount is estimated at about 35,000 ton per year as follows;

Season	Harvested Area (ha)	Yield (ton/ha)	Production (ton)
Wet	4,420	4.2	18,564
Dry	3,300	4.5	14,850
Total	7,720		33,414

The target yields of the diversified crops are estimated as shown in TABLE G3-14. The yearly yield projection of respective crops is summarized in TABLE G3-15. The total crop production in the full development year is shown in TABLE G3-16.

3.2 Food Demand and Supply Balance

3.2.1 Rice

An increment of paddy production at 30,120 tons would be expected in the project area. The provincial-wise rice supply-demand balance is estimated as follows, taking into account the incremental paddy of about 37,000 tons in Phase I and about 30,100 tons in Phase II.

Rice Supply and Demand Balance in Bohol (2000)

Item	Without Project	With Project
1. Supply of paddy	114,800	181,900
2. Annual demand*		
103 kg per capita consumption	124,920	124,920
120 kg	144,580	144,580
130 kg	156,140	156,140
3. Balance		
103 kg per capita consumption	-10,120	56,980
120 kg	-29,780	37,320
130 kg	-41,340	25,760

Note: * Estimated on the basis of 966,400 population with rice eating population at 695,800 (70 percent)

In case of rice consumption of 130 kg/year per capita, surplus of paddy at 25,700 ton will be exported outside Bohol province.

3.2.2 Corn

Traditionally, the supply and demand balance of corn in the central Visayas and also in Bohol province has shown a large shortage. The corn balance in the three municipalities concerned with the project area is in the same condition. This deficit would still continue in Bohol province even after project completion.

Corn Supply and Demand Balance (2000)

Item	Without Project	With Project
1. Corn eating population		
Bohol	277,700	277,700
Three Municipalities	24,221	24,221
2. Production (ton)		
Bohol	20,100	21,230
Three Municipalities	255	1,385
3. Consumption (ton) 1/		
Bohol	25,548	25,548
Three Municipalities	2,228	2,228
4. Balance (ton)		
Bohol	-5,448	-4,668
Three Municipalities	-1,973	-1,193

Note: Per capita consumption is estimated at 145 kg/year

3.2.3 Mungbean

After completion of the project, mungbean production in the project area would occupy about 22 percent of the total cropping area in Bohol. But the incremental volume could not cover the deficit as follows;

Supply and Demand Balance of Mungbean
in Bohol (2000)

Item	Without Project	With Project
1. Population	991,930	991,930
2. Production (ton)	446	866
3. Consumption (ton)	1,389	1,389
4. Balance (ton)	-943	-523

3.2.4 Peanut

With implementation of the project, cropping area of peanut would increase to 1,160 hectares from 735 hectares in Bohol province while the existing production of 669 tons would expand to 1,380 tons. The balance of 711 tons could be exported to Cebu as described in the below. As the population of Cebu province is forecasted at about 2.7 million persons in the year of 2000, the annual consumption is estimated at 1,620 tons, where 0.6 kg of annual consumption rate is applied. When the share of Bohol peanut is assumed at 45 percent, the balance of 729 tons would be marketable as fresh food in Cebu province.

3.2.5 Vegetables

Per capita supply of vegetables in Bohol province is estimated at only 0.68 kg per year at present. The amount of 0.68 kg would be reduced to 0.61 kg in case of without project. However with completion of the project, the self-supply per capita will be increased to 4.4 kg as follows.;

Supply and Demand Balance of Vegetables
in Bohol (2000)

Item	Without Project	With Project
1. Population	991,930 persons	991,930 persons
2. Production	605 tons	4,343 tons
3. Consumption	6,983 "	6,983 "
4. Balance	-6,378 "	-2,640 "
5. Production Per capita	0.61 kg	4.38 kg

3.3 Farm Management Plan

3.3.1 Land Holding Size

With the project implementation, the rice field will be expanded from 1,780 hectares to 5,300 hectares whereas rainfed upland field will be reduced from 1,900 hectares to 1,200 hectares. The coconut land of 1,230 hectares will be maintained while 3,090 hectares of grassland will be converted to 2,170 hectares of rice field and 920 hectares of upland field. Relating to the development of these rice fields and upland fields, special measures have to be taken by the Government so that the landless farmers and project farmers outside the Project area will settle in the area to be developed, especially the estate farm areas where most of land are left idle at present.

It is assumed that the existing average farm size of 2.7 hectares will be maintained with the following number of farm;

No. of Farm			Area		
Total	Existing	Newly Settling		Total Farm Area (ha)	Average Farm Size (ha)
2,860	2,280	580	Total	7,730	2.7
			Rice Field	5,300	1.9
			Upland Field	1,200	0.4
			Coconut	1,230	0.4

Note: The number of existing farm is shown in TABLE G3-17

3.3.2 Cropping System

In the irrigated rice field, double cropping of rice will be practiced continuously in the existing rice fields and also in low elevation areas of the newly developed rice fields. On the other hand, the cropping pattern of "the wet season rice and the diversified crop in the dry season" will be introduced in the remaining area where drainage condition is superior to the former areas due to the more elevated lands. Naturally it is recommended to rotate the diversified crops in the rice fields

for the maintenance of soil fertility.

Followed the existing cropping pattern in the upland field, cassava and sweet potato will be grown in the full area with applying enough amount of fertilizers.

3.3.3 Mechanization and Labor Balance

a) Mechanization

Farm mechanization plan is formulated as follows;

1) Basic Plan of Farm Mechanization

With the increase of cropping intensity after the irrigation project, cropping operation should be carried out according to the water management schedule to secure economical water utilization. This is the main reason why farm mechanization will be required after the irrigation project. Other purposes of mechanization are the decrease of yield losses caused by the delay of farm operation and also the yield increase by means of deep plowing.

Under the present condition that few machinery is introduced in the project area, it is recommendable that partial mechanization will be introduced with a minimum number of machinery for the supplemental use of animal power and man power. The maximum use will be made with the minimum number of machinery by applying collective use of machinery among farmers' groups or contractor-base use of machinery. (See TABLE G3-18)

For the land development of new rice fields, introduction of middle size 4-wheel tractors (40 to 50 horse power) is planned in each Irrigation Block (average size = 320 ha) under the project. These tractors could be re-utilized for farming purposes after developmeng works. Use of tractors may be managed by the project office at the initial stage, but afterward tractors will be used among farmers through transfer to farmers' groups or contractors.

Besides the above said 4-wheel tractors, it is planned that three kinds of small farm machinery, power tillers, threshers and driers will be introduced for the partial mechanization.

2) Farm Machinery Selection and Area Coverage

There are three types of recommended farm operation methods for rice cultivation as shown in TABLE G3-18. Out of these three types, two types of operation methods are partially mechanized with use of 4-wheel tractors or power tillers and other related machinery. The remaining type of farm operation method relies on draft animal. The selection of farm machinery and the estimated area coverage of mechanization in the two type of farm operation methods are as follows;

Area Coverage of Farm Mechanization by Operation

Operation	Selected Machineries		Degree of Mechanization (%)
	Machinery	Attachment	
(1) Land preparation	4-wheel tractor (40-50 HP Diesel)	Rotary (1.6 m)	20
(2) Land Preparation	Power tiller (7-8 HP Diesel)	Plow (0.25 m), Harrow (1.5 m)	45
(3) Threshing	Power thresher (Axial flow, 7-8 HP)		75
(4) Threshing	Pedal thresher		25
(5) Drying	Dryer (2-ton Flat bin, 5 HP)	- (Supplemental drying)	60

The capacity and efficiency of the selected machinery are shown in TABLE G3-19. These machinery is available locally. The farm operation method with mechanization by 4-wheel tractor in TABLE G3-18 could be adopted for the most of the diversified crops except for the operation of threshing. The threshing work of the most diversified crops will be done manually.

3) Farm Machinery Requirement

The number of the selected machinery is computed in the below with assumption that the required number of machinery will be introduced in each turn-out command area (average size = 40 ha) except for the 4-wheel tractors, applying the operation efficiency of the selected machinery is shown in TABLE G3-19.

(i) 4-Wheel tractor

One unit of four-wheel tractors will be used in each

Irrigation Block (average size = 320 ha) as follows;

Mechanized area per Irrigation Block: 64 ha
= 320 ha x 20% (Degree of mechanization)

Efficiency: 0.5 days/ha/unit

Workable days: 36 days = 48 days x 75%
where 48 days ... land preparation period
75% ... assumed ratio of workable days

Required unit per Irrigation Block:
0.5/ha/unit x 64 ha ≒ 36 days = 1 unit

(ii) Power tiller

Two units of power tiller are required in each turn-out command area as follows;

Mechanized area: 18 ha = 60 ha x 45%
(Degree of mechanization)

Efficiency: 4 days/ha/unit

Workable days: 36 days = 48 days x 75%
where 48 days ... land preparation period
75% ... assumed ratio of workable days

Required unit per turn-out command areas:
*/ 4 days/ha x 18 ha ≒ 36 days = 2 units

Note: */ ... 4 days = 1.8 days (Plowing) + 1.3 days (First harrowing) + 0.9 days (Final harrowing)

(iii) Thresher

One unit of power thresher will be operated for 75 percent of the expected paddy production in each turn-out command areas and two units of pedal threshers will be operated for the remaining production as follows;

Power thresher

Mechanized area: 30 ha = 40 ha x 75%
(Degree of mechanization)

Efficiency: 1.0 days/ha/unit

Workable days: 30 days = 50 days x 60%
where 50 days ... Harvesting period
60% ... Assumed ratio of workable days

Required unit per turn-out command areas:
1.0 days x 30 ha ≒ 30 days = 1.0 unit

Pedal thresher

Area coverage: 10 ha = 40 ha x 25%
(Degree of mechanization)

Efficiency: 6.2 days/ha/unit

Workable days: 30 days = 50 days x 60%

where 50 days ... Harvesting period

60% ... Assumed ratio of workable days

Required unit per turn-out command areas;

6.2 days x 10 ha ≒ 30 days = 2 units

(iv) Dryer

To assure the quality of palay, palay is stored/milled at 14 percent moisture content (MC). For the purpose, one unit of dryer is required for supplementary drying from 18 percent MC to 14 percent MC in each turn-out command area as follows;

Area coverage: 24 ha = 40 ha x 60%
(Degree of mechanization)

Efficiency: Palay 4.0 ton/day = 2.0 ton/bin x 2 rotations/day

Workable days: 50 days x 0.6 = 30 days

Required unit per two turn-out command areas:

24 ha x 2.1 ton/ha 30 days x 4.0 tons/day x */ 80% = 1 unit

Note: */ ... 20% operation loss

The remaining palay would be dried by sunshine only.

4) Machinery Cost

The machinery cost per ha for rice cultivation is estimated as follows:

Fixed cost:	₱515
Variable cost:	₱383
Total	₱898/ha (See TABLE G3-20)

Note: Above figures mean average machinery cost for the every case of farm mechanization

The average cost of draft animal is estimated at ₱165 per ha as in TABLE G3-21. The combined cost of the machinery and draft animal is ₱1,063 per ha. Some minor cost of transportation facilities is not included in the estimated cost. Therefore, 10 percent

of contingency is added to the above estimate. Finally, the estimated cost is ₱1,169 ≒ 1,200 per ha.

5) Labor and Draft Animal Requirement

The labor and draft animal requirement of the project crops are estimated in TABLE G3-22 to G3-27.

3.3.4 Farm Labor Balance

The labor requirements of the project crops per hectare for both cases of "Without mechanization, by animal power" and "With mechanization" were estimated as shown in TABLE G3-22 to G3-27.

Supposing that two men of the converted labor force will be available per farm on the average in the project area, the farm labor balance between supply and requirement was estimated for the year of 2000, as shown in TABLE G3-28. The existing low employment opportunities will be improved to a considerable extent with increase of labor requirement and more equitable distribution of monthly labor requirement. As seen in the above figure, the monthly distribution of labor requirement will balance the available labor force in the project area.

3.4 Animal Husbandry

3.4.1 Selection of Livestock

The cattle breeding/fattening and hog raising are most recommendable among various kinds of livestock and poultry, aiming sufficient supply of beef and pork at all times in Bohol province. The maximum utilization of such byproducts as rice straw, rice bran, tops of sweet potato, bulb screenings of sweet potato and cassava so on, and also the utilization of idle lands for pasture and forage crops should be promoted. Carabao-calf production, piggeries production and goat raising are also recommendable not only to raise farmers' income level but also to revitalize the soil fertility in the project area.

3.4.2 Livestock Production Plan

It is planned that the following five types of animal husbandry will be managed by about two thirds of the total farms in the project area through upgrading the existing producers or establishing new producers; i) cattle fattening combined with cattle breeding ii) carabao-calf production with one breeding female, sale of offsprings after the third year iii) hog fattening producing ten fat animals per year iv) piggeries production with raising two sows v) goat raising with one buck and ten does. Number of participating farms and the total of annual production are estimated at in TABLE G3-29. Bureau of animal Husbandry should be responsible for providing the concerned farmers with initial stock of animals and technical assistance, combined crop/livestock loans or specific livestock loans also have to be provided the concerned agencies. The labor requirement of the animal husbandry is shown in TABLE G3-30.

3.5 Fishery

The development of fish culture is promoted by the Provincial Development Council in the Five-year Development Plan (1983 - 87). The main strategies include the development in steady supply of fry/ fingerlings and strengthening extension service. In the Comprehensive Development Plan of Trinidad, the development of fingerlings reservation area is proposed to stabilize prices of fingerlings and to eliminate the shortage of fingerlings. The concerned facilities are planned to construct as Soon by 1990 by Bureau of Fisheries and Aquatic Resources.

In Ubay, about 750 hectares of fishponds is managed by 66 operators already. During the field survey of this sutdy, it is revealed that Ubay Fishpond Operating Cooperation prepared feasibility study on the development of new fishponds.

The construction of not only two reservoirs namely, Bayongan and Capayas reservoirs but also village ponds in 22 Barangays is planned in the project. The utilization of the reservoirs and village ponds for fish culture is proposed to improve malnutrition in the rural area and also to generate additional income. The water surface areas of Bayongan and Capayas reservoirs amount to about 140 hectares and 40 hectares respectively. Aggregated water surface area of 22 village ponds is 3.5 hectares (40m x 40m x 22 ponds).

Aqua-farming methods to be applied in the project area pond culture and cage fish culture. It is reported that the productivity of floating cages are 10 to 20 times higher than that of pond culture in terms of production per unit input volume and area size. But the cage culture is a specialized system and needs much capital cost.

Fish culture using 22 of the village ponds is to raise such fishes as tilapia, carp, hito, etc. Tilapia production is a most popular and profitable backyard industry. The marketing of fish culture produce in the project area will be handled by co-operatives, fish vendors and Kadiwa Center.

3.6 Supporting Services

3.6.1 Extension Services

It is essential to strengthen agricultural extension activities for the achievement of the project target. The following items of strengthening are planned;

1) At least one field technologist and one livestock inspector have to be staffed in every three barangays to provide farmers with adequate and systematic extention services, which is planned in the Reginal Five-year Plan (1984 - 87);

2) Training of extension personnel especially in the following items; i) proper soil management and fertilization for the soils of low fertility and nutrient deficiency. ii) On-farm irrigation technique; iii) proper quality control of agricultural product.

3) Provision of adequate transportation facilities and audio-visual equipments

4) Demonstration of the modernized irrigation farming methods.

During the initial stage of the project implementation, the pilot scheme will be established and operated for the extension activities in the project area nuder the project. The success of pilot scheme will significantly contribute for the project to attain the full target within the planned period.

3.6.2 Cooperative Activity

Paddy production will be expanded from 3,100 ton to 33,400 tons. On the other hand, the upland crops production will amounts to 21,000 tons with the project. To attain the production target, about 400 tons of rice seeds, 4,500 tons of fertilizer, and 500 tons of pesticides and herbicides are required.

How shall the marketing of the increased outputs and inputs as shown in the above and also credit services to purchase the inputs be managed? Although the greater parts of inputs and outputs are presently managed by dealers with limited amounts at present, it is important that the functional cooperative activities will be promoted in the project area. The activities of the San Miguel Farm Marketing Cooperative has directed the cooperative movement which is needed in the project area.

Establishment of the Farm Marketing Cooperatives in Trinidad and Ubay and also the expansion of the San Miguel Farm Marketing Cooperative are required to manage the marketing as described in

the above. The outline of functions to be required in the co-operative activities is as follows;

(i) Marketing contract, crop insurance, credit services and education of Samahang Nayon members
(ii) Rice milling, storage, trucking, and management of workshop for farm machinery

Cooperatives shall be organized by stockholders. Crop insurance service is an imperative matter to give an incentive to the commercialized farmers. The updated Philippine Development Plan, 1984 - 1987 adopts the group farming scheme to foster strong linkage between production, processing and marketing. Activities of Farm Marketing Cooperative should be promoted through coordinating the group farming groups.

NIA has promoted the establishment of the irrigators' association so as to cover various tasks such as procurement of farming materials, credit, marketing etc. It is an actual situation that farmers does not have enough cash to purchase fertilizers and chemicals. Therefore, NIA shall pay it in advance instead of farmers. The payment contracts which shall be made between NIA and the members of irrigator's association will enable farmers to get inputs. In this way, the irrigators' association would function as pre-cooperatives at an initial stage of the project implementation.

3.6.3 Plan of Pilot Project

a) Objectives

With the project implementation, the target in the agricultural development plan will not be achieved by the proposed full development year, if the farmers would still follow the existing traditional farming practices. In order to make familiar with the modern irrigation farming methods quickly, it is proposed to establish a pilot scheme.

At least within the second year of the project implementation, one pilot farm should be developed to conduct the trial and demonstration activities in the farmers' fields, which has same infrastructure to that of the project.

There is another problem associated with the project implementation, which is supply of quality seeds for the project ares. In the full development year of the project, some 5,300 hectares of rice field will require about 100 tons of rice quality seeds for renewal. Most of the right varities seeds should be supplied timely from the pilot farm where seed production technology will be applied. The seeds of other crops also should be supplied in the same way as rice seeds.

b) Location of Pilot Farm

The selection criterior of the Pilot Farm are as follows;

(i) Strategic location along the major highways and near to a community
(ii) Availability of irrigation water source
(iii) Farmers' willingness to take part in the Pilot Project

According to the above said criteria , the proposed site of the pilot farm is selected in the Capayas Irrigation System where the pilot farm is faced on the highway. The site should correspond to the command area covered by the one of the proposed turnout in the main project. Temporary irrigation water supply is needed by the pumping water from the Bayong river under the pilot scheme.

c) Project Facilities and Operation

The management staff in the proposed organization of the pilot scheme will be headed by a project manager who is a rice agronomist with good background on seed production and soil management. The manager will be supported by four staff members, namely a diversified crops agronomist with background of water management, an agricultural engineer with land development and farm mechanization inclusive

of post harvest technology, and a farm management specialist with strong background of economics. These staff should be sufficiently qualified and experienced with the necessary training.

3.6.4 Farmer Irrigators' Association

It is proposed that four levels of irrigators' organization are established for operation and maintenance of the irrigation systems as follows;

(i) Rotational Unit Group on supplemental farm dich level (averagely 5 to 10 hectares)
(ii) Farmer Irrigators' Group on turnout level (averagely 25 to 50 hectares)
(iii) Farmer Irrigators' Association on operation division level (about 1,000 hectares)
(iv) Federation of Farmer Irrigators' Association (Project level)

Prior to the construction of the Project, as earlier as possible, the first two levels shall be organized with bottom-up approach from Rotational Unit Group to Farmer Irrigators' Group. Though enabling the beneficial farmers to participate in the Project even at initial stage, the farmers have to acquire participative and problem-solving oriented behavior and to develop values of collective action as they confront irrigation-related issues ranging from review/revision of tentatively planned canal alignment to construction of on-farm facilities. The latter two levels organizations should be formally established in the phase of operation and maintenance of the irrigation facilities. The project is to be responsible for supplying adequate supporting service in organizing four levels Farmer Irrigators' Organizations, and also for designing of on-farm facilities which will facilitate on-farm development. For the on-farm development of irrigation facilities, it is recommendable that the concerned farmers with the said Irrigators' Group will be hired by NIA for the construction works. The funds of the on-farm development should be born by the land owners through the specific loan.

Ultimately, the Irrigators' Association will carry out by

themselves operation and maintenance works on the lateral canal level facilities, that is, planning and implementation of water distribution, collection of amortized project cost and irrigation fee. However, such process of the staging transfer of operation and maintenance from the on-farm level (first stage) to the lateral canal level (last stage) would be taken. Namely, at the first stage, organizing of Irrigators' Association has to be implemented on the lateral level in the project. In the Capayas Irrigation System which is solely covered by Operation Division 5 Area, the Irrigators' Association has to be organized at first and followed Operation Division 1 Area to Operation Division 4 Area.

The proposed irrigation area includes new development area to rice fields from grassland. Generally, landowner will bear the development cost of new rice fields. However, new settlers to new rice fields have to purchase the grasslands or the developed rice fields. Therefore, it is required that the Irrigators' Association should have the function of collective loan borrowing for purchasing lands and rice fields development.

Few estate farms owned a large area of grasslands to be developed into rice fields. Regarding the development of grasslands ; inclusive of lands owned by estate farms, it is recommended that following procedures will be taken;

(i) Government authority will purchase the grassland in the said estate farms and develop the lands to rice fields. The developed rice fields will be purchased by the settlers to the lands.

(ii) The other reclaimable grasslands owned by the smaller holders of the lands will be purchased directly by the new settlers or the developed rice field by the holders will be sold to new settlers.

The new settlers organize the Farmer Irrigators' Group to borrow funds for purchasing cost and reclamation cost. It is recommended that new fund for land purchasing and land reclamation should be established through introduction of two step loan system of bank and domestic bank.

3.6.5 Processing and Marketing

a) Paddy Processing and Facilities

Paddy production in three municipalities was averaged at 7,132 tons for wet season during 1982 to 1984 and 1,970 tons for dry season during 1983 to 1984. This paddy was milled by 27 milling equipment located in three municipalities. Total capacity of 27 mills was estimated at 3,305 bags or 165 tons per day. If about 20 percnet of paddy produced in the wet season (1,400 tons) is marketed, the capacity of 27 mills will be enough to operate within 10 to 15 days.

According to the crop production plan, paddy volume of 18,500 tons with the project would be harvested during 20th September to 10th November. If new paddy grains have to be milled by the end of November at the full development stage, the present mill and storage capacity will not be enough.

The following three cases for establishment of new mill and storage were stuided.

Projection of Additional Mill and Storage

Study Case	Mill		Storage	
	Present Capacity	Additional Capacity	Present Capacity	Additional Capacity
	(ton/day)		(ton)	
A	165	165	2,157	7,200
B	165	200	2,157	2,157
C	165	250	2,157	-

b) Marketing Facilities for Input Materials

Paddy seeds shall be renewed at the interval of once per four years. The certified seeds of 100 tons per year (400 tons ÷ 4) have to be supplied in the project area. New seed farm is recommended to be supplied in the Pilot Farm as described earlier.

Fertilizer requirement amounts to about 3,200 tons in Phase I and about 4,500 tons in Phase II, that is totalized at 7,700 tons. These fertilizer has to be shipped from Cebu port. In 1982, fertilizer of about 4,000 tons was unloaded at Tagbilaran port. Maximum monthly volume was shipped at about 1,400 tons in October. After completion of the Bohol Irrigation Project Phase I and Phase II, the marketed volume of fertilizer would be increased three times of the existing amount. Unless there is an increase in number of vessel, the controlled distribution system with additional new warehouses has to be applied.

c) Livestock Development Facilities

Trinidad and San Miguel formulated the comprehensive development plan in 1984. To encourage the farmers to engage livestock and poultry production, the development of pastures, establishment of feedmills, feedgrains marketing program and construction of slaughterhouse is planned as follows.

Livestock Development Facilities

(Unit: ₱ '000)

Project	Locations	Cost	Schedule Implement	Implementing Agency
San Miguel				
Feedmill	Bayongan	1,000	1985-88	Ministry of Human Settlements
do.	Poblacion	750	do.	Bank
Slaughter House	Poblacion Mahayag	60,000	1985-86	Provincial Government
Trinidad				
Feedgrains Marketing Program	All balangays	-	1980-90	NGA, BAEx
Slaughter House	Poblacion	30,000	1981	MPWH/Municipality

Source: Comprehensive development plan in 1984

According to the Provincial Development Council's Development Plan (1983 - 87), establishment of the animal breeding centers at 12 places is scheduled in Bohol province. These centers shall contribute to encourage farmers to use pure bull-artificial insemination services.

Agricultural Promotion Center in Tagbilaran undertakes the experiment on the processing of the new feed from cassava and ipil-ipil leafmeal. Ipil-ipil branches with leaves and fresh cassava tubes are processed into pellet freeds mechanically. As the production of feeds at a low cost is essential to develop animal husbandry, it is recommend that the Ubay Stock Farm Station should promote the processing of the said new feeds.

d) Manufacture of Lime

Under the Provincial Development Council's Development Plan, the manufacturing factories of industrial and agricultural lime are planned to be constructed in both municipalities of Ubay and Trinidad. This project shall be promoted to be realized.

TABLE G3-1 PROPOSED CROPPING PATTERN (AVERAGE CROPPING INTENSITY)

(Unit: ha)

Pattern/Crop	Total		Bayongan		Capayas	
	Wet	Dry	Wet	Dry	Wet	Dry
1. Irrigated Rice Field 1/	-	-	-	-	-	-
(1) Rice - Rice Area	-	-	-	-	-	-
-Rice (wet & dry seasons)	2,940	3,300	2,300	2,580	640	720
(2) Rice-Diversified Crop Area	-	-	-	-	-	-
-Rice (wet season only)	1,480	-	1,150	-	330	-
-Beans (Mungbean)	-	420	-	330	-	90
-Peanut	-	420	-	330	-	90
-Corn and Feed Grains (Corn)	-	420	-	330	-	90
-Fruit Crops/Vegetables	-	420	-	330	-	90
2. Upland Field, Rainfed	1,200	-	980	-	220	-
(1) Cassava	720	-	590	-	130	-
(2) Sweet Potato	480	-	390	340	90	-

Note: 1/ .... Annual cropping intensity is estimated at 177 percent for the average year on the basis of water balance study (83 percent in the wet season and 94 percent in the dry season year)

TABLE G3-2 PHILIPPINE SEED BOARD REPORT as of MAY, 1983

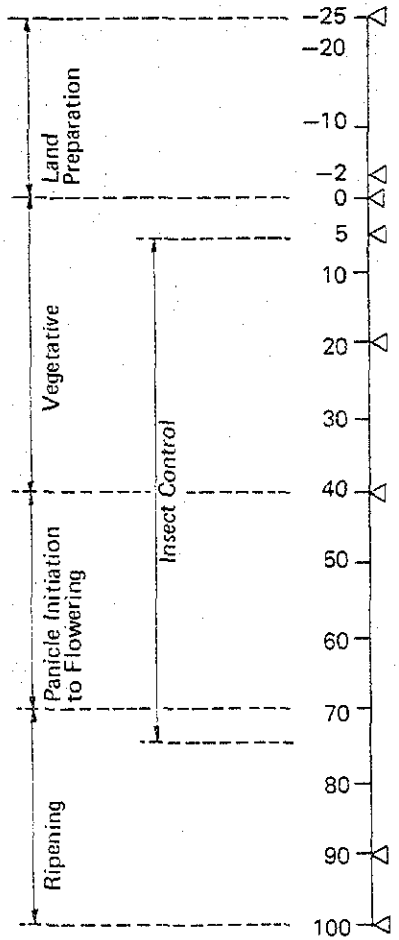
Recommended Seed Board Variety Name	IR58	IR60	IR62	Group II	BPI Ri-10
Parents/Pedigree	IR28/Kwang Chang/IR36	IR44/PTB33/ IR36	Ptb/IR30/ IR36	Index 19	BPI 121-407
Sponsoring Agency	IRRI	IRRI	IRRI	IRRI	BPI
Yield (Kg/ha)	4155	4750	N.A	5805	4657
Maturity (days) - Wet season	98	109	120	N.A	120
Dry Season	102	107	110	112	N.A
Mature Plant Height (cm) - Wet season	79	85	100	N.A	84
Dry season	72	83	100	94	N.A
Reaction to: Pests - Stemborer	MR	MR	N.A	Under	MR
Brown planthopper	R	MR	N.A	Study	MR
Diseases -					
Blast	MR	MR	MR	N.A	I
Bacterial blight	I	I	R	N.A	MS
Tungro virus	I	R	R	N.A	I
Grossy stunt virus	I	I	R	N.A	R
Ragged stunt virus	R	R		N.A	MR
Milling Recovery	H	H	H	N.A	H
Cultural Adaptations	Lowland	Lowland	Lowland	Lowland	Lowland

MR=moderately resistant P=resistant I=Intermediate H=high MS=moderately susceptible

TABLE G 3-3 FARM INPUT REQUIREMENT

Crop	Seed (kg/ha)	Compost (ton/ha)	Lime (kg/ha)	Schemical Fertilizers: Urea (45-0-0) (kg/ha)	Superphosphate (0-18-0) (kg/ha)	MP (0-0-60) (kg/ha)	Composed (16-20-0) (kg/ha)	Composed (14-14-14) (kg/ha)	Pesticides: Quantity	Pesticides: Chemicals	Herbicides: Quantity	Herbicides: Chemicals
1. Rice, transplanted												
- Wet season	50		1,500 kg per two croppings	138	210	-		-	L. 1.0 lit. G. 34 kg	Sevin XLR Furadan 3G	L. 2.0 l	2,4D Amine EC
- Dry season	50		1,500 kg per two croppings	160	210	-		-	L. 1.0 lit. G. 34 kg	Sevin XLR Furadan 3G	L. 2.0 l	- do -
2. Rice, direct seeded												
- Wet season	100			133	200	-			L. 1.0 lit. G. 34 kg	Sevin XLR Furadan 3G	L.1.25l/L.1.25l L. 2.0 lit.	Butachlor+2, 4D, G Hedonal 40% EC
- Dry season	100			155	200	-			L. 1.0 lit. G. 34 kg	Sevin XLR Fradan 3G	L.1.25l/L.1.25l L. 2.0 lit.	Butachlor+2, 4D, G Hedonal 40% EC
3. Mungbean	25		1,500			50		250	G. 16 kg L. 2.0 lit.	Fradan 3G Thiodan EC		
4. Peanut	125		1,500			50	94		G. 6 kg L. 1.0 lit.	Aldrex Malathion 50%.EC		
5. Corn	20	5	3,000	50		50	200		G. 17 kg L. 1.5 lit.	Furadan 3G Sevin 85SEC		
6. Vegetables (Water Melon)	2	12	3,000	89				286	G. 17 kg L 3.0 lit W.S 3.0 kg W.S 3.0 kg W.S 3.0 kg	Furadan 3G Malathion 50% EC Lannate Difoltan Benlate		
(Un-irrigated) 8. Cassava	cuttings 13,000		1,500				200					
(Un-irrigated) 9. Sweet potatoes	cuttings 50,000		1,500			100	200					

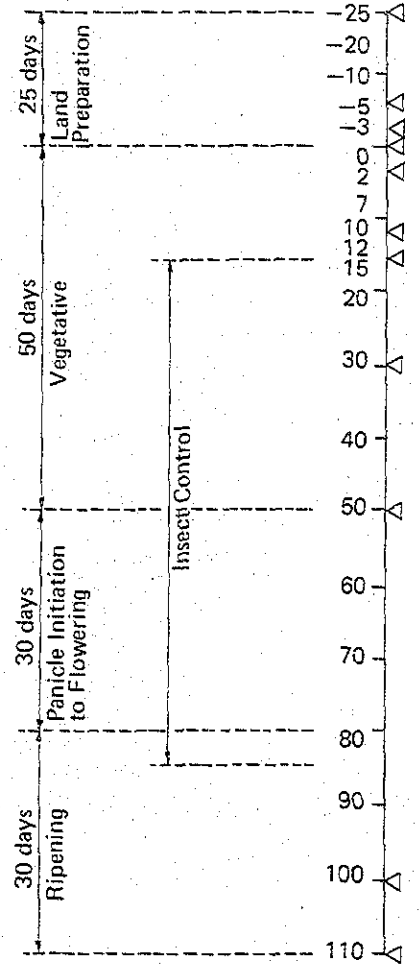
TABLE G3–4 FARM PRACTICES AND INPUT REQUIREMENT, RICE, TRANSPLANTED



Growth Stage	Farm Practice	Farm Input per Hectare
–25	Land preparation	*Seeds:* 50 kg Fertilizer for seedbeds: – Urea, 5 kg – Superphosphate, 10 kg
–2	Application of basal fertilizers	*Basal fertilizer:* – Urea, 67 kg (Wet), 78 kg (Dry) – Superphosphote, 200 kg
0	Transplanting (cross-wise strait row, 20 cm x 20 cm)	
5	Application of pre-emergence typed herbicide and protection typed insecticides	protection typed insecticides – e.g. Fradan 3G 34 kg Pre-emergence typed herbicides: – e.g. Hedonal EC, 2.0 lit.
20	Weeding by rotary and hand	Ingecticides: – e.g. Sevin XLR 1.0 lit.
40	Top dressing	*Top dressing fertilizer:* – Urea, 45 kg (Wet), 52 kg (Dry)
90	Drainage	
100	Harvesting	

Note: (1) Recommended varieties: IR58, 60, 62 & BPI Ri 10
(2) Fertilizer requirement: 60–40–0 (Wet)
70–40–0 (Dry)
(3) 1,500 kg of lime application per hectare will be required in every two croppings

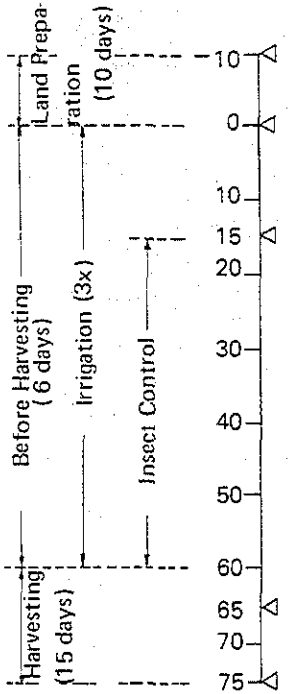
TABLE G3–5 FARM PRACTICES AND INPUT REQUIREMENT, RICE, DIRECT SEEDED



Farm Practice	Farm Input per Hectare
Land preparation	Pre-emergence typed herbicides: – e.g. Butachlor + 2,4D, 0.75 kg + 0.5 kg (a. i) Seeds: 100 kg
Final harrowing & leveling Application of pre-emergence typed herbicides Sowing sprouted seeds Drain out water	Basal fertilizer: – Urea, 67 kg (Wet), 78 kg (Dry) – Superphosphate, 200 kg
Replanting with thickly planted seedling Application of basal fertilizers and protection typed insecticides	Protection typed insecticides: – e.g. Frudan 3G, 34 kg Post-emergence typed herbicides: – Hedonal 40% EC 1.0 lit.
Application of post-emergence typed herbicides	Insecticides: – e.g. Sevin x LR 1.0 lit. Top dressing fertilizer: – Urea, 66 kg (Wet), 77 kg (Dry)
Top dressing	
Drainage	
Harvesting	

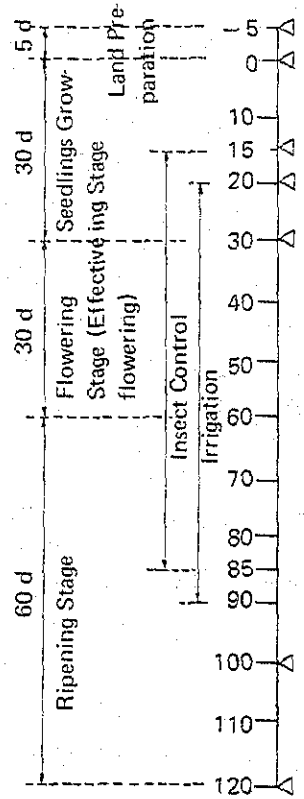
Note: (1) Recommended varieties: IR58, 60, 62 & BPI Ri 10
(2) Fertilizer requirement: 60–40–0 (Wet)
70–40–0 (Dry)

TABLE G3–6 FARM PRACTICES AND FARM INPUTS, MUNGBEAN

Growth Stage	Farm Practices	Farm Input per Hectare
	Land preparation/Basal fertilizer application	Basal fertilizer: –14–14–14, 250 kg – 0– 0–60, 50 kg Lime, 1,500 kg
	Drilling inoculated seeds at the spacing of 50 cm between rows	Seeds: 25 kg
	Thinning/Off-baring, Hilling-up/Weeding	Insecticides: e.g. – Thiodan 35%, EC, 2 qts. (2) – Furadan 3G, 16 kg
	First Harvest	
	Last Harvest	

Note: (1) *Recommendaed varieties: Pagasa 1, 2, 3, MG50–10A*
(2) Soil requirement: Clay loam to silty loam (PH 5.8 – 6.5)
(3) Fertilizer requirement: 35–35–30 (N–P–K)

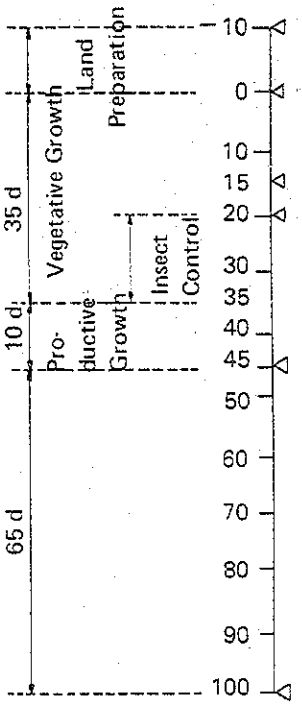
TABLE G3–7 FARM PRACTICES AND INPUT REQUIREMENT, PEANUT



Growth Stage	Farm Practices	Farm Inputs per Hectare
– 5	Start of land preparation	Basal fertilizer: – 16–20–0 94 kg – 0–0–60 50 kg Lime: 1,500 kg Seeds: 125 kg (with shell)
0	Sowing (1 m width bed, 30 cm x 20 cm, 2 – 3 seeds/hill)	
15	Start of weeding/cultivation	
20	Ridging	
30	Start of intercultivation	
		Insecticides: – e.g. Aldrex 6 kg or any other (Pre-planting application) – e.g. Malathion 50% EC, 1.0 lit.
100	Last irrigation	
120	Harvesting	

Note: (1) Recommended varieties: Ex. BPI 99, UPL PN–A
(2) Soil requirement: Loam and sandy loam
(3) Total of chemical fertilizers: N, 15 kg – P_2O_5, 20 kg – K_2O, 30 kg

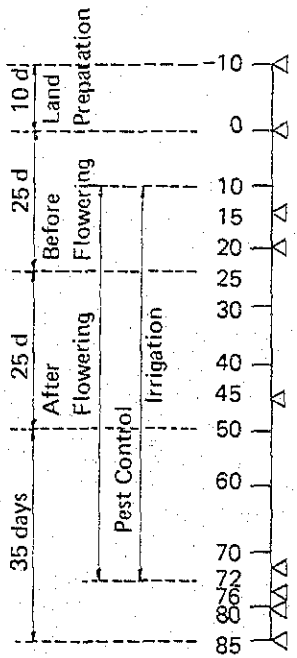
TABLE G3–8 FARM PRACTICE AND INPUT REQUIREMENT, CORN



Growth Stage	Farm Practices	Farm Inputs per Hectare
10	Start of land preparation	
0	Sowing (75 cm x 25 cm, 2 – 3 seeds/hill)	Basal fertilizer: { 16–20–0, 200 kg 0– 0–60 50 kg }
		Lime: 3,000 kg
		Compost
10		
15	Thinning	Seeds: 20 kg
20	Weeding/inter cultivation	Insecticides: e.g. Furadan 3G, 17 kg Sevin 85S, EC 2.0 lit. (2x)
30		
35		
40		
45	Side-dressing/off-barrying	Side–dressing: Urea 50 kg
50		
60		
70		
80		
90		
100	Harvesting	

Note: (1) Recommended varieties: e.g. Phil DMR–2, BPI Var–1
(2) Soil requirement: Loam and Sandy Loam
(3) Total requirement of chemical fertilizer: 55–40–30

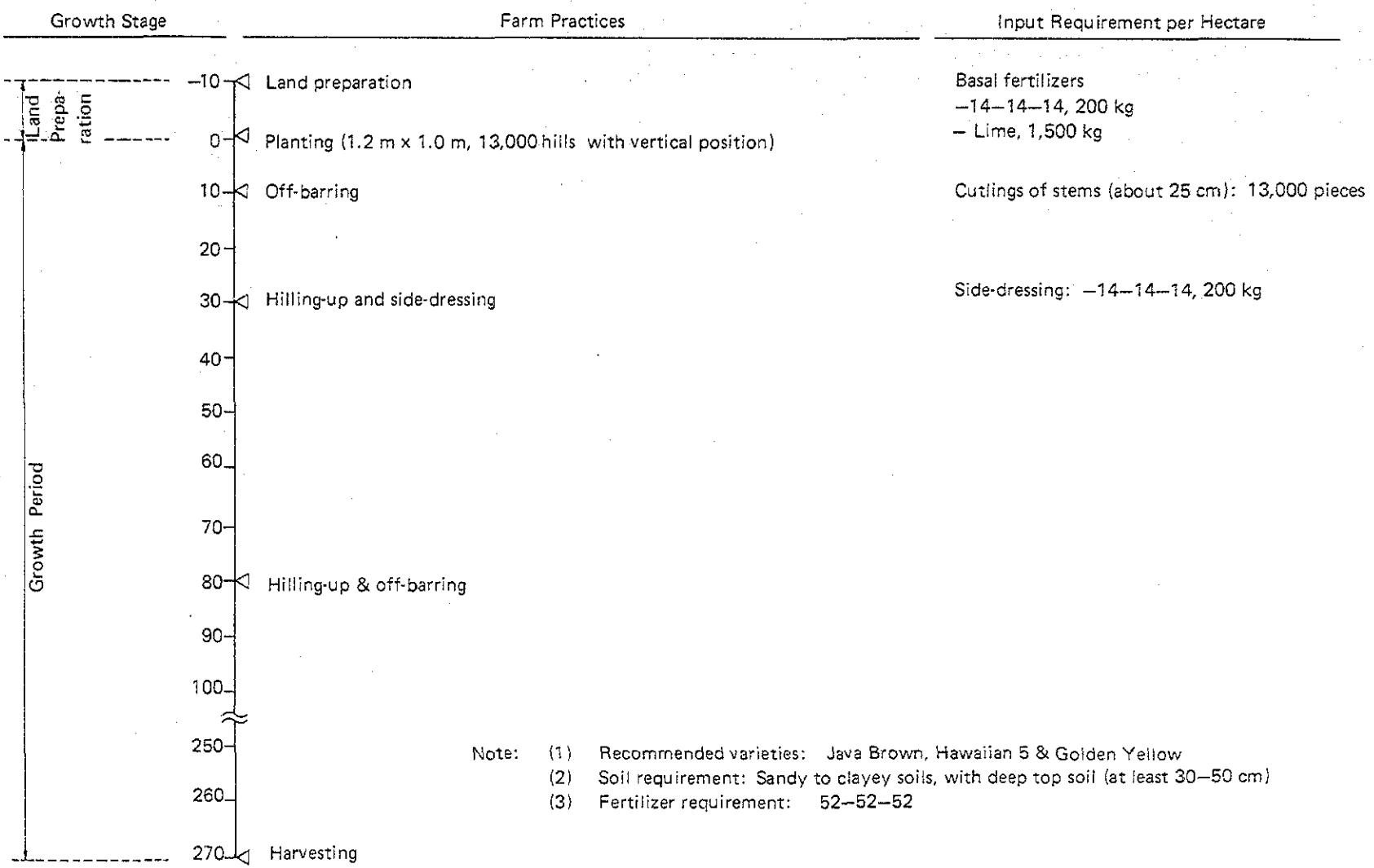
TABLE G3–9 FARM PRACTICES AND INPUT REQUIREMENT, VEGETABLE (WATER MELON)



Farm Practices	Farm Inputs per Hectare
Start of land preparation	Seeds: 2 kg Basal fertilizer: –14 –14 –14 286 kg – Urea 39 kg – Animal manure/Compost, 12 ton – Lime 3,000 kg
Sowing (2 m x 2 m, 2,500 hills/ha 3 seeds/hill)	
Start of weeding/hilling–up	
Top dressing/off-burying/mulching	Top-dressing fertilizer: – Urea 50 kg Insecticides: – e.g. Furadan 3G 17 kg (Pre–planting application) – e.g. Lannate WP 3 kg – e.g. Malathion EC 3.0 lit.
Last weeding	Fungicides: – e.g. Difoltan WP, 3 kg – e.g. Benlate WP, 3 kg
1st Harvesting	
2nd Harvesting	
3rd Harvesting	
Last Harvesting	

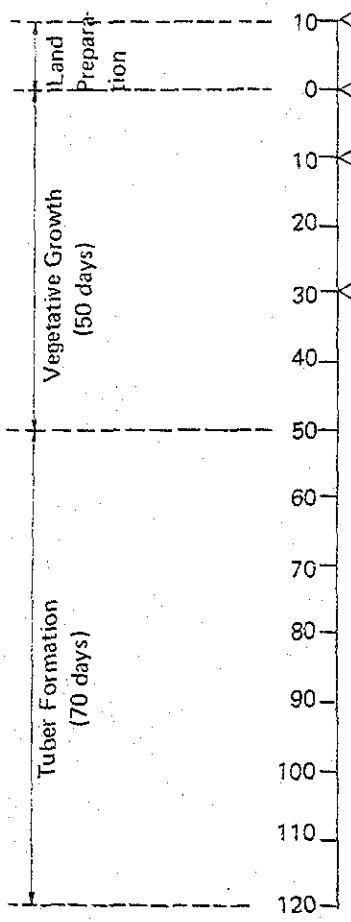
Note: (1) Recommended varieties; e. g. Sugarbaby
(2) Soil requirement; SiCL – L
(3) Total of chemical fertilizer requirement; 100–40–40

TABLE G3–10 FARM PRACTICES AND INPUT MATERIALS, CASSAVA



Note: (1) Recommended varieties: Java Brown, Hawaiian 5 & Golden Yellow
(2) Soil requirement: Sandy to clayey soils, with deep top soil (at least 30–50 cm)
(3) Fertilizer requirement: 52–52–52

TABLE G3–11 FARM PRACTICES AND INPUT REQUIREMENT SWEET POTATOES



Growth Stage	Farm Practices	Input Requirement per Hectare
10	Land preparation	Basal fertilizer:
0	Planting (75 – 100 cm x 20 – 30 cm, 33,000 – 66,000 hills)	–16–20–0 200 kg – 0– 0–60 100 kg – Lime, 1,500 kg Cuttings: 50,000 pieces
10	Hilling-up and off-barring	
30	Weeding, 2nd Hilling-up and off-barring	
120	Harvesting	

Note: (1) Recommended varieties: BNAS 51, Georgia Red & Yellow
(2) Soil requirement: Sandy to Clayey Soils Rich in Organic Matter
(3) Fertilizer Requirement: 32–40–30

TABLE G3-12 ATTAINDED YIELD OF RICE IN THE PROJECT AREA

(Wet Season, 1984)

Fortilizer Level	Variety	Lumangog (Rainfed)	Calangaman (Irrigated)
		Yield (Kg/12m^2)	Yield (Kg/12m^2)
1. 30-15-15	IR36	4.9	3.7
	IR56	3.4	3.9
	MRC	4.0	4.2
	UPL Ri4	4.8	4.6
	Average	4.28 (3.57 ton/ha)	4.10 (3.41 ton/ha)
2. 60-30-30	IR36	4.8	6.0
	IR56	4.6	4.1
	MRC	3.8	4.3
	UPL Ri4	4.2	5.4
	Average	4.35 (3.63 ton/ha)	5.00 (4.17 ton/ha)
3. 90-45-45	IR36	4.2	4.0
	IR56	4.4	7.2
	MRC	4.6	5.7
	UPL Ri4	4.4	4.0
	Average	4.40 (3.67 ton/ha)	5.23 (4.36 ton/ha)

Note: No application of compost and lime. In each case of fertilizer level, each half amount of nitrogen is applied as basal and top-dressing fertiligers respectively.

Source: BPI Bohol Experiment Farm.

TABLE G3-13 ATTAINED YIELD OF RICE AT APC GABI TRIAL FARM

	Level of Fertilizers Application				
	N	P_2O_5	K_2O	Yield	No. of Sample
	(Kg/ha)	(Kg/ha)	(Kg/ha)	(ton/ha)	(Am^2/sample)
1.	120	80	60	5,818	5
2.	90	60	40	4,725	5
3.	60	40	-	5,289	5

Source: APC, 1985

TABLE G3-14 TARGET YIELD OF DIVERSIFIED CROPS

Land Class	Productivity Rating		Irrigated				Rainfed	
	Range (%)	Average (%)	Beans	Peanut	Feed Grains	Fruit Grops Vegetables	Cassava	Sweet Potato
Potential	100	100	1.2[1/]	2.0[2/]	3.2[2/]	10.5[2/]	18.9[3/]	14.4[3/]
First	90 - 100	95	1.1	1.9	3.0	10.0	18.0	13.7
Second	80 - 90	85	1.0	1.7	2.7	8.9	16.0	12.2
Third	70 - 80	75	0.9	1.5	2.4	7.9	14.2	10.8

Note: 1/ Attained yield of mungbean at APC Dao Farm in 1983, and also in the Angat-Magat Integrated Agricultural Development Project.

2/ 80 percent of the potential yield for peanut, corn and watermelon in in Philippines Recommendation for the respective crops, PCARR.

3/ 90 percent of the attained yield under rainfed condition in APC Farm in 1983.

TABLE G3-15 YIELD PROJECTION

Year	Without Project				With Project, Irrigated								With Project, Rainfed	
	Rice		Sweet Potato	Cassava	Rice				Mungbean	Peanut	Corn	Vegetables	Cassava	Sweet Potato
	Wet	Dry			Wet		Dry							
					EXi.	NEW	EXi.	NEW						
1	1.37	1.26	2.02	4.71	2.9	2.5	3.2	2.7	0.6	1.0	1.6	5.3	8.5	6.5
2	1.38	1.27	2.03	4.72	3.4	2.9	3.6	3.2	0.7	1.2	1.9	6.2	9.9	7.6
3	1.39	1.27	2.03	4.74	3.8	3.2	4.1	3.4	0.8	1.3	2.0	6.7	10.7	8.1
4	1.39	1.28	2.03	4.75	4.0	3.4	4.3	3.6	0.8	1.4	2.2	7.1	11.4	8.6
5	1.40	1.29	2.03	4.76	4.2	3.6	4.5	3.8	0.9	1.4	2.3	7.6	12.1	9.2
6	1.41	1.29	2.04	4.77	4.2	3.8	4.5	4.1	0.9	1.5	2.4	8.0	12.8	9.7
7	1.41	1.30	2.04	4.78	4.2	4.0	4.5	4.3	1.0	1.6	2.6	8.5	14.5	10.3
8	1.42	1.30	2.04	4.79	4.2	4.2	4.5	4.5	1.0	1.7	2.7	8.9	14.2	10.8
9	1.42	1.31	2.04	4.80	4.2	4.2	4.5	4.5	1.0	1.7	2.7	8.9	14.2	10.8
10	1.43	1.31	2.05	4.81	4.2	4.2	4.5	4.5	1.0	1.7	2.7	8.9	14.2	10.8

The increase rate	Year after Project Construction							
Area	1	2	3	4	5	6	7	8
Newly developed area	60	70	75	80	85	90	95	100
Existing area	70	80	90	95	100	100	100	100