

**ANNEX-D**

**AGRICULTURE AND AGRO-ECONOMY**



ANNEX - D

AGRICULTURE AND AGRO-ECONOMY

TABLE OF CONTENTS

	<u>Page</u>
1. GENERAL .....	D-1
2. PRESENT CONDITION .....	D-2
2.1 Location and Population .....	D-2
2.1.1 Location .....	D-2
2.1.2 Population .....	D-2
2.2 Soils and Land Classification .....	D-3
2.3 Land Use .....	D-4
2.4 Cropping Pattern and Farming Practices .....	D-5
2.4.1 Cropping Pattern .....	D-5
2.4.2 Farming Practices .....	D-5
2.5 Yield and Production of Crops .....	D-6
2.6 Land Tenure and Holding .....	D-7
2.7 Agricultural Support Systems .....	D-8
2.8 Marketing and Prices .....	D-8
2.8.1 Marketing of Agricultural Outputs and Inputs ...	D-8
2.8.2 Prices of Agricultural Outputs and Inputs .....	D-9
2.9 Farmer's Economy .....	D-10
2.9.1 Farm economic Survey .....	D-10
2.9.2 Farmer's Economy .....	D-11
3. FARM MANAGEMENT PLAN .....	D-12
3.1 General .....	D-12
3.1.1 Agricultural Development Policy .....	D-12
3.1.2 Present Agricultural Constraints .....	D-13
3.1.3 Basic Concept of Farm Management Plan .....	D-13
3.2 Proposed Land Use .....	D-13
3.3 Proposed Cropping Pattern .....	D-14
3.4 Proposed Farming Practices .....	D-16
3.5 Anticipated Yield and Production of Crops .....	D-17
3.6 Marketing and Price Prospects .....	D-18
3.6.1 Marketing .....	D-18
3.6.2 Price Prospects .....	D-19
3.7 Crop Budget and Irrigation Benefit .....	D-20
3.8 Farm Economy .....	D-21

## LIST OF TABLES

		<u>Page</u>
Table 2.1	DEMOGRAPHIC CONDITION .....	D-23
Table 2.2	AGE DISTRIBUTION IN PROVINCE BY SEX IN 1987 .....	D-24
Table 2.3	EMPLOYED POPULATION OF PROVINCE BY INDUSTRY IN 1987 ..	D-24
Table 2.4	EMPLOYED AND UNEMPLOYED POPULATION OF PROVINCE IN 1987 .....	D-24
Table 2.5	SOILS AND LAND CLASSIFICATION .....	D-25
Table 2.6	PRESENT LAND USE .....	D-26
Table 2.7	PRESENT IRRIGATED RICE FARMING PRACTICES .....	D-27
Table 2.8	PRESENT RAINFED RICE FARMING PRACTICES .....	D-27
Table 2.9	PRESENT FARMING PRACTICES OF DIVERSIFIED CROPS .....	D-27
Table 2.10	PRESENT FARM INPUTS .....	D-28
Table 2.11	LAND TENURE AND HOLDING .....	D-29
Table 2.12	AGRICULTURAL EXTENSION SERVICES .....	D-31
Table 2.13	MARKETING FACILITIES AND COST OF RICE .....	D-31
Table 2.14	PRESENT FARM BUDGET .....	D-32
Table 3.1	PROPOSED LAND USE .....	D-33
Table 3.2	PROPOSED FARMING PRACTICES .....	D-34
Table 3.3	PROPOSED FARM INPUTS .....	D-35
Table 3.4	RICE PRODUCTION AND USE IN EACH SYSTEM IN 1995 .....	D-36
Table 3.5	RICE PRODUCTION AND USE IN REGION IV (INCLUDING METRO MANILA) FROM 1982 TO 1986 .....	D-36
Table 3.6	CALCULATION OF ECONOMIC FARM GATE PRICES .....	D-37
Table 3.7	ECONOMIC CROP BUDGET .....	D-38
Table 3.8	IRRIGATION BENEFIT .....	D-40
Table 3.9	IRRIGATION BENEFIT FLOW .....	D-41
Table 3.10	FARM ECONOMY .....	D-42

## LIST OF FIGURES

		<u>Page</u>
Fig. 2.1	SOIL MAP .....	D-43
Fig. 2.2	LAND CLASSIFICATION MAP .....	D-45
Fig. 2.3	LAND USE MAP .....	D-47
Fig. 2.4	PRESENT CROPPING PATTERN .....	D-50
Fig. 3.1	PROPOSED CROPPING PATTERN .....	D-52

## 1. GENERAL

This ANNEX is to support the report on "the Feasibility Study on the Improvement of Operation and Maintenance in Pumping Irrigation Systems". It describes the results of agricultural and agro-economic study covering the present agricultural conditions and farm management plan for the six (6) pump irrigation systems; Bonga #1, Bonga #2, Bonga #3, Alcala-Amulung, Solana and Libmanan-Cabusao.

Data and information were mainly obtained from the following government authorities concerned:

- 1) Bureau of Soils,
- 2) National Census and Statistic Office,
- 3) Department of Agriculture (DA),
- 4) National Food Authority (NFA),
- 5) Bureau of Agricultural Statistics (BAS),
- 6) National Economic and Development Authority (NEDA),
- 7) Fertilizer and Pesticide Authority,
- 8) Philippine National Lines,
- 9) National Irrigation Administration

In addition to the data collection, field survey and farm economic survey were carried out.

## 2. PRESENT CONDITION

### 2.1 Location and Population

#### 2.1.1 Location

The six (6) pump irrigation systems; Bonga #1, Bonga #2, Bonga #3, Alcala-Amulung, Solana and Libmanan-Cabusao are located in the Luzon island. Administratively, these systems are under the jurisdiction of three (3) regions, three (3) provinces and eight (8) municipalities as shown below:

Systems	Region	Province	Municipality
1) Bonga #1	I	Ilocos Norte	Sarrat, San Nicolas
2) Bonga #2	I	Ilocos Norte	San Nicolas, Laoag
3) Bonga #3	I	Ilocos Norte	Laoag
4) Alcala-Amulung	II	Cagayan	Alcala, Amulung
5) Solana	II	Cagayan	Solana
6) Libmanan-Cabusao	V	Camarines Sur	Libmanan, Cabusao

#### 2.1.2 Population

The demographic conditions; 1) Population, 2) Population growth rate, 3) Population density, 4) Number of households, 5) Family size, and 6) Number of farm households in the regions, provinces and municipalities related with the six (6) pump systems are given in Table 2.1.

For using of labor balance study under with project conditions mentioned in Section 3.4, the available labor force of the six (6) pump systems was estimated on the basis of the data given in Tables 2.2 to 2.4 and the following formula:

$$\text{Available Labor Force} = \frac{\text{Population in 1987}}{\text{Rate of 15 years and over}} \times \frac{\% \text{ of Labor Force}}{\% \text{ of Agricultural Labor Force}}$$

The estimated available labor force in each pump system is summarized as follows:

System	Number of Available Labor Force
1) Bonga #1	11,700
2) Bonga #2	25,900
3) Bonga #3	19,300
4) Alcala-Amulung	16,700
5) Solana	14,900
6) Libmanan-Cabusao	19,000

## 2.2 Soils and Land Classification

The soils and land classification maps of the six (6) pump systems have been reviewed with the aim of identifying any constraints to cropping by either rice or diversified crops and ensuring that all the suitable soils in the maps are incorporated into the systems. These maps are:

1) Bonga #1, #2 and #3 pump systems

Soil Map (1:50,000), Ilocos Norte Land Resources Evaluation Project, Bureau of Soils, 1983/84.

2) Alcala-Amulung and Solana pump systems

Soil Map (1:20,000), Bureau of Soils, Provincial Office in Cagayan, 1986/87.

3) Libmanan-Cabusao pump system

Land Classification Map (1:50,000), Economic Land Classification of the Libmanan Project Area Bicol River Basin, Bureau of Soil, 1975.

The delineation of soil series and land classes was checked and adjusted through the field reconnaissance in the six (6) pump systems by using the maps mentioned above. The soil series were classified based on the procedures outlined by the Bureau of Soils Land Classification System. The soil mapping symbols and the land classes within the six (6) pump systems are illustrated in Fig. 2.1 and 2.2, respectively. The soil mapping symbols, area of each soil series and areas of various land classes are given in Table 2.5. The land class identified in the six (6) pump systems and its proportion are summarized as follows:

(Unit: %)

System	Land Class						
	1R	1R-2	2R	3R	1	2	6
1) Bonga #1	87.5	4.2	8.3	-	-	-	-
2) Bonga #2	50.0	29.3	2.2	-	16.8	1.7	-
3) Bonga #3	-	78.8	-	-	21.2	-	-
4) Alcala-Amulung	88.1	11.0	0.9	-	-	-	-
5) Solana	96.8	3.2	-	-	-	-	-
6) Libmanan-Cabusao	37.2	-	47.3	14.5	-	-	-

The relation between the land classes mentioned above and rate for their suitability to rice and diversified crops by the Bureau of Soils Land Classification System is as follows:

Land Class	Rice	Diversified Crops
1R	Arable	Nonarable
1R-2	Arable	Arable
2R	Arable	Nonarable
3R	Arable	Nonarable
1	Nonarable	Arable
2	Nonarable	Arable
6	Nonarable	Nonarable

According to above table, the most lands classified as 1R to 3R in each pump system are arable for rice cropping. It is anticipated that two (2) crops of rice in the six (6) pump systems can be achieved in a year with high yields through good management by use of high yielding varieties, regular fertilizer application, and proper irrigation and drainage. On the other hand, the lands classified as 1R-2 mainly found in Bonga #1, #2 and #3 pump systems are arable both rice and diversified cropping. Judging from the soil condition and good drainage of the lands during the dry season in these systems, diversified crops can also be grown in these area by adopting the same farm management mentioned above.

### 2.3 Land Use

The present land use in the six (6) pump systems was identified through information from each pump system office, interviewing of watermasters and field verification using the general layout maps of 1:20,000. At present, most of the lands in each pump system are developed as paddy fields with irrigation facilities. However, the rate of irrigation area in each system is very low and largely fluctuates year by year. The rate of irrigation area in the last five (5) years in each system is ranging from 85% to 165% for the firm-up service area and 60% to 103% for the maximum service area. Therefore, the agricultural potential in each system is not fully exploited although the systems have abundant land and water resources. The constraints mentioned above keep the present crop yields at low level in each system. It is considered that the unstable irrigation water supply mentioned above is due mainly to the following two (2) reasons:

- 1) Deterioration of irrigation facilities and pump equipment, and
- 2) Inadequate water management.

The present land use categories were thus determined on the basis of the irrigated condition in each pump system. The present land use in the systems is described in Table 2.6 and the land use maps of each pump system are illustrated in Fig. 2.3. The present land use conditions in each pump system are summarized as follows:

(Unit: ha)

System	Area	Paddy Field				Sugar- cane	RIA (%)	CI (%)
		Wet		Dry				
		I	R	I	R			
	(1)	(2)	(3)	(4)	(5)	(6)		
<b>Firmed-up Service Area</b>								
Bonga #1	298	143	155	110	0	0	85	137
Bonga #2	674	457	177	233	0	40	103	135
Bonga #3	202	141	46	67	0	15	103	133
Alcala-Amulung	1,652	803	849	1,006	0	0	110	161
Solana	1,100	916	184	906	0	0	165	182
Libmanan-Cabusao	1,838	1,201	637	1,538	0	0	149	184
<b>Maximum Service Area</b>								
Bonga #1	426	143	283	110	0	0	60	123
Bonga #2	-	-	-	-	-	-	-	-
Bonga #3	202	141	46	67	0	15	103	133
Alcala-Amulung	2,158	803	1,355	1,006	0	0	84	147
Solana	1,960	916	1,044	906	0	0	93	146
Libmanan-Cabusao	3,085	1,201	1,884	1,538	0	0	89	150

Remarks: I = Irrigated, R = Rainfed,  
 RIA (Rate of irrigated area) =  $\{(2)+(4)\}/(1)$   
 CI (Cropping intensity) =  $\{(2)+(3)+(4)+(5)+(6)\}/(1)$



## 2.4 Cropping Pattern and Farming Practices

### 2.4.1 Cropping Pattern

The present cropping patterns of the six (6) pump systems were identified through field survey with interviewing of watermasters and farmers. The main crop cultivated in these systems is rice. Other crops cultivated in these systems are garlic, sugarcane and corn. The present cropping patterns found in the six (6) pump systems are summarized as follows:

- 1) Rice-Rice (all pump systems)
- 2) Rice-Fallow (all pump systems)
- 3) Rice-Garlic (Bonga #1, #2 and #3 pump systems)
- 4) Sugarcane (Bonga #2 and #3 pump systems)
- 5) Corn-Fallow (Solana pump system)

The cropping calendar of the above patterns in each pump system is directly affected by seasonal distribution of rainfall due mainly to unstable water supply mentioned in Section 2.3 and is as follows:

Systems	Wet Season		Dry Season	
	Planting	Harvesting	Planting	Harvesting
1) Bonga #1				
Rice	July	Oct.-Nov.	Jan.	May-June
Garlic	-	-	Jan.	May
2) Bonga #2				
Rice	July	Nov.	Jan.	May
Garlic	-	-	Jan.	May
Sugarcane	-	-	Dec	Nov.
3) Bonga #3				
Rice	July	Nov.	Jan.	May
Garlic	-	-	Jan.	May
Sugarcane	-	-	Dec.	Nov.
4) Alcala-Amulung				
Rice	June	Oct.	Dec.	Apr.
5) Solana				
Rice	July-Sept.	Nov.-Feb.	Feb.	June-July
Corn	June-July	Oct.-Nov.	-	-
6) Libmanan-Cabusao				
Rice	Jun.-Jul.	Oct.-Nov.	Nov.-Jan.	Apr.-May

The present cropping patterns of the six (6) pump systems are illustrated in Fig. 2.4.

### 2.4.2 Farming Practices

The present farming practices for main crops in the six (6) pump systems were identified through the field survey. The field survey covered three (3) types of respondents, namely the farmers, presidents of Irrigator's Association and watermasters. The farmers were randomly sampled and were interviewed. They serve as prime sources of data on site-specific farm productivity and management systems. The present farming practices and farm inputs of irrigated and rainfed rice, garlic, sugarcane and corn in each pump system are given in Tables 2.7 to 2.10. At present, extensive farming practices, with low farm inputs and therefore low outputs, are carried out in each pump system due mainly to unstable water supply mentioned in Section 2.3. The present farming practices of crops are summarized as follows:

1) Rice (all pump systems)

The majority of rice farmers use improved varieties such as IR and C series, because of their high yield, early maturity, ease of threshing, etc. Local varieties are still used for rainfed rice farming in the Solana because of their characteristics of drought resistance. Plowing and harrowing are commonly carried out by draft animals. Rice farmers commonly apply inorganic fertilizers such as urea, complete, etc. and weed their crop manually. Spraying of weedicide and insecticide is done at minimal quantity because of the high cost of agro-chemicals. No chemicals are employed to control rats.

2) Garlic (Bonga #1, #2 and #3 pump systems)

Farmers are planting local varieties of garlic. The fields are prepared by plowing which also eradicates the weeds. Cloves are planted and mulched with rice straw. Fertilizers are sidedressed one (1) or two (2) times. Weeds are removed by hand. Spraying for prevention of insects, pests and diseases is commonly done just after irrigation or depending upon the occurrence of insects.

3) Sugarcane (Bonga #2 and #3 pump systems)

Local varieties of sugarcane are planted in the Bonga #2 and #3 pump systems. Plowing and harrowing are done by draft animals. Furrows are made before planting at intervals of 80 cm and at a desirable depth. One cutting is laid in every 65-75 cm furrow. Fertilizers are commonly applied and are placed at the beginning of wet season. When the plants are about knee-high, off-barring and hilling up are common method adapted by farmers in order to suppress the growth of weeds. No pest and diseases control was employed.

4) Corn (Solana pump system)

Farmers in the Solana are using local varieties of corn. The land is plowed, harrowed and furrowed using the carabao drawn implements. Furrows are made at intervals of 80 cm and 2-3 seeds are planted at space of 60 cm. Application of fertilizers and agro-chemicals is not common. For weeding, off-barring and hilling up are usually practiced when the plants are knee-high.

## 2.5 Yield and Production of Crops

The present yields of crops in the six (6) pump systems were estimated on the basis of the data collected from each pump system office, Department of Agriculture, Bureau of Agricultural Statistics and from the farm economic survey. The estimated yields of crops in each pump system at present are as follows:

(Unit: ton/ha)

Crops	Bonga #1	Bonga #2	Bonga #3	Alcala-Amulung	Solana	Libmanan-Cabusao
Irrigated Rice						
Wet	3.3	3.5	3.8	3.3	3.1	2.8
Dry	3.5	4.0	4.1	3.5	3.3	3.3
Rainfed Rice	2.3	2.4	2.3	1.8	2.0	2.0
Garlic	0.9	1.7	2.2	-	-	-
Sugarcane (Basi)	-	40.0 (15.0)	27.0 (10.1)	-	-	-
Corn	-	-	-	-	1.0	-

The present crop production in the six (6) pump systems was estimated on the basis of the present land use and yield of crops in each pump system as follows:

(Unit: ton)

Crops	Bonga #1	Bonga #2	Bonga #3	Alcala-Amulung	Solana	Libmanan-Cabusao
Firmed-up Service Area						
Rice	1,098	2,568	797	7,699	6,123	9,712
Garlic	30	165	64	-	-	-
Sugarcane (Basi)	-	1,600 (600)	405 (152)	-	-	-
Corn	-	-	-	-	37	-
Maximum Service Area						
Rice	1,392	-	-	8,610	7,499	12,206
Garlic	30	-	-	-	-	-
Sugarcane	-	-	-	-	-	-
Corn	-	-	-	-	209	-

## 2.6 Land Tenure and Holding

In order to identify the land tenure and holding situation in the six (6) pump systems, "the Master List of Farmers" collected from each pump system office was analyzed. The results of the analysis are given in Table 2.11 and summarized as follows:

Systems	Number of Farmer (%)		Average Holding Size (ha)		
	Owner Operator	Tenant Operator	Owner Operator	Tenant Operator	Total
1) Bonga #1	60.1	39.9	0.21	0.19	0.21
2) Bonga #2	8.1	91.9	0.30	0.27	0.27
3) Bonga #3	32.8	67.2	0.44	0.49	0.48
4) Alcala-Amulung	60.9	39.1	0.82	0.86	0.84
5) Solana	41.6	58.4	1.15	0.99	1.06
6) Libmanan-Cabusao	17.9	82.1	2.33	2.04	2.09

## 2.7 Agricultural Support Systems

The Department of Agriculture (DA) plays an important role in agricultural support for increasing agricultural production through the following services:

- 1) Propagation of new technologies which have been established through researches and trials,
- 2) Supply of registered seeds,
- 3) Promotion of cooperative movement, and
- 4) Execution of special national program.

The support services is roughly divided into the following three (3) categories:

### 1) Extension services

The extension services are carried out by provincial agricultural officers, municipal agricultural officers and agricultural food technologists under the supervision of regional directors. The number of extension staff and extension methods employed in the six (6) pump systems are given in Table 2.12. The extension services in each pump system are generally not so active.

### 2) Cooperative management

The number of farmers' cooperatives actually operating in the six (6) pump systems and their membership are given in Table 2.12. The farmers' cooperatives in these systems are not so active in general. Only a small number of farmers participates in the farmers' cooperatives and most of them are large scale of farmers.

### 3) Research

There exist agricultural experimental stations operated by DA in the provinces related with the six (6) pump systems. The activities, size and location of each experimental station are given in Table 2.12.

## 2.8 Marketing and Prices

### 2.8.1 Marketing of agricultural outputs and inputs

#### 1) Rice

According to the farm economic survey, rice produced in the six (6) pump systems was distributed by three (3) marketing channels; i) National Food Authority (NFA), ii) farmers' cooperatives and iii) commercial channel. Among these, the commercial channel plays an important role in marketing of rice. Most of the marketable surplus of rice in these systems is distributed through this channel. NFA, a government food marketing agency created to ensure adequate and constant supply of foods at reasonable prices, also functions as a marketing leader for rice, handling about 10-20% of the marketable surplus of rice in most of the systems. Only Libmanan-Cabusao system has a channel of farmers' cooperative. The number, capacity and related costs of marketing facilities and number of wholesalers and retailers of

rice in each pump system are given in Table 2.13. The general market flow of rice is summarized as follows:

(Unit: %)

Items	Bonga #1	Bonga #2	Bonga #3	Alcala-Amulung	Solana	Libmanan-Cabusao
Outlet						
NFA	5.0	0.0	10.0	8.0	5.0	0.0
Cooperative	0.0	0.0	0.0	0.0	0.0	10.0
Commercial	15.0	40.0	35.0	38.0	50.0	57.0
Sub-total	20.0	40.0	45.0	46.0	55.0	67.0
Consumption	80.0	60.0	55.0	54.0	45.0	33.0

## 2) Garlic

Garlic is classified depending on maturity, firmness and size. By size, garlic is grouped into small, medium and large. Traders collected garlic from farmers and sell to wholesalers and retailers. The marketing of garlic is intricate. Traders, wholesalers and retailers trade with each other. Of the total volume handled by traders, about a half is sold within the province of Ilocos Norte while another half is brought out of the province.

## 3) Sugarcane

Most of the sugarcanes are processed to make basi (local wine), following vinegar and panucha. Farmers and local processors extract the juice of sugarcane using mechanical crusher. Approximately half of the volume of basi produced is procured by traders. The remaining half is handled by processors and traded by wholesalers and retailers. Most of the basi produced is sold within the province of Ilocos Norte.

## 4) Corn

Corn is easy to market because it is a substitute for rice and used as feeds for livestock and has a country-wide marketing channels like rice. Traders secure supply of corn directly from farmers. Corn was later sold in larger percent to wholesalers and retailers. Duplication of marketing function exists among wholesalers of corn. Most of the surplus corn is transported out of the province of Cagayan.

### 2.8.2 Prices of Agricultural Outputs and Inputs

According to the data obtained from the Bureau of Agricultural Statistics, Department of Agriculture and from farm economic survey, the estimated farm gate prices of agricultural outputs and inputs are as follows:

(Unit: Peso)

Crops	Bonga #1	Bonga #2	Bonga #3	Alcala-Amulung	Solana	Libmanan-Cabusao
<b>Outputs</b>						
Rice (kg)	3.50	3.50	3.50	3.04	3.04	2.89
Garlic (kg)	17.78	17.78	17.78	-	-	-
Basi (liter)	-	1.59	1.59	-	-	-
Corn (kg)	-	-	-	-	3.08	-
<b>Inputs</b>						
<b>Fertilizers (kg)</b>						
Nitrogen (N)	6.04	6.04	6.04	6.02	6.02	6.59
Phosphate (P)	4.69	4.69	4.69	4.80	4.80	5.07
Potassium (K)	3.33	3.33	3.33	3.31	3.31	3.54
<b>Agro-chemicals (liter)</b>						
Insecticide	109.10	109.10	109.10	111.42	111.42	122.26
Weedicide	98.79	98.79	98.79	105.58	105.58	111.22
Labor (md)	30.00	30.00	30.00	20.00	20.00	25.00
Animal (ad)	60.00	60.00	60.00	50.00	50.00	50.00
Machine (mcd)	400.00	400.00	400.00	270.00	260.00	330.00

Remarks: md = man day  
ad = animal day  
mcd = machinery day

## 2.9 Farmer's Economy

### 2.9.1 Farm Economic Survey

The farm economic survey was carried out so as to clarify economic activities of the farmers through farm economic analysis in both Phase (I) and Phase (II) studies.

It was conducted on randomly selected farmers corresponding to 1% of the total number of farmers in the service area of each of the 16 pumping irrigation systems in Phase (I) study. The survey items were farming practice, production cost, crop yield, farm gate price, way of marketing and farmer's intention on irrigation fee, water management and farmer's association. The number of farmers on which the survey was conducted was 200 in all the systems.

In Phase (II) study, the survey was conducted on intentionally sampled farmers who managed the land of an average size in the selected six (6) systems. Stress was put on grasping information on livestock production, non-farm income and living expenditure. About 1% of the total number of farmers in the service areas of the respective systems were selected. Irrigation condition was also taken into account in selection of sample farmers. Allocation of sample farmers to the irrigated and rainfed areas was made based on aerial proportion. The number of samples selected was 109 in total.

The breakdown of the sample farmers is as follows:

System	Average Farm Size (ha)	Number of Farmers			
		Phase (I)	Phase (II)		
			Irrigated	Rainfed	Total
Bonga #1	0.21	5	4	2	6
Bonga #2	0.27	9	10	7	17
Bonga #3	0.48	5	5	1	6
Alcala-Amulung	0.84	37 *	24	5	29
Solana	1.06	24	14	16	30
Libmanan-Cabusao	2.09	19	12	9	21
Total	-	99	69	40	109

Remark: \* = including the Iguig pump system

### 2.9.2 Farmer's Economy

The farm economy of the farmers in the respective irrigation systems was analyzed based on the survey result mainly to make clear the farmer's capacity-to-pay for irrigation service fee. The budget was prepared on a farmer with an average size farm on each land condition. The dominant tenurial status of each system was taken as the representative one and the budget was analyzed on this representative tenurial status in each system; owner operator in Bonga #1 and Solana, tenant in Bonga#2, Bonga #3, Alcala-Amulung and Libmanan-Cabusao. The most prevailing pattern of tenant in the systems is share tenant with a sharing rate of 25% of the net production value for tenant charge.

They are small-scale farmers excluding those in Libmanan-Cabusao. The income is derived from crop production, livestock raising and non-farm income. Through the analysis of farm budget, the characteristics of the farm economy can be summarized as below:

- 1) Income derived from paddy production amounts to around 20% to 70% of net income in the irrigated area, and 10% to 50% in the rainfed area.
- 2) Around 5% to 35% of net income is derived from livestock raising in both irrigated and rainfed areas.
- 3) The production cost of paddy occupies around 25% to 35% of the gross income.
- 4) A considerable amount of income is derived from non-farm activity and remittance from family members working in Metro-Manila and abroad.
- 5) Food expenses occupy around 60% to 80% of total living expenses, including rice expenses that amount to 30% of total living expenses.
- 6) The budget of the owner operator indicates that they can afford to pay irrigation fee with non-farm income. On the other hand, the budget of the tenant shows that the net reserve is sometimes too small to pay irrigation fee and they remain at subsistence level even with non-farm income.

The present condition of farm budget is shown in Table 2.14.

### 3. FARM MANAGEMENT PLAN

#### 3.1 General

##### 3.1.1 Agricultural Development Policy

According to the "Medium-Term Philippine Development Plan 1987-1992", the agricultural sector shall concentrate on the following objectives over this period:

- 1) to enhance small farmers' income,
- 2) to sustain the increases in productivity,
- 3) to effect an equitable distribution of the factors of and the returns to production,
- 4) to attain food self-sufficiency/self-reliance for improved nutritional well-being,
- 5) to create/increase agro-based employment opportunities among the rural population, particularly the landless rural workers and sustenance fishermen,
- 6) to improve the delivery system for agricultural crops/commodities, farm inputs, and services, and
- 7) to institutionalize the expanded participation of farmers through cooperatives and other farmers' organizations.

To realize the above objectives, the following policies and strategies shall be pursued:

##### 1) Agricultural production system

Strengthening of the agricultural production system shall be strongly emphasized to increase farm productivity and profitability and make full use of the comparative advantage which the country has in some crops/commodities. To enhance farm productivity, efficient use of lands shall be complemented by a crop diversification program, lower costs of farm inputs and improved farm practices. Long-term sustainability of agriculture shall be protected through appropriate management and conservation of land and water resources.

##### 2) Marketing support system

Agricultural market support system shall be strengthened and made more efficient in order to increase farmers' returns to production and to assist the private sector in agri-business. To this end, the government's support price for palay and corn shall be maintained and production and marketing infrastructure shall be provided. Moreover, orientation of agricultural policies to world trade and developing domestic and international markets shall likewise be promoted. With regard to the latter, collection and dissemination of production and market information shall also be intensified.

##### 3) Support services and facilities

Agricultural development shall likewise depend to a large extent on other support services and facilities. Thus, while credit to the sector shall be made more accessible and research and extension and information system shall be improved, measures to minimize agriculture risks shall be strengthened and/or



developed. Lastly, in line with the decentralization thrust of the government, the critical role of farmers' organizations such as cooperatives shall be emphasized.

### 3.1.2 Present Agricultural Constraints

Most of the lands in the six (6) pump systems are covered by well developed paddy fields with irrigation facilities. However, the rate of irrigation area in each pump system is very low and largely fluctuates year by year due to deterioration of irrigation facilities and pump equipment as well as inadequate water management. It causes low cropping intensity in each pump system and the cropping calendar in each pump system is directly affected by seasonal distribution of rainfall. As far as cultivation technique is concerned, therefore, there is much room for improvement because of farmers are not very aware of improved irrigation farming due to unstable water supply as well as inactive agricultural extension services. All these constraints keep the present crop yields at low level. The present farm income is not sufficient to maintain the livelihood of the farmers due mainly to the reasons mentioned above and small holding size of the farm. Furthermore, the farm size of an average farmer tends to become smaller with population growth. Under such circumstances, the farm income should be increased in each pump system.

### 3.1.3 Basic Concept of Farm Management Plan

The basic concept of farm management plan for the six (6) pump systems exactly conforms to the agricultural policy given in Section 3.1.1 and is set to increase the farm income through full utilization of land and water resources for increase of agricultural production. Considering the above basic concept, the strategies of farm management plan for the six (6) pump systems have been conceived as follows:

- 1) The unit yield and production of crops should be increased and stabilized through introduction of improved irrigation farming, and
- 2) The year-round irrigation area should be expanded as much as possible and thereby the cropping intensity be increased.

### 3.2 Proposed Land Use

- 1) "With project" condition

The irrigation facilities and pump equipment will be improved, rehabilitated and replaced through the project implementation. In addition, proper water management will be carried out through training of staff and farmers in each pump system by the project. Consequently, the existing paddy fields in each pump system under both irrigated and rainfed conditions will become improved irrigated paddy fields under the "with project" condition.

- 2) "Without project" condition

The useful life of pump equipment in the Bonga #1, Bonga #2, Bonga #3, Solana and Libmanan-Cabusao pump systems will expire before commencement of the project implementation. Therefore, it is assumed that the paddy fields actually irrigated in the above systems will become rainfed under the "without project"

condition. In the Alcala-Amulung pump system, the useful life of pump equipment will expire in the 6th year after the commencement of the project implementation. After the 6th year, the actual irrigated paddy fields in this system will become rainfed paddy fields.

The land use in each pump system of firmed-up and maximum service areas under both "with" and "without" project conditions is given in Table 3.1 and summarized as follows:

(Unit: ha)

System	"With Project"				SC	"Without Project"				
	Paddy Field					Paddy Field				
	Wet		Dry			Wet		Dry		
	I	R	I	R		I	R	I	R	
Firmed-up Service Area										
Bonga #1	298	0	298	0	0	0	298	0	0	0
Bonga #2	634	0	634	0	40	0	634	0	0	40
Bonga #3	187	0	187	0	15	0	187	0	0	15
Alcala-Amulung	1,652	0	1,652	0	0	803 *	849	1,006 *	0	0
Solana	1,100	0	1,100	0	0	0	1,100	0	0	0
Libmanan-Cabusao	1,838	0	1,838	0	0	0	1,838	0	0	0
Maximum Service Area										
Bonga #1	426	0	426	0	0	0	426	0	0	0
Bonga #2	-	-	-	-	-	-	-	-	-	-
Bonga #3	187	0	187	0	15	0	187	0	0	15
Alcala-Amulung	2,158	0	2,158	0	0	803 *	1,355	1,006 *	0	0
Solana	1,960	0	1,960	0	0	0	1,960	0	0	0
Libmanan-Cabusao	3,085	0	3,085	0	0	0	3,085	0	0	0

Remark: \* = After expiration of the useful life of pump equipment, these lands will become rainfed lands.

I = Irrigated, R = Rainfed, SC = Sugarcane

### 3.3 Proposed Cropping Pattern

In formulation of the proposed cropping pattern, the following basic principles were applied:

- 1) The cropping pattern must create maximum benefits for the farmers as well as the nation as a whole,
- 2) The cropping pattern should be practical in view of the number of available labor forces in each system, and
- 3) The cropping pattern must conform with the existing social tradition and be acceptable to the farmers.

In consideration of the above basic principles, rice is selected as the main crop for the proposed cropping pattern of all pump systems. Rice is the most profitable crop among other possibly grown crops under the present economic situations. The farmers have long experience in rice cultivation and realize maximum irrigation benefits under the project. In addition to rice, garlic and tomato are selected as diversified crops for the Bonga #1, #2 and #3 pump systems due to the farmers' intention, soils, marketability of crops, profitability of crops and farmers' ability in cultivation of crops. On the other hand, the sugarcane farmers in the Bonga #2 and #3 pump systems intend to continue the present cropping pattern even the project will be implemented. Therefore, the following cropping patterns are proposed for the six (6) pump systems under proper irrigation management:

- 1) Rice-Rice (all pump systems)
- 2) Rice-Garlic (Bonga #1, #2 and #3 pump systems)
- 3) Rice-Tomato (Bonga #1, #2 and #3 pump systems)
- 4) Sugarcane (Bonga #2 and #3 pump systems)

The optimum cropping calendar was planned on the basis of climatic conditions and irrigation water management as follows:

Systems	Wet Season		Dry Season	
	Planting	Harvesting	Planting	Harvesting
1) Bonga #1				
Rice	May-June	Oct.-Nov.	Nov.-Dec.	Mar.-Apr.
Garlic	-	-	Dec.	Apr.
Tomato	-	-	Dec.	Apr.
2) Bonga #2				
Rice	May-July	Oct.-Nov.	Nov.-Dec.	Mar.-Apr.
Garlic	-	-	Dec.-Jan.	Apr.-May
Tomato	-	-	Dec.-Jan.	Apr.-May
Sugarcane	-	-	Dec.	Nov.
3) Bonga #3				
Rice	May-June	Oct.-Nov.	Nov.	Mar.-Apr.
Garlic	-	-	Dec.	Apr.
Tomato	-	-	Dec.	Apr.
Sugarcane	-	-	Dec.	Nov.
4) Alcala-Amulung				
Rice	May-June	Sept.-Nov.	Oct.-Dec.	Mar.-Apr.
5) Solana				
Rice	May-June	Sept.-Nov.	Oct.-Dec.	Mar.-Apr.
6) Libmanan-Cabusao				
Rice	Apr.-June	Sept.-Oct.	Nov.-Dec.	Mar.-May

The proposed cropping patterns of the six (6) pump systems are illustrated in Fig. 3.1.

The labor balance study of each pump system was made through comparison between the labor requirement for proposed farming practices and the present available labor force as follows:

(Unit: 1,000 men day/year)

System	Proposed Labor Requirement*	Available Labor Force**	Balance
1) Bonga #1	118	3,416	3,298
2) Bonga #2	179	7,563	7,384
3) Bonga #3	53	5,636	5,583
4) Alcala-Amulung	561	4,876	4,315
5) Solana	510	4,351	3,841
6) Libmanan-Cabusao	802	5,548	4,746

Remarks: \* = Labor requirement for maximum service area  
 \*\* = Available labor force x 365 days x rate of workable day (80%)

As a result of the labor balance study, no shortage of labor force would occur in each system even under the "with project" condition.

### 3.4 Proposed Farming Practices

Proper farming practice is one of the essential factors for realizing full exploitation of the agricultural potential in each pump system. The proposed farming practices and farm inputs for rice, garlic and tomato under the "with project" condition were planned on the basis of the data obtained from the authorities concerned and are given in Tables 3.2 and 3.3. On the other hand, the proposed farming practices and farm inputs of sugarcane were planned as same as present condition due to intention of the sugarcane farmers. The proposed farming practices of crops are summarized as follows:

#### 1) Rice

On rice varieties, IR series are recommended in order to ensure the anticipated yield under the "with project" condition. Use of certified extension seeds and pre-germination practice are also recommended. Land preparation consists of one (1) plowing, two (2) times of harrowing and one (1) puddling. Fertilization in nursery bed is essential for healthy growth of seedlings. The spacing of transplanting is set to be 30 x 10 cm with three (3) seedlings per hill. The fertilizer requirement for sustaining target yield is estimated at 80-90 kg/ha of nitrogen and 30 kg/ha of phosphate (P) and potassium (K). The proposed weeding consists of herbicide application during the period between puddling time and rooting stage and manual weeding depending on the stage of weed growth after herbicide application. With regard to plant protection, intensive application of insecticides is required for control of stem borers, plant hoppers, etc. Harvesting is carried out by manual labor, and harvested paddy is dried on ground.

#### 2) Garlic

Land preparation consisting of one (1) plowing, one (1) harrowing and one (1) furrowing is proposed and the soils are thoroughly pulverized and raised beds are prepared. The direct seeding method is recommended for garlic. The rate of seed requirement is estimated to be 500 kg/ha. One clove is drilled into rows spaced at 40 cm apart with depth of 3-4 cm from the surface. Space between hills is 10 cm. All the required phosphate and potassium and half of the nitrogen are applied at planting time. Sidedressing with the remaining half of nitrogen is done as bulbing begins. Application is done to the side of the rows about 20 cm away and about 10 cm deep. The most applicable method of weeding for garlic is hand weeding. Weeding should commence on the earliest date when weeds are observed. By this way, weed control is easier. Control of pests and diseases is important. Pesticides are sprayed at 10-day intervals.

#### 3) Tomato

Land preparation consisting of one (1) plowing, one (1) harrowing and one (1) furrowing is proposed. As for the cultivation of tomato, introduction of setting and support practices is recommended. The rate of seed is 1 kg/ha per planting area, and setting of seedlings is carried out within one (1) month after seeding. Space of setting is 75 x 45 cm. Split dressing of fertilizers consisting of a basic dressing and sidedressing applied seven (7) times at two (2) weeks interval is recommended in order to control overgrowth. Control of pests and diseases is the most important practice in cultivation of tomato. Weeding is

carried out four (4) times at interval of three (3) weeks after seeding of tomato.

In the "without project" condition, no significant changes in the present farming practices and farm inputs were considered.

### 3.5 Anticipated Yield and Production of Crops

After completion of the project, the yield of crops will be increased and attain anticipated yields through supply of sufficient irrigation water and proper farming practices. Anticipated yield of crops under with project condition was estimated on the basis of the experimental data obtained from related authorities concerned as well as the farm economic survey. On the other hand, the yield of crops under without project condition was estimated as same as present condition. Anticipated yield of crops under both with and without project conditions is summarized as follows:

(Unit: ton/ha)

Crops	Bonga #1	Bonga #2	Bonga #3	Alcala-Amulung	Solana	Libmanan-Cabusao
<b>"With Project"</b>						
Irrigated Rice						
Wet	4.5	4.5	4.5	4.5	4.5	4.5
Dry	5.0	5.0	5.0	5.0	5.0	5.0
Garlic	4.5	4.5	4.5	-	-	-
Tomato	10.0	10.0	10.0	-	-	-
Sugarcane	-	40.0*	27.0*	-	-	-
<b>"Without Project"</b>						
Irrigated Rice						
Wet	-	-	-	3.3**	-	-
Dry	-	-	-	3.5**	-	-
Rainfed Rice	2.3	2.4	2.3	1.8	2.0	2.0
Garlic	-	-	-	-	-	-
Sugarcane	-	40.0	27.0	-	-	-
Corn	-	-	-	-	1.0	-

Remarks: \* = Because of same farming practices and farm inputs are proposed due to intention of the sugarcane farmers

\*\* = After expiration of the useful life of pump equipment, these yields will become as same as those under rainfed condition.

Anticipated production of crops in the six (6) pump systems was estimated on the basis of proposed land use, cropping pattern and anticipated yield of crops as follows:

(Unit: ton)

Crops	Bonga #1	Bonga #2	Bonga #3	Alcala-Amulung	Solana	Libmanan-Cabusao
<b>Firmed-up Service Area</b>						
Rice	2,481	5,348	1,577	15,694	10,450	17,461
Garlic	45	180	68	-	-	-
Tomato	600	950	250	-	-	-
Sugarcane (Basi)	-	1,600	405	-	-	-
	-	(600)	(152)	-	-	-
<b>Maximum Service Area</b>						
Rice	3,547	-	1,577	20,501	18,620	29,308
Garlic	45	-	68	-	-	-
Tomato	900	-	250	-	-	-
Sugarcane (Basi)	-	-	405	-	-	-
	-	-	(152)	-	-	-

### 3.6 Marketing and Price Prospect

#### 3.6.1 Marketing

##### 1) Rice

The deficit and surplus of paddy in the six (6) pump systems in 1995 were estimated on the basis of the data obtained from the Bureau of Agricultural Statistics (BAS) and the National Census and Statistics as shown in Table 3.4. Marketable surplus of paddy at full development stage of the project was assessed by comparing the demand of rice with the production of the maximum service area in each system in 1995 as follows:

(Unit: ton)

System	Production	Demand	Market Surplus
Bonga #1	7,410	6,190	- 2,110
Bonga #2	15,630	14,750	- 7,070
Bonga #3	10,600	11,000	- 6,320
Alcala-Amulung	23,370	8,150	10,830
Solana	19,680	7,290	8,470
Libmanan-Cabusao	31,830	12,610	29,560
Total	-	-	33,360

As shown above, the marketable paddy production is expected to reach 33,360 tons in maximum service area which are equivalent to only 2.8% of the average paddy deficit of 1,205,000 tons in Region IV (including Metro Manila) from 1983 to 1987 as shown in Table 3.5. It is considered that the marketable surplus of paddy would be marketed in Region IV (including Metro Manila) through the present marketing channels.

##### 2) Garlic

The prices of garlic are sensitively influenced by the volume of production. Overproduction in Region II, where the Bonga #1, #2 and #3 pump systems are located and are producing approximately 60% of the total volume of garlic in the Philippines, might bring about a decline in price of garlic. Therefore, the total production of garlic under the "with project" condition in the above systems was planned to be as same as that at present for maintaining the current price of garlic in this study. Garlic

produced in the above systems will be marketed through the existing channels.

### 3) Tomato

A processing plant for tomato paste was established in Sarrat and has been operated since 1985. This plant has a processing capacity of 480 tons per day of fresh tomato but at present it is running only at about 30% of this capacity. Technical support for proper farming of tomato is fully provided to farmers on the contract basis by the above private firm. Under such condition of marketability, tomato is considered to become one of the promising crops in the Bonga #1, #2 and #3 pump systems. However, the marketable amount of tomato produced from the above systems under the "with project" condition was conservatively estimated to be 70 tons/day (2,100 tons/month), equivalent to 15% of the processing capacity or a half of the present running capacity for this study.

### 3.6.2 Price Prospects

Economic farm gate prices are used in the economic evaluation of the project in view of its place in the national economy. Economic farm gate prices of tradable agricultural commodities such as rice, corn, fertilizers were estimated on the basis of the projected world market prices of the World Bank in the long range for the period of 1985 to 1995. The World Bank forecast prices of tradable commodities were adjusted to 1988 constant price using the manufacturing unit value (MUV) of 1.403. Economic farm gate prices of other tradable commodities were valued at their financial prices. On the other hand, economic farm gate prices of non-tradable agricultural commodities were estimated by applying the Standard Conversion Rate (SCR) of 0.83 computed by the National Economic and Development Authority (NEDA). Economic farm gate price of unskilled labor was evaluated taking into account the Shadow Wage Rate (SWR) of 0.6 computed also by NEDA. Calculation of economic prices of tradable agricultural commodities is as shown in Table 3.6. Economic farm gate prices of agricultural outputs and inputs are summarized as follows:

(Unit: Peso)

Crops	Bonga #1	Bonga #2	Bonga #3	Alcala-Amulung	Solana	Libmanan-Cabusao
<b>Outputs</b>						
Rice (kg)	3.77	3.77	3.77	3.85	3.85	3.76
Garlic (kg)	14.81	14.81	14.81	-	-	-
Tomato (kg)	3.42	3.42	3.42	-	-	-
Basi (liter)	-	1.32	1.32	-	-	-
Corn (kg)	-	-	-	-	4.08	-
<b>Inputs</b>						
<b>Seed (kg)</b>						
Rice	6.23	6.23	6.23	5.41	5.41	5.14
Garlic	41.50	41.50	41.50	-	-	-
Tomato	2,916	2,916	2,916	-	-	-
<b>Fertilizers (kg)</b>						
Nitrogen (N)	13.52	13.52	13.52	13.55	13.55	13.49
Phosphate (P)	25.47	25.47	25.47	25.13	25.13	25.40
Potassium (K)	7.06	7.06	7.06	6.91	6.91	7.03
<b>Agro-chemicals (liter)</b>						
Insecticide	109.10	109.10	109.10	111.42	111.42	122.26
Weedicide	98.79	98.79	98.79	105.58	105.58	111.22
Rodenticide	125.3	125.3	125.3	106.00	106.00	111.03
Labor (md)	18.00	18.00	18.00	12.00	12.00	15.00
Animal (ad)	49.80	49.80	49.80	41.50	41.50	41.50
Machine (mcd)	332.00	332.00	332.00	224.10	215.80	273.90

Financial farm gate prices are used for appraising the financial viability of the farmers. Financial farm gate prices of the agricultural commodities were estimated on the basis of current farm gate prices mentioned in Section 2.8.2.

### 3.7 Crop Budget and Irrigation Benefit

Irrigation benefit to be expected is defined as the difference of primary profit from crops between future with and without project conditions. On the basis of the estimated production cost and gross income, primary profit per ha of crop was calculated both under with and without project conditions. Details are given in Table 3.7 and summarized as follows:

(Unit: Pesos/ha)

Crops	Bonga #1	Bonga #2	Bonga #3	Alcala-Amulung	Solana	Libmanan-Cabusao
<b>With Project</b>						
Paddy						
- Wet	10,184	10,184	10,184	11,464	11,469	10,542
- Dry	11,821	11,821	11,821	13,202	13,206	12,205
Diversified Crop						
- Garlic	36,600	36,600	36,600	-	-	-
- Tomato	24,408	24,408	24,408	-	-	-
- Sugarcane	-	14,037	9,083	-	-	-
<b>Without Project</b>						
Paddy						
Irrigated						
- Wet	-	-	-	9,548*	-	-
- Dry	-	-	-	10,236*	-	-
Rainfed	5,286	5,598	5,297	4,753	5,291	4,997
Diversified Crop						
- Sugarcane	-	14,037	9,083	-	-	-
- Corn	-	-	-	-	3,272	-

Remark: \* = only before useful life of pump

Applying the primary profit per crop estimated to crop area, the total primary profits accrued from agricultural production by the project were estimated both under with and without project conditions. Based on this result the irrigation benefit was calculated as shown in Table 3.8 and summarized below.

(Unit: 1,000 Pesos)

Crops	Bonga #1	Bonga #2	Bonga #3	Alcala-* Amulung	Alcala-** Amulung	Solana	Libmanan-Cabusao
<b>Firmed-up Area</b>							
With project	7,561	16,700	4,938	40,748	40,748	27,143	41,809
Without project	1,575	4,111	1,127	22,000	7,852	5,396	9,184
Increment	5,985	12,589	3,811	18,748	32,896	21,767	32,625
<b>Maximum Service Area</b>							
With project	10,755	-	-	53,229	53,229	48,363	70,174
Without project	2,252	-	-	24,405	10,257	9,579	10,968
Increment	8,503	-	-	28,824	42,972	38,784	59,206

Remarks: \* = before useful life of pump  
 \*\* = after useful life of pump



The irrigation benefit is expected to increase year by year and will reach the full benefit in and after five (5) years after the completion of irrigation facilities. The expected irrigation benefit during build-up period is assumed as follows:

(Unit: %)	
Year in Order	Rate to the Full Benefit
1	40
2	55
3	70
4	85
5	100

The irrigation benefit flow of the six (6) pump systems is shown in Table 3.9.

### 3.8 Farm Economy

In order to assess the irrigation project from the farmers' economic viewpoint, financial analysis of farm budget was examined under "with" and "without project" conditions.

After implementation of the irrigation project, the project will provide bases for introduction of improved irrigation farming through year-round irrigation. As a result, increase of cropping intensity and unit yield of crops will be much expected in the future "with project" condition. Under such situations, drastic increase of farm income in the future "with project" condition can be expected in the project area. On the other hand, the life of pumps will expire and all the land will be rainfed in future "without project" condition. Accordingly, the income of the farmer who manages irrigated land at present will decrease, and substantial increase of farm income can not be expected for the farmer whose land is now rainfed. The farm budgets of average size farmers in both "with" and "without project" conditions are presented in Table 3.10 and outlined below:

(Unit: 1,000 Pesos)						
	Bonga #1	Bonga #2	Bonga #3	Alcala- Amulung	Solana	Libmanan- Cabusao
Farm Size (ha)	0.21	0.27	0.49	0.82	0.99	2.04
Tenurial Status	Owner	Tenant	Tenant	Owner	Tenant	Tenant
<b>"With Project"</b>						
Net income	16.6	18.3	22.3	22.0	26.2	40.1
farm income	8.9	9.8	15.1	17.7	21.0	36.8
non-farm income	7.7	8.5	7.2	4.3	5.2	3.4
Living expense	13.6	14.6	15.3	17.7	15.9	18.9
Tenant fee/Land tax	0.0	1.8	3.2	0.1	3.7	2.8
Net reserve	2.9	1.9	3.8	4.1	6.6	18.5
(Irrigation fee)	(0.7)	(0.9)	(1.7)	(2.2)	(4.9)	(4.3)
<b>"Without Project"</b>						
Net income	12.8	14.2	13.5	12.7	13.7	14.0
farm income	4.5	4.6	5.4	7.2	6.9	8.2
non-farm income	8.3	9.6	8.0	5.5	6.8	5.8
Living expense	11.9	13.6	10.8	12.5	12.7	12.3
Tenant fee/Land tax	0.0	0.4	0.7	0.0	0.8	1.7
Net reserve	0.9	0.2	2.0	0.1	0.1	0.0

The net farm income of an average size farmer under "with project" condition is expected to be around 2 to 3 times of that under "without project" condition. The annual net reserve or capacity-to-pay under "with project" condition will be much larger than that under "without project" condition.

Table 2.1. DEMOGRAPHIC CONDITION

Description	Population (x1,000)			Growth Rate 1975-80 (%)	Area (km <sup>2</sup> )	Person per km <sup>2</sup> 1987	No. of Households		Family Size		Rate of Farm Households	
	1975	1980	1987				1980	1980	1980	1980	1980	1980
Philippines	42,071	48,098	57,357	2.7	299,410	192	8,607	5.6	3,439	39.9		
Region												
I	3,269	3,541	4,056	1.6	21,569	188	651	5.4	298	45.8		
II	1,933	2,216	2,648	2.8	36,403	73	404	5.5	254	62.8		
V	3,194	3,477	7,490	1.7	17,633	425	604	5.8	314	52.0		
Province												
Ilocos Norte	372	391	440	1.0	3,399	129	77	5.1	42	54.7		
Cagayan	644	711	827	2.0	9,003	92	131	5.4	75	57.0		
Camarines Sur	1,024	1,099	1,309	1.4	2,113	619	188	5.8	97	51.3		
Municipality/System												
Bonga #1												
San Nicolas	22.2	23.4	26.5	1.1	49	540	4.7	5.0	1.4	30.3		
Sarrat	18.1	18.8	20.9	0.8	81	259	3.9	4.8	2.2	55.6		
Total	40.2	42.2	47.4	0.9	130	365	8.6	4.9	3.6	41.8		
Bonga #2												
Laoag	66.3	69.6	78.5	1.0	108	727	13.6	5.1	3.6	26.2		
San Nicolas	22.2	23.4	26.5	1.1	49	540	4.7	5.0	1.4	30.3		
Total	88.4	93.0	105.0	1.0	157	669	18.3	5.1	5.0	27.3		
Bonga #3												
Laoag	66.3	69.6	78.5	1.0	108	727	13.6	5.1	3.6	26.2		
Alcala-Amulung												
Alcala	22.6	24.5	27.8	1.7	187	148	4.5	5.5	3.7	82.3		
Amulung	25.7	29.1	34.2	2.5	242	141	5.4	5.4	4.2	77.9		
Total	48.3	53.6	62.0	2.1	429	144	9.9	5.4	7.9	79.9		
Solana												
Solana	40.6	46.1	55.4	2.6	201	276	8.2	5.6	5.0	61.1		
Libmanan-Cabusao												
Cabusao	10.1	10.8	12.9	1.4	47	274	1.9	5.7	0.4	23.0		
Libmanan	66.6	68.4	79.5	0.5	336	237	11.7	5.8	6.8	57.8		
Total	76.7	79.3	92.4	0.7	383	241	13.6	5.8	7.2	53.0		

Source: 1980 Census of Population and Housing, National Census and Statistics Office, Manila  
 1981 Census of Agriculture, Special Report, National Census and Statistics Office, Manila  
 Data file of Central and Provincial National Census and Statistics Offices  
 Philippine Statistical Year Book 1987, National Economic Development Authority

Table 2.2 AGE DISTRIBUTION IN PROVINCE BY SEX IN 1987

Age Group	Bonga #1, #2 and #3			Alcala-Amulung and Solana			Libmanan-Cabusao		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-4	29,406	27,877	57,283	59,316	56,730	116,046	100,754	96,536	196,790
5-9	26,872	25,987	52,859	55,696	53,220	108,916	96,337	93,388	189,725
10-14	26,146	24,906	51,052	48,056	46,379	94,435	89,033	83,868	172,901
15-19	24,547	23,686	48,233	45,522	43,477	88,999	79,740	73,365	153,105
20-24	20,863	19,856	40,719	42,685	39,043	81,728	64,393	61,234	125,627
25-29	16,047	16,312	32,359	37,030	34,013	71,043	46,754	49,009	95,763
30-34	12,737	14,644	27,381	30,890	29,818	60,708	38,519	40,281	78,800
35-39	11,358	12,104	23,462	22,707	22,796	45,503	32,421	31,780	64,201
40-44	10,485	10,483	20,968	18,767	19,114	37,881	26,459	25,942	52,421
45-49	9,665	9,869	19,534	16,337	16,170	32,507	22,112	22,049	44,161
50-54	7,456	7,687	15,143	12,514	12,700	25,214	17,367	18,090	35,657
55-59	5,025	6,200	11,225	7,855	8,327	16,182	11,811	12,465	24,276
60-64	4,490	5,437	9,927	5,560	6,039	11,599	8,652	9,708	18,360
65-69	3,554	4,387	7,941	3,914	4,430	8,344	6,942	6,751	13,693
70-74	4,159	6,074	10,233	3,322	4,128	7,450	6,258	6,082	12,340
> 75									
Total	218,447	221,640	440,087	420,158	406,965	827,123	662,562	646,349	1,308,911
% of 15 years and over			53.4			51.4			57.3

Source: Data file of National Census and Statistic Office, Manila

Table 2.3 EMPLOYED POPULATION OF PROVINCE BY INDUSTRY IN 1987

Industry Group	Bonga #1, #2 and #3			Alcala-Amulung and Solana			Libmanan-Cabusao		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Agriculture/Fishery/Forestry	68	36	104	136	84	220	212	50	262
Mining/Quarrying	1	0	1	0	0	0	1	0	1
Manufacturing	3	5	8	8	10	18	5	10	15
Electricity/Gas/Water	0	0	0	1	0	1	1	0	1
Construction	3	0	3	14	0	14	9	0	9
Wholesale/Retail Trade	2	11	13	10	26	36	11	30	41
Transportation/Storage/Communication	6	0	6	14	0	14	20	0	20
Financing/Insurance/Business services	2	0	2	1	0	1	3	2	5
Communal/Social/Personal Services	14	19	33	23	25	48	38	34	72
Not adequately defined	0	0	0	0	0	0	0	0	0
Total	99	71	170	208	145	353	300	126	426

Source: Data file of National Census and Statistic Office, Manila

Table 2.4 EMPLOYED AND UNEMPLOYED POPULATION OF PROVINCE IN 1987

Description	Bonga #1, #2 and #3			Alcala-Amulung and Solana			Libmanan-Cabusao		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Employed labor force	98	71	169	208	145	353	300	126	426
Unemployed labor force	1	0	1	5	15	20	4	5	9
Not in the labor force	29	67	96	31	98	129	70	223	293
Total	128	138	266	244	259	503	374	354	728

Source: Data file of National Census and Statistic Office, Manila

Table 2.5 SOILS AND LAND CLASSIFICATION

Mapping Symbol	Soil Series	Texture	Slope (%)	Degree of Flooding Hazard	Land Class		Area	
					Rice	Diversified Crops	(ha)	(%)
<b>BONGA PUMP #1</b>								
BtA	Bantog	Clay Loam	0-3	-	1R	-	464	87.5
SmA	San Manuel	Clay Loam	0-3	-	1R-2	-	22	4.2
BtB	Bantog	Clay Loam	3-5	-	2R	-	44	8.3
Total							530	100.0
<b>BONGA PUMP #2</b>								
BtA	Bantog	Clay Loam	0-3	-	1R	-	750	50.0
SmA	San Manuel	Clay Loam	0-3	-	1R-2	-	440	29.3
BtB	Bantog	Clay Loam	3-5	-	2R	-	33	2.2
SmA	San Manuel	Sandy Loam	0-3	-	-	1	251	16.8
SmAfl	San Manuel	Sandy Loam	0-3	Slight	-	2	26	1.7
Total							1500	100.0
<b>BONGA PUMP #3</b>								
SmA	San Manuel	Clay Loam	0-3	-	1R-2	-	197	78.8
SmA	San Manuel	Sandy Loam	0-3	-	-	1	53	21.2
Total							250	100.0
<b>ALCALA-AMULUNG</b>								
BoA	Bago	Clay Loam	0-3	-	1R	-	429	14.6
PaA	Padapada	Clay	0-3	-	1R	-	829	28.2
TgA	Tagulod	Clay Loam	0-3	-	1R	-	1332	45.3
QgA	Quingua	Clay Loam	0-3	-	1R-2	-	323	11.0
TgB	Tagulod	Clay Loam	3-5	-	2R	-	27	0.9
Total							2940	100.0
<b>SOLANA</b>								
BgA	Bigaa	Clay	0-3	-	1R	-	2402	53.4
BoA	Bago	Clay Loam	0-3	-	1R	-	338	7.5
BtA	Bantog	Clay	0-3	-	1R	-	540	12.0
TgA	Tagulod	Clay Loam	0-3	-	1R	-	1076	23.9
QgA	Quingura	Silty Clay Loam	0-3	-	1R-2	-	144	3.2
Total							4500	100.0
<b>LIBMANAN-CABUSAO</b>								
-	-	-	0-3	-	1R	-	2102	37.2
-	-	-	0-3	Moderate	2R	-	2672	47.3
-	-	-	0-3	Severe	3R	-	819	14.5
-	-	-	-	-	6	-	57	1.0
Total							5650	100.0

Source: Bureau of Soils

Table 2.6 PRESENT LAND USE

(Unit : ha)

Name of Systems	PADDY FIELD												TOTAL	
	Irrigated				Rainfed				SUGAR CANE		FALLOW		Wet	Dry
	Wet	Rice	Garlic	Dry	Wet	Rice	Corn	Total	Wet	Dry	Wet	Dry	Wet	Dry
<b>1 Firmed-up Area</b>														
Bonga Pump #1	143	77	33	110	155	-	155	-	188	298	298	298	298	298
Bonga Pump #2	457	136	97	233	177	-	177	-	441	674	674	674	674	674
Bonga Pump #3	141	38	29	67	46	-	46	-	135	202	202	202	202	202
Alcala-Amulung	803	1,006	-	1,006	849	-	849	-	646	1,652	1,652	1,652	1,652	1,652
Solana	916	906	-	906	147	37	184	-	194	1,100	1,100	1,100	1,100	1,100
Libmanan-Cabusao	1,201	1,538	-	1,538	637	-	637	-	300	1,838	1,838	1,838	1,838	1,838
<b>2 Maximum Service Area</b>														
Bonga Pump #1	143	77	33	110	283	-	283	-	316	426	426	426	426	426
Bonga Pump #2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bonga Pump #3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alcala-Amulung	803	1,006	-	1,006	1,355	-	1,355	-	1,152	2,158	2,158	2,158	2,158	2,158
Solana	916	906	-	906	835	209	1,044	-	1,054	1,960	1,960	1,960	1,960	1,960
Libmanan-Cabusao	1,201	1,538	-	1,538	1,884	-	1,884	-	1,547	3,085	3,085	3,085	3,085	3,085



Table 2.10 PRESENT FARM INPUTS

Description	Unit	Bonga #1		Bonga #2		Bonga #3		Alcala-Amulung		
		Irrigated	Rainfed	Irrigated	Rainfed	Irrigated	Rainfed	Irrigated	Rainfed	
		WS	DS	WS	DS	WS	DS	WS	DS	
<b>1. Materials</b>										
Seed	kg	75	75	70	70	70	70	75	75	
Fertilizer										
Nitrogen (N)	kg	70	49	64	64	72	44	49	50	
Phosphorus (P)	kg	22	15	13	13	17	10	3	4	
Potassium (K)	kg	14	10	13	13	17	10	3	4	
Insecticide	lit	1.2	0.8	1.2	0.8	0.8	0.8	1.6	1.5	
Weedicide	kg	0.4	0.3	1.3	0.9	0.2	0.5	0.8	0.4	
Rodenticide	lit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
<b>2. Labour Force</b>										
Family	md	20	19	19	19	20	18	20	20	
Hired(Other)/1	md	17	17	17	17	17	16	16	16	
Hired(H/T)/2	md	64	45	68	78	74	80	72	76	
Total	md	101	104	103	114	111	117	108	112	
<b>3. Animal</b>										
Family	ad	7	7	9	9	8	8	9	9	
Hired	ad	2	2	1	1	2	2	1	1	
Total	ad	9	9	10	10	10	10	10	10	
<b>4. Machinery(Hired)</b>										
	mcd	0.0	0.0	0.5	0.5	0.5	0.4	0.6	0.6	
<b>Rice</b>										
Description	Unit	Solana		Limahan-Cabusao		Diversified Crop			Sugar Cane	Corn
		Irrigated	Rainfed	Irrigated	Rainfed	Bonga	Bonga	Bonga		
		WS	DS	WS	DS	#1	#2	#3		
<b>1. Materials</b>										
Seed	kg	70	70	90	90	90	210	280	19000/3	17000/3
Fertilizer										
Nitrogen (N)	kg	20	33	35	40	40	72	127	55	35
Phosphorus (P)	kg	1	2	7	5	5	14	36	15	0
Potassium (K)	kg	0	0	7	3	3	14	36	5	0
Insecticide	lit	0.3	0.5	0.8	3.6	3.6	1.0	3.0	0.0	0.0
Weedicide	kg	0.1	0.2	0.4	0.9	0.9	0.0	0.0	0.0	0.0
Rodenticide	lit	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
<b>2. Labour Force</b>										
Family	md	20	20	18	19	19	38	39	53	55
Hired(Other)/1	md	16	17	17	17	16	37	53	55	57
Hired(H/T)/2	md	67	72	43	42	50	30	-	-	-
Total	md	103	109	78	78	65	75	92	108	112
<b>3. Animal</b>										
Family	ad	7	7	7	7	7	1.5	1.5	8.7	36.0
Hired	ad	2	2	2	2	2	0.0	0.0	0.0	0.0
Total	ad	9	9	9	9	9	1.5	1.5	8.7	36.0
<b>4. Machinery(Hired)</b>										
	mcd	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0

Remarks /1 Hired labor for work other than harvest & threshing  
/2 Hired labor for harvest & threshing  
/3 Unit:cuttings



TABLE 2.13 (1/2) LAND TENURE AND HOLDING (PLANNED-UP AREAS)

Farm Size (ha)	No. of Owner Farmers		No. of Tenant Farmers		Total Farmers (No.)	Total Area (ha)		Average Farm Size (ha)
	No. of Farmers	Total Area (ha)	No. of Farmers	Total Area (ha)				
Below 0.1	16	1.27	8	0.71	24	1.98	0.1	
0.1 - 0.2	43	6.90	29	4.47	71	11.37	0.16	
0.2 - 0.3	108	27.44	60	15.38	168	42.81	0.25	
0.3 - 0.4	124	46.32	73	23.14	197	69.46	0.35	
0.4 - 0.5	143	69.97	73	31.72	216	101.69	0.47	
0.5 - 0.6	135	68.46	71	45.19	206	113.65	0.55	
0.6 - 0.7	114	67.43	70	44.72	184	112.15	0.61	
0.7 - 0.8	101	76.29	70	52.32	171	128.61	0.75	
0.8 - 0.9	92	78.76	49	33.83	141	112.59	0.79	
0.9 - 1.0	55	53.26	43	41.26	98	94.52	0.96	
1.0 - 1.1	86	88.64	76	82.69	162	171.33	1.06	
1.1 - 1.2	54	71.14	35	45.89	89	117.03	1.32	
1.2 - 1.4	38	56.94	23	49.06	61	106.00	1.75	
1.4 - 1.6	29	48.17	22	37.74	51	85.91	1.69	
1.6 - 1.8	29	48.17	22	37.74	51	85.91	1.69	
1.8 - 2.0	27	33.89	16	27.20	43	61.09	1.43	
2.0 - 3.0	46	108.96	35	84.87	81	193.83	2.39	
3.0 - 4.0	5	17.40	10	34.48	15	51.88	3.46	
Over 4.00	10	57.25	2	7.77	12	65.02	5.42	
Total (%)	1205 (60.9)	934.52 (59.6)	774 (39.1)	667.48 (40.4)	1979 (100)	1602.00 (100)	0.84 (Average)	

Farm Size (ha)	No. of Owner Farmers		No. of Tenant Farmers		Total Farmers (No.)	Total Area (ha)		Average Farm Size (ha)
	No. of Farmers	Total Area (ha)	No. of Farmers	Total Area (ha)				
Below 0.1	8	0.73	4	0.33	12	1.06	0.1	
0.1 - 0.2	27	4.38	28	4.30	54	8.68	0.16	
0.2 - 0.3	34	8.99	32	8.18	66	17.17	0.26	
0.3 - 0.4	30	10.40	47	16.33	77	26.73	0.35	
0.4 - 0.5	35	15.84	48	24.14	83	39.98	0.48	
0.5 - 0.6	25	19.00	33	21.36	58	40.36	0.69	
0.6 - 0.7	32	23.58	32	27.46	64	51.04	0.79	
0.7 - 0.8	16	12.48	17	12.53	33	25.01	0.76	
0.8 - 0.9	25	24.33	39	41.15	64	65.48	0.98	
0.9 - 1.0	45	47.63	45	47.63	90	95.26	1.06	
1.0 - 1.2	28	36.07	45	58.83	73	94.90	1.30	
1.2 - 1.4	31	22.92	21	32.17	52	55.09	1.06	
1.4 - 1.6	15	25.39	27	35.42	42	60.81	1.45	
1.6 - 1.8	16	31.62	21	40.89	37	72.51	1.93	
1.8 - 2.0	21	52.92	40	38.35	61	91.27	1.50	
2.0 - 3.0	14	48.01	11	38.95	25	86.96	3.48	
3.0 - 4.0	14	97.58	20	34.57	34	132.15	3.88	
Over 4.00	14	97.58	20	34.57	34	132.15	3.88	
Total (%)	433 (41.6)	498.60 (45.2)	608 (58.4)	667.48 (40.4)	1041 (100)	1166.00 (100)	1.06 (Average)	

Farm Size (ha)	No. of Owner Farmers		No. of Tenant Farmers		Total Farmers (No.)	Total Area (ha)		Average Farm Size (ha)
	No. of Farmers	Total Area (ha)	No. of Farmers	Total Area (ha)				
Below 0.4	19	4.99	65	16.58	84	21.57	0.26	
0.4 - 0.8	34	20.72	111	69.09	145	89.81	0.62	
0.8 - 1.2	25	18.90	103	132.14	128	151.04	1.20	
1.2 - 1.6	13	12.90	58	71.77	71	84.67	1.20	
1.6 - 2.0	11	19.58	50	106.45	61	126.03	2.07	
2.0 - 2.4	11	22.87	50	109.92	61	132.79	2.18	
2.4 - 2.8	5	12.04	46	138.01	51	150.05	2.94	
2.8 - 3.2	10	13.33	37	123.02	47	136.35	2.90	
3.2 - 3.6	5	18.30	29	98.97	34	117.27	3.45	
3.6 - 4.0	6	22.03	19	72.57	25	94.60	3.78	
4.0 - 6.0	1	10.48	56	267.98	57	278.46	4.83	
6.0 - 10.0	1	28.87	4	21.15	5	50.02	10.00	
10.0 - 15.00	5	63.96	4	30.96	9	94.92	10.55	
Over 15.00	5	49.54	3	80.18	8	129.72	16.22	
Total (%)	158 (17.9)	967.33 (45.2)	721 (62.1)	1470.67 (64.8)	879 (100)	2438.00 (100)	2.79 (Average)	

Farm Size (ha)	No. of Owner Farmers		No. of Tenant Farmers		Total Farmers (No.)	Total Area (ha)		Average Farm Size (ha)
	No. of Farmers	Total Area (ha)	No. of Farmers	Total Area (ha)				
Below 0.05	229	7.59	180	5.44	408	13.03	0.03	
0.05 - 0.10	224	17.06	147	10.63	371	27.69	0.07	
0.10 - 0.15	132	12.42	73	9.06	205	21.48	0.10	
0.15 - 0.20	69	11.99	37	6.34	106	18.33	0.17	
0.20 - 0.25	37	5.95	19	4.33	56	10.28	0.23	
0.25 - 0.30	26	10.02	16	4.51	42	14.53	0.35	
0.30 - 0.35	26	8.62	13	4.16	39	12.79	0.33	
0.35 - 0.40	24	8.90	14	5.07	38	13.97	0.37	
0.40 - 0.50	29	13.30	21	9.59	50	22.89	0.46	
0.50 - 0.60	18	10.05	14	7.87	32	17.92	0.56	
0.60 - 0.70	21	13.82	16	6.25	37	20.07	0.54	
0.70 - 0.80	12	8.59	8	3.73	20	12.32	0.62	
0.80 - 0.90	7	7.45	5	5.63	12	13.08	0.95	
0.90 - 1.00	13	11.80	11	10.15	24	21.95	0.91	
1.00 - 2.00	24	35.34	12	16.84	36	52.18	1.45	
Over 2.00	1	2.84	1	2.84	2	5.68	2.84	
Total (%)	873 (60.1)	182.61 (62.3)	578 (39.9)	112.39 (37.7)	1451 (100)	295.00 (100)	0.21 (Average)	

Farm Size (ha)	No. of Owner Farmers		No. of Tenant Farmers		Total Farmers (No.)	Total Area (ha)		Average Farm Size (ha)
	No. of Farmers	Total Area (ha)	No. of Farmers	Total Area (ha)				
Below 0.05	44	16.54	512	17.07	556	33.61	0.06	
0.05 - 0.10	38	2.80	369	42.24	407	45.04	0.11	
0.10 - 0.15	16	1.95	241	13.11	257	15.06	0.06	
0.15 - 0.20	19	2.14	184	10.55	203	12.69	0.06	
0.20 - 0.25	13	3.75	103	21.58	116	25.33	0.22	
0.25 - 0.30	6	1.98	72	28.03	78	30.01	0.38	
0.30 - 0.35	5	2.04	59	23.04	64	25.08	0.39	
0.35 - 0.40	12	5.96	58	24.85	70	30.81	0.44	
0.40 - 0.50	10	5.35	52	34.11	62	39.46	0.64	
0.50 - 0.60	5	3.46	33	17.22	38	20.68	0.54	
0.60 - 0.70	4	3.26	23	13.92	27	17.18	0.64	
0.70 - 0.80	3	2.81	20	19.45	23	22.26	0.96	
0.80 - 1.00	3	11.86	67	89.19	70	101.05	1.44	
1.00 - 2.00	3	6.58	24	163.38	27	170.00	6.30	
Over 2.00	139 (8.1)	60.01 (9.3)	2254 (91.9)	931.11 (31.1)	2393 (100)	991.11 (100)	0.27 (Average)	

Farm Size (ha)	No. of Owner Farmers		No. of Tenant Farmers		Total Farmers (No.)	Total Area (ha)		Average Farm Size (ha)
	No. of Farmers	Total Area (ha)	No. of Farmers	Total Area (ha)				
Below 0.03	4	0.16	24	0.89	28	1.05	0.04	
0.03 - 0.10	24	2.06	36	2.82	60	4.88	0.08	
0.10 - 0.15	17	1.77	33	4.27	50	6.04	0.12	
0.15 - 0.20	9	1.62	25	4.43	34	6.06	0.18	
0.20 - 0.25	5	1.19	12	2.63	17	3.82	0.23	
0.25 - 0.30	10	2.05	12	3.21	22	5.26	0.24	
0.30 - 0.35	15	4.74	20	6.41	35	11.15	0.32	
0.35 - 0.40	6	2.37	9	3.49	15	5.87	0.39	
0.40 - 0.50	5	2.56	20	9.01	25	11.57	0.46	
0.50 - 0.60	10	5.80	10	5.76	20	11.57	0.58	
0.60 - 0.70	8	5.69	10	6.55	18	12.24	0.68	
0.70 - 0.80	2	1.53	12	8.72	14	10.25	0.73	
0.80 - 0.90	5	4.88	13	10.66	18	15.54	0.86	
0.90 - 1.00	7	6.88	5	8.92	12	15.80	1.32	
1.00 - 2.00	6	39.76	37	51.07	43	90.83	2.11	
Over 2.00	3	8.98	4	11.34	7	20.32	2.90	
Total (%)	139 (32.8)	614.01 (30.6)	286 (67.2)	1401.19 (69.4)	425 (100)	2015.20 (100)	0.48 (Average)	

Table 2.11(2/2) LAND TENURE AND HOLDING (Maximum Service Area)

Farm Size (Ha)	Owner		Tenant		Total Farmers		Total Area		Average Farm Size (Ha)
	No. of Farmers	Total Area (Ha)	No. of Farmers	Total Area (Ha)	(No.)	(Ha)	(%)	(%)	
Below 0.1	24	1.93	12	1.09	36	3.02	1.2	3.02	0.1
0.1 - 0.2	65	10.51	43	6.81	109	17.32	3.6	17.32	0.16
0.2 - 0.3	164	41.82	92	23.44	256	65.26	8.5	65.26	0.25
0.3 - 0.4	217	60.80	99	35.27	316	105.87	10.9	105.87	0.37
0.4 - 0.5	217	105.64	111	49.87	328	156.51	10.9	156.51	0.48
0.5 - 0.6	351	104.38	135	49.37	486	179.22	10.8	179.22	0.55
0.6 - 0.7	174	112.20	106	68.16	280	180.36	9.3	180.36	0.64
0.7 - 0.8	155	116.28	106	68.16	261	196.04	8.7	196.04	0.75
0.8 - 0.9	140	120.05	100	71.71	240	191.76	8.0	191.76	0.86
0.9 - 1.0	85	81.08	63	62.89	148	143.97	5.0	143.97	0.96
1.0 - 1.1	130	135.08	116	126.04	246	261.12	8.2	261.12	1.06
1.1 - 1.2	130	135.08	116	126.04	246	261.12	8.2	261.12	1.06
1.2 - 1.4	58	108.48	53	93.98	111	178.37	4.5	178.37	1.32
1.4 - 1.6	36	106.78	44	57.38	80	168.58	4.4	168.58	1.49
1.6 - 1.8	44	132.42	33	57.38	77	179.95	2.6	179.95	1.69
1.8 - 2.0	27	131.85	24	57.38	51	189.23	1.7	189.23	2.84
2.0 - 2.0	79	182.98	53	129.33	132	312.31	4.1	312.31	2.60
3.0 - 4.0	14	86.55	14	52.53	28	139.08	0.7	139.08	3.1
Over 4.00	14	86.55	14	52.53	28	139.08	0.7	139.08	3.1
Total	1856	1500.61	1179	1017.39	3035.19	2518.00	100.0	2518.00	0.84
(Average)	(60.9)	(59.6)	(39.1)	(40.4)	(100)	(100)			

Farm Size (Ha)	Owner		Tenant		Total Farmers		Total Area		Average Farm Size (Ha)
	No. of Farmers	Total Area (Ha)	No. of Farmers	Total Area (Ha)	(No.)	(Ha)	(%)	(%)	
Below 0.1	13	1.30	7	0.58	20	1.89	1.1	1.89	0.09
0.1 - 0.2	47	7.14	49	7.67	97	15.11	7.67	15.11	0.16
0.2 - 0.3	51	15.00	56	14.57	117	30.59	6.2	30.59	0.25
0.3 - 0.4	54	18.55	62	29.10	137	47.65	7.4	47.65	0.26
0.4 - 0.5	63	27.68	94	43.02	157	70.71	8.5	70.71	0.45
0.5 - 0.6	63	31.85	70	38.05	133	71.90	7.2	71.90	0.54
0.6 - 0.7	52	33.10	76	48.94	128	82.04	6.8	82.04	0.64
0.7 - 0.8	52	33.10	76	48.94	128	82.04	6.8	82.04	0.64
0.8 - 0.9	23	22.74	58	49.75	81	95.56	4.9	95.56	0.76
0.9 - 1.0	42	43.06	57	59.89	99	106.95	5.7	106.95	0.85
1.0 - 1.1	42	43.06	57	59.89	99	106.95	5.7	106.95	0.85
1.1 - 1.2	76	84.87	81	87.82	157	172.69	8.5	172.69	1.10
1.2 - 1.4	76	84.87	81	87.82	157	172.69	8.5	172.69	1.10
1.4 - 1.6	37	40.66	38	57.33	75	97.99	3.5	97.99	1.50
1.6 - 1.8	37	40.66	38	57.33	75	97.99	3.5	97.99	1.50
1.8 - 2.0	24	55.25	28	73.24	52	128.49	5.6	128.49	1.91
2.0 - 2.0	38	94.30	22	173.24	60	289.53	5.9	289.53	2.45
3.0 - 4.0	25	85.55	20	69.40	45	154.95	2.4	154.95	2.95
Over 4.00	25	173.86	36	61.60	61	235.46	3.3	235.46	3.88
Total	771	888.41	1084	1071.59	1855.36	1950.00	100.0	1950.00	1.06
(Average)	(41.6)	(45.3)	(58.4)	(54.7)	(100)	(100)			

Farm Size (Ha)	Owner		Tenant		Total Farmers		Total Area		Average Farm Size (Ha)
	No. of Farmers	Total Area (Ha)	No. of Farmers	Total Area (Ha)	(No.)	(Ha)	(%)	(%)	
Below 0.4	21	8.58	109	91.83	130	100.41	9.5	100.41	0.26
0.4 - 0.8	57	24.75	186	116.29	243	141.04	16.5	141.04	0.65
0.8 - 1.2	28	31.52	222	221.79	250	253.31	8.4	253.31	1.00
1.2 - 1.6	26	31.72	173	178.67	199	210.39	6.9	210.39	1.85
1.6 - 2.0	18	28.56	95	184.51	113	213.07	7.2	213.07	2.18
2.0 - 2.4	18	28.56	95	184.51	113	213.07	7.2	213.07	2.18
2.4 - 2.8	17	50.91	53	155.57	70	206.48	4.7	206.48	2.87
2.8 - 3.2	17	50.91	53	155.57	70	206.48	4.7	206.48	2.87
3.2 - 3.6	10	36.97	32	121.80	42	158.77	3.9	158.77	3.79
3.6 - 4.0	12	171.89	94	468.78	107	640.67	7.2	640.67	4.41
4.0 - 8.0	12	171.89	94	468.78	107	640.67	7.2	640.67	4.41
8.0 - 10.0	7	64.24	5	54.97	12	119.21	3.9	119.21	8.98
10.0 - 15.0	9	105.32	7	90.30	16	195.62	6.4	195.62	12.26
Over 15.00	5	81.47	4	124.58	9	206.05	7.0	206.05	22.04
Total	265	616.95	1211	2468.45	1476.59	2085.00	100.0	2085.00	2.09
(Average)	(17.9)	(23.0)	(82.1)	(20.0)	(100)	(100)			

Farm Size (Ha)	Owner		Tenant		Total Farmers		Total Area		Average Farm Size (Ha)
	No. of Farmers	Total Area (Ha)	No. of Farmers	Total Area (Ha)	(No.)	(Ha)	(%)	(%)	
Below 0.05	327	10.84	257	1.77	584	12.61	4.4	12.61	0.03
0.05 - 0.10	334	24.39	210	15.20	544	39.59	9.3	39.59	0.07
0.10 - 0.15	146	17.75	105	12.55	251	30.30	7.2	30.30	0.12
0.15 - 0.20	98	17.14	72	9.07	170	26.21	6.2	26.21	0.17
0.20 - 0.25	37	8.50	28	6.20	65	14.70	3.1	14.70	0.23
0.25 - 0.30	32	14.32	23	6.43	55	20.75	4.9	20.75	0.27
0.30 - 0.35	37	22.33	18	5.95	55	28.28	4.3	28.28	0.33
0.35 - 0.40	41	19.01	39	13.70	80	32.71	7.7	32.71	0.46
0.40 - 0.50	26	14.36	21	11.53	47	25.89	6.0	25.89	0.55
0.50 - 0.60	10	19.47	14	8.94	24	28.41	6.7	28.41	0.64
0.60 - 0.70	17	12.28	7	3.23	24	17.61	4.1	17.61	0.75
0.70 - 0.80	12	10.87	10	8.02	22	18.69	4.4	18.69	0.85
0.80 - 1.00	18	16.87	15	14.51	33	31.38	7.5	31.38	1.46
1.00 - 2.00	33	50.32	17	24.02	50	74.34	1.9	74.34	2.97
Over 2.00	1	4.14	1	4.06	2	8.20	1.9	8.20	2.97
Total	1248	285.54	827	160.66	2075.32	446.00	100.0	446.00	0.21
(Average)	(60.1)	(82.3)	(37.1)	(37.1)	(100)	(100)			

Farm Size (Ha)	Owner		Tenant		Total Farmers		Total Area		Average Farm Size (Ha)
	No. of Farmers	Total Area (Ha)	No. of Farmers	Total Area (Ha)	(No.)	(Ha)	(%)	(%)	
Below 0.05	44	1.54	312	15.34	356	17.87	2.7	17.87	0.03
0.05 - 0.10	36	2.80	380	27.24	416	30.04	5.9	30.04	0.07
0.10 - 0.15	16	1.95	383	27.60	399	29.55	5.9	29.55	0.12
0.15 - 0.20	15	3.13	184	30.96	199	34.09	4.9	34.09	0.22
0.20 - 0.25	12	2.04	168	28.50	180	30.54	4.9	30.54	0.26
0.25 - 0.30	6	1.78	121	28.93	127	30.71	3.9	30.71	0.32
0.30 - 0.35	5	1.58	85	20.94	90	22.52	3.2	22.52	0.38
0.35 - 0.40	5	2.04	59	23.43	64	25.47	2.6	25.47	0.44
0.40 - 0.50	10	3.35	32	26.16	42	29.51	3.1	29.51	0.54
0.50 - 0.60	5	3.46	33	21.21	38	24.67	3.0	24.67	0.65
0.60 - 0.70	3	3.26	22	17.22	25	20.48	3.0	20.48	0.74
0.70 - 0.80	3	2.30	22	18.52	25	20.82	3.0	20.82	0.85
0.80 - 1.00	3	2.63	20	19.45	23	22.07	3.3	22.07	1.34
1.00 - 2.00	5	11.86	57	151.19	62	163.05	15.0	163.05	2.63
Over 2.00	3	6.58	34	183.36	37	189.94	25.2	189.94	5.14
Total	199	60.01	2254	613.99	2453.99	674.00	100.0	674.00	0.27
(Average)	(61.1)	(61.5)	(31.5)	(31.5)	(100)	(100)			

Farm Size (Ha)	Owner		Tenant		Total Farmers		Total Area		Average Farm Size (Ha)
	No. of Farmers	Total Area (Ha)	No. of Farmers	Total Area (Ha)	(No.)	(Ha)	(%)	(%)	
Below 0.05	4	0.16	24	0.89	28	1.05	0.5	1.05	0.04
0.05 - 0.10	24	2.06	36	3.22	60	5.28	2.5	5.28	0.08
0.10 - 0.15	17	1.77	33	4.27	50	6.04	3.1	6.04	0.12
0.15 - 0.20	9	1.62	23	4.43	32	6.05	3.1	6.05	0.18
0.20 - 0.25	5	1.19	12	2.63	17	3.82	2.0	3.82	0.22
0.25 - 0.30	10	2.80	22	6.41	32	9.21	3.1	9.21	0.27
0.30 - 0.35	15	4.74	20	6.41	35	11.15	3.8	11.15	0.32
0.35 - 0.40	6	2.37	9	3.49	15	5.86	3.0	5.86	0.37
0.40 - 0.50	5	2.36	20	9.01	25	11.37	5.0	11.37	0.46
0.50 - 0.60	10	5.78	10	6.55	20	12.33	6.0	12.33	0.55
0.60 - 0.70	6	5.69</							

Table 2.12 AGRICULTURAL EXTENSION SERVICES

Description	Bonga #1		Bonga #2		Bonga #3		Alcala-Paulung		Solana		Libmanan-Cabusao			
<b>Extension Services</b>														
No. of Extension staff														
Municipal Agricultural Officer	2		2		1		2		1		2			
Agricultural Food Technologist	20		27		19		19		17		31			
<b>Methods employed</b>														
Practical farmers' class	Yes		Yes		Yes		Yes		Yes		Yes			
Farm and home visit	Yes		Yes		Yes		Yes		Yes		Yes			
Training and visit	Yes		Yes		Yes		-		Yes		Yes			
Demonstration plot	Yes		Yes		Yes		-		Yes		Yes			
Training of contact leader	Yes		-		-		-		Yes		-			
Office call	Yes		Yes		Yes		Yes		Yes		Yes			
<b>Farmers' cooperatives</b>														
	Number	Member	Number	Member	Number	Member	Number	Member	Number	Member	Number	Member		
Credit cooperatives	5	-	8	-	6	-	2	193	1	200	0	-		
Consumers cooperatives	5	-	7	-	6	-	0	-	1	44	2	367		
Service cooperatives	1	-	1	-	1	-	0	-	0	-	0	-		
Producers cooperatives	1	-	1	-	1	-	0	-	1	25	0	-		
Marketing cooperatives	1	-	0	-	0	-	2	54	2	62	1	46		
Multipurpose cooperatives	0	-	5	-	5	-	0	-	0	-	1	145		
<b>Research</b>														
Name of Experimental Station	Dingras Experimental Station				:		Regional Seed Testing Laboratory				:		Bicol Experimental Station	
Location	Dingras, Ilocos Norte				:		Iguig, Cagayan				:		Etili, Camarines Sur	
Size of experimental farm	5 ha				:		-				:		170 ha	
Kind of Activity	Seed and plant production, Research on Vegetables and cereals, and Varietal experiments				:		-				:		Varietal experiments and Trials of fertilizers and agro-chemicals	

Source: Data file of Department of Agriculture Provincial Office

Table 2.13 MARKETING FACILITIES AND COST OF RICE

Description	Bonga #1		Bonga #2		Bonga #3		Alcala-Paulung		Solana		Libmanan-Cabusao			
<b>Rice Mill</b>														
Number														
NFA	0		1		1		0		0		0			
Private	76		118		56		46		35		42			
Total	76		119		57		46		35		42			
Capacity (ton/hour)														
NFA	0.00		0.75		0.75		0.00		0.00		0.00			
Private	23.91		38.14		26.59		10.45		11.60		22.01			
Total	23.91		38.89		27.34		10.45		11.60		22.01			
<b>Warehouse</b>														
Number														
NFA	0		1		1		0		2		0			
Private	5		18		14		9		14		17			
Total	5		19		15		9		16		17			
Capacity (ton)														
NFA	0		5,000		5,000		0		2,250		0			
Private	1,073		1,882		815		840		2,673		4,021			
Total	1,073		6,882		5,815		840		4,923		4,021			
No. of Retailer	39		111		92		37		20		53			
No. of Wholesaler	20		48		39		8		5		34			
<b>Related Cost</b>														
Milling cost (Peso/ton)			109.60		:				148.00		:		177.60	
Milling recovery rate (%)			65.00		:				63.00		:		63.30	
Warehousing cost (Peso/ton/month)			24.80		:				2.00		:		2.78	
Handling cost (Peso/ton/move)			7.60		:				5.60		:		7.00	
Transportation cost (Peso/ton/km)														
< 10km			0.86		:				0.79		:		1.05	
10-20km			0.82		:				0.75		:		1.05	
20-30km			0.78		:				0.72		:		0.99	
30-40km			0.75		:				0.69		:		0.96	
40-50km			0.73		:				0.67		:		0.92	
50-100km			0.70		:				0.64		:		0.90	
100-150km			0.67		:				0.62		:		0.87	
150-200km			0.64		:				0.58		:		0.83	
200-250km			0.62		:				0.57		:		0.81	
250-350km			0.61		:				0.56		:		0.79	
350-550km			0.58		:				0.55		:		0.77	
> 550km			0.58		:				0.51		:		0.73	

Source: Data file of National Food Authority (NFA) Provincial Office

Table 2.14 FARM BUDGET

Description	Bonga #1		Bonga #2		Bonga #3		Alcala-Amulung		Solana		Lipmanan-Cabusao	
	Owner		Tenant		Tenant		Owner		Tenant		Tenant	
	Irrigated	Rainfed	Irrigated	Rainfed	Irrigated	Rainfed	Irrigated	Rainfed	Irrigated	Rainfed	Irrigated	Rainfed
Family size <sup>/1</sup>	4.9	4.9	5.1	5.1	5.1	5.1	5.4	5.4	5.6	5.6	5.8	5.8
1. Area (ha)	0.21	0.21	0.27	0.27	0.49	0.49	0.82	0.82	0.99	0.99	2.04	2.04
Paddy												
-Net	0.21	0.21	0.27	0.22	0.49	0.37	0.82	0.82	0.99	0.79	2.04	2.04
-Dry	0.11	-	0.08	-	0.13	-	0.82	0.82	0.99	-	0.00	/4
Diversified crop												
-Garlic	0.05	-	0.06	-	0.10	-	-	-	-	-	-	-
-Tomato	-	-	-	-	-	-	-	-	-	-	-	-
-Sugar cane	-	-	-	0.05	-	0.12	-	-	-	-	-	-
-Corn	-	-	-	-	-	-	-	-	-	0.20	-	-
2. Net farm income	6,501	4,561	6,951	4,994	11,315	5,030	14,488	7,261	17,018	6,908	11,954	8,796
Paddy												
-Gross income	3,611	1,691	4,432	1,848	8,412	2,975	16,951	4,487	19,261	4,803	16,508	11,791
-Production cost	1,162	579	1,349	647	2,371	1,049	4,631	1,493	4,475	1,510	5,484	4,329
-Net income	2,648	1,111	3,083	1,201	6,041	1,926	12,321	2,994	14,787	3,293	11,024	7,462
Diversified crop												
-Gross income	775	-	1,732	1,193	3,942	1,890	-	-	-	678	-	-
-Production cost	180	-	384	237	908	227	-	-	-	99	-	-
-Net income	595	-	1,348	955	3,034	1,663	-	-	-	579	-	-
Livestock												
-Net income	3,258	3,450	2,520	2,838	2,239	3,104	2,167	4,267	2,231	3,036	930	1,334
3. Non-farm income <sup>/2</sup>	7,655	8,285	8,456	9,637	7,227	8,039	4,310	5,489	5,174	6,782	6,774	5,771
4. Total Farmer's Income <sup>(2+3)</sup>	14,156	12,846	15,407	14,631	18,542	13,069	18,798	12,750	22,192	13,690	18,728	14,567
5. Living expense <sup>/3</sup>	12,362	11,905	13,104	13,606	13,608	10,784	16,066	12,534	14,326	12,730	14,101	12,256
Food	8,534	8,299	9,945	9,882	8,092	7,050	9,980	8,711	10,858	9,434	9,800	8,882
-Rice	3,722	3,722	3,873	3,873	3,873	3,873	4,101	4,101	4,253	4,253	4,405	4,405
-Other food	4,812	4,577	6,072	6,009	4,219	3,177	5,879	4,610	6,605	5,181	5,395	4,457
Other items	3,828	3,606	3,159	3,724	5,516	3,734	6,086	3,823	3,468	3,236	4,301	3,394
6. Tenant fee	-	-	1,108	300	2,269	481	-	-	3,697	823	2,756	1,666
7. Land tax	40	14	-	-	-	-	139	37	-	-	-	-
8. Net reserve (4-5-6-7)	1,754	927	1,195	725	2,665	1,804	2,593	179	4,169	136	1,871	446
(Irrigation fee) (P/Yr/ha)	3,500	-	3,500	-	3,500	-	2,624	-	4,900	-	2,100	-
(Irrigation fee) (P/Yr)	735	-	945	-	1,715	-	2,152	-	4,851	-	2,142	-

Remarks:

<sup>/1</sup> : Average family size at municipality level<sup>/2</sup> : Non-farm income comprises earnings from employment, other economic activities, gifts and remittance, etc.<sup>/3</sup> : Survey result has been modified according to the average family size.<sup>/4</sup> : Pump was not operated during Dry Season 1988.

Table 3.1 PROPOSED LAND USE

(Unit : ha)

Name of Systems	PADDY FIELD										TOTAL			
	Irrigated					SUGAR CANE					FALLOW		Wet	Dry
	Wet	Rice	Garlic	Tomato	Total	Wet	Dry	Wet	Dry	Wet	Dry			
<b>1 Firmed-up Area</b>														
Bonga Pump #1	298	228	10	60	298	-	-	-	-	-	-	298	298	
Bonga Pump #2	634	499	40	95	634	40	-	-	-	-	-	674	674	
Bonga Pump #3	187	147	15	25	187	15	-	-	-	-	-	202	202	
Alcala-Amulung	1,652	1,652	-	-	1,652	-	-	-	-	-	-	1,652	1,652	
Solana	1,100	1,100	-	-	1,100	-	-	-	-	-	-	1,100	1,100	
Libmanan-Cabusao	1,838	1,838	-	-	1,838	-	-	-	-	-	-	1,838	1,838	
<b>2 Maximum Service Area</b>														
Bonga Pump #1	426	326	10	90	426	-	-	-	-	-	-	426	426	
Bonga Pump #2	-	-	-	-	-	-	-	-	-	-	-	-	-	
Bonga Pump #3	-	-	-	-	-	-	-	-	-	-	-	-	-	
Alcala-Amulung	2,158	2,158	-	-	2,158	-	-	-	-	-	-	2,158	2,158	
Solana	1,960	1,960	-	-	1,960	-	-	-	-	-	-	1,960	1,960	
Libmanan-Cabusao	3,085	3,085	-	-	3,085	-	-	-	-	-	-	3,085	3,085	

Table 3.2 PROPOSED FARMING PRACTICES

Item	Rice	Garlic	Tomato
Variety	IR series	Ilocos White, Ilocos Pink	Ilocandia IV, T82-44
Growing Duration	115 to 120 days	120 days	120 days
Planting Method	Transplanting (straight)	Direct seeding	Transplanting
Raising of seedlings	Wet bed	-	-
Area of seed bed	1/20 - 1/25 of planting area	-	-
Amount of seed	50 kg per ha of planting area	500 kg per ha	300 gram per ha of planting area
Age of seedling	2 - 3 weeks	-	4 weeks
Planting density	30 x 15 cm, 3 seedlings per hill	10 x 40 cm, 1 clove per hill	75 x 45 cm
Planting depth	3 cm from surface	3 - 4 cm from surface	-
Land Preparation	1 time	1 time	1 time
Plowing	2 times	1 time	1 time
Harrowing	1 time	-	-
Puddling	-	-	-
Fertilization	-	-	-
Amount of application	-	-	-
Nitrogen (N)	75 kg per ha for wet season	120 kg per ha for wet season	100 kg per ha for wet season
(N)	80 kg per ha for dry season	100 kg per ha	85 kg per ha
Phosphorus (P)	35 kg per ha	100 kg per ha	85 kg per ha
(P)	35 kg per ha	100 kg per ha	85 kg per ha
Potassium (K)	35 kg per ha	-	-
(K)	-	-	-
Time of application	-	-	-
Basic dressing	-	-	-
Period	At planting	At planting	Harrowing
Amount	25 % of total amount	50 % of total amount	1/8 of total amount
(N)	50 % of total amount	100 % of total amount	100 % of total amount
(P)	50 % of total amount	100 % of total amount	1/8 of total amount
(K)	50 % of total amount	-	-
Top dressing	-	-	-
1st	-	-	-
Period	2 weeks after transplanting	-	-
Amount	25 % of total amount	-	-
(N)	-	-	-
2nd	-	-	-
Period	Late of young panicle formation stage	-	-
Amount	25 % of total amount	-	-
(N)	50 % of total amount	-	-
(P)	50 % of total amount	-	-
(K)	50 % of total amount	-	-
3rd	-	-	-
Period	3 - 4 weeks before harvesting	-	-
Amount	25 % of total amount	-	-
(N)	-	-	-
Side dressing	-	-	-
Period	-	-	-
Amount	-	-	-
(N)	-	-	-
(K)	-	-	-
Weeding	-	-	-
Manual	As bulbing begins	As bulbing begins	7 times (2 weeks interval after transplanting)
Chemicals	50 % of total amount (between the rows and about 10 cm deep)	50 % of total amount (between the rows and about 10 cm deep)	1/8 of total amount in each time
Pest and Diseases Control	2 times (4 and 8 weeks after transplanting)	3 times	4 times (3-week interval after transplanting)
Amount of application	9 litter per ha	-	-
Time of application	3 litter per ha	5 litter per ha	8 litter per ha
Harvesting	Manual harvesting	12 times (10 days interval) Manual harvesting	8 times (2 weeks interval after 1 month of Manual harvesting)



Table 3.4 RICE PRODUCTION AND USE IN EACH SYSTEM IN 1995

Province/System	Production		Domestic Utilization			Balance of						
	From the systems (Paddy)	From Other Area (Paddy)	Total (Paddy)	Total (Rice)	Population Per Capita in 1995 Consumption (kg)	Food Use	Seed	Rice	Paddy			
	(Paddy)	(Paddy)	(Paddy)	(Rice)	(1,000)	Per Capita	Total	of Rice	Balance of Paddy			
Ilocos Norte	-	-	92.00	59.80	503.09	114.20	57.45	3.00	3.69	64.14	-4.34	-6.68
Bonga #1	3.55	3.86	7.41	4.82	50.05	114.20	5.72	0.17	0.30	6.19	-1.37	-2.11
Bonga #2	5.35	10.28	15.63	10.16	120.14	114.20	13.72	0.40	0.63	14.75	-4.59	-7.07
Bonga #3	1.58	9.02	10.60	6.89	89.74	114.20	10.25	0.32	0.43	11.00	-4.11	-6.32
Cagayan	-	-	334.00	217.10	942.09	94.50	89.03	11.00	13.40	113.42	103.68	159.50
Alcala-Amulung	20.50	2.87	23.37	15.19	70.14	94.50	6.63	0.57	0.95	8.15	7.04	10.83
Solana	18.62	1.06	19.68	12.79	65.17	94.50	6.16	0.32	0.81	7.29	5.50	8.47
Camarines Sur	-	-	322.00	209.30	1,571.95	87.00	136.76	11.00	12.89	160.65	48.65	74.85
Libmanan-Cabusao	29.31	19.66	48.97	31.83	108.32	87.00	9.42	1.20	1.99	12.61	19.22	29.56

Source: Data file of Bureau of Agricultural Statistics

Production of the systems was estimated on the basis of under the with project condition  
 Production of Province and other area were estimated on the basis of the data in 1987

Recovery rate of rice = 65%

Seed = 75 kg per ha

Feed and waste = (Production - Seeds) x 6.5%

Table 3.5 RICE PRODUCTION AND USE IN REGION IV (INCLUDING METRO MANILA) FROM 1982 TO 1986

Year	Production		Domestic Utilization			Balance of				
	Paddy	Rice	Population Per Capita Consumption (kg)	Food Use	Seed	Feed and Waste	Rice	Paddy		
	(1,000)	(1,000)	(1,000)	Per Capita	Total	and Waste	of Rice	Balance of Paddy		
1982	814	529	12,968	95.39	1,237	19	33	1,289	-760	-1,169
1983	783	509	13,358	91.63	1,224	18	32	1,274	-765	-1,177
1984	878	571	13,756	97.05	1,335	18	36	1,389	-818	-1,258
1985	997	648	14,032	95.71	1,343	18	41	1,402	-754	-1,160
1986	972	632	14,486	94.50	1,369	19	40	1,428	-796	-1,224
Average	908	590	13,908	94.72	1,318	18	37	1,373	-783	-1,205

Source: Data file of Bureau of Agricultural Statistics

Recovery rate of rice = 65%

Seed = 75 kg per ha

Feed and waste = (Production - Seeds) x 6.5%



Table 3.6 CALCULATION OF ECONOMIC FARM GATE PRICE (AT 1988 CONSTAT PRICE)

Description	Unit	Operation	Region		
			I	II	V
<b>A. Rice (Import Parity)</b>					
1) Projected 1995 International Market Price (FOB Bangkok, 5% broken rice)	US\$/ton		293	293	293
2) Adjust Quantity to 25-35% Broken	US\$/ton	x 0.86	252	252	252
3) Ocean Freight and Insurance	US\$/ton	+	30	30	30
4) CIF Manila	US\$/ton	=	282	282	282
5) Converted to Philippine Peso	Peso/ton	x 21.0	5,926	5,926	5,926
6) Cost for Port Charge, Handling and Warehousing	Peso/ton	+	360	360	360
7) NFA Administration Charge	Peso/ton	+	70	70	70
8) Wholesale Price of Rice in Manila	Peso/ton	=	6,356	6,356	6,356
9) Transportation Cost (Manila to Region Capital)	Peso/ton	-	326	231	308
10) Price of Rice at Ex-mill Gate	Peso/ton	=	6,030	5,125	6,048
11) Milling Cost	Peso/ton	-	147	148	178
12) Conversion to Price of Dried Paddy	Peso/ton	x 0.65	3,824	3,885	3,815
13) Cost for Transportation and Handling (Farm Gate to Mill)	Peso/ton	-	52	39	51
14) Farm Gate Price of Dried Paddy	Peso/ton	=	3,772	3,846	3,764
	(Peso/kg)		(3.77)	(3.85)	(3.76)
<b>B. Corn (Import Parity)</b>					
a) Projected 1995 International Market Price (FOB US Gulf, TSP, Bulk)	US\$/ton		-	130	-
b) Ocean Freight and Insurance	US\$/ton	+	-	39	-
c) CIF Price at Manila	US\$/ton	=	-	169	-
d) Converted to Philippine Peso	Peso/ton	x 21.0	-	3,559	-
e) Cost for Port Charge, Handling and Warehousing	Peso/ton	+	-	220	-
f) Ex-warehouse Price	Peso/ton	=	-	3,779	-
g) Cost for Transportation, Handling and Retail Margin	Peso/ton	+	-	300	-
h) Farm Gate Price	Peso/ton	=	-	4,079	-
	(Peso/kg)			(4.08)	
<b>C. Fertilizers (Import Parity)</b>					
<b>1) Nitrogen</b>					
a) Projected 1995 International Market Price (FOB N.W. Europe, Urea, Bagged)	US\$/ton		229	229	229
b) Ocean Freight and Insurance	US\$/ton	+	33	33	33
c) CIF Price at Manila	US\$/ton	=	262	262	262
d) Converted to Philippine Peso	Peso/ton	x 21.0	5,495	5,495	5,495
e) Cost for Port Charge, Handling and Warehousing	Peso/ton	+	220	220	220
f) Ex-warehouse Price	Peso/ton	=	5,715	5,715	5,715
g) Cost for Transportation, Handling and Retail Margin	Peso/ton	+	375	300	360
h) Farm Gate Price	Peso/ton	=	6,090	6,015	6,075
i) Conversion to Price of Nitrogen (N)	Peso/ton	x 2.22	13,521	13,354	13,488
	(Peso/kg)		(13.52)	(13.35)	(13.49)
<b>2) Phosphorus</b>					
a) Projected 1995 International Market Price (FOB US Gulf, TSP, Bulk)	US\$/ton		199	199	199
b) Ocean Freight and Insurance	US\$/ton	+	39	39	39
c) CIF Price at Manila	US\$/ton	=	238	238	238
d) Converted to Philippine Peso	Peso/ton	x 21.0	5,003	5,003	5,003
e) Cost for Port Charge, Handling and Warehousing	Peso/ton	+	220	220	220
f) Ex-warehouse Price	Peso/ton	=	5,223	5,223	5,223
g) Cost for Transportation, Handling and Retail Margin	Peso/ton	+	375	300	360
h) Farm Gate Price	Peso/ton	=	5,598	5,523	5,583
i) Conversion to Price of Phosphorus (P)	Peso/ton	x 4.55	25,470	25,128	25,401
	(Peso/kg)		(25.47)	(25.13)	(25.40)
<b>3) Potassium</b>					
a) Projected 1995 International Market Price (FOB Vancouver, Muriate of Potash, Bulk)	US\$/ton		114	114	114
b) Ocean Freight and Insurance	US\$/ton	+	33	33	33
c) CIF Price at Manila	US\$/ton	=	147	147	147
d) Converted to Philippine Peso	Peso/ton	x 21.0	3,080	3,080	3,080
e) Cost for Port Charge, Handling and Warehousing	Peso/ton	+	220	220	220
f) Ex-warehouse Price	Peso/ton	=	3,300	3,300	3,300
g) Cost for Transportation, Handling and Retail Margin	Peso/ton	+	375	300	360
h) Farm Gate Price	Peso/ton	=	3,675	3,600	3,660
i) Conversion to Price of Potassium (K)	Peso/ton	x 1.92	7,055	6,911	7,026
	(Peso/kg)		(7.06)	(6.91)	(7.03)

Remarks : Region I ; Bonga Pump #1, #2 and #3  
Region II ; Alcala-Amulung, Solana  
Region V ; Libmanan-Cabusao

Source : Half-Yearly Revision of Commodity Price Forecasts, IBRD, February 1, 1988  
Data were obtained from following Authorities :  
National Food Authority (NFA),  
National Economic and Development Authority (NEDA),  
Philippine National Lines, and  
Fertilizer and Pesticide Authority.

Table 3. 7 (1/2) ECONOMIC CROP BUDGET (present condition)

Description	Bonga #1				Bonga #2				Bonga #3				Alcala-Amulung			
	Irrigated		Rainfed		Irrigated		Rainfed		Irrigated		Rainfed		Irrigated		Rainfed	
	MS	DS	MS	DS	MS	DS	MS	DS	MS	DS	MS	DS	MS	DS		
(Unit : Pesos)																
1. Gross Production Value	3.3	3.5	2.3	4.0	3.5	4.0	2.4	4.1	3.8	4.1	2.3	3.3	3.5	3.5	1.9	
a) Yield (ton/ha)	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.85	3.85	3.85	3.85	
b) Unit Price (Peso/kg)	12,441	13,195	8,671	15,080	13,195	15,080	9,048	15,457	14,326	15,457	8,671	12,705	13,475	13,475	6,930	
c) Gross Production Value	283	283	283	264	264	264	264	264	264	264	264	289	289	289	289	
2. Production Cost	946	946	662	865	865	865	595	973	973	973	595	684	678	678	298	
a) Materials	560	560	382	331	331	331	229	433	433	433	229	75	101	101	25	
- Fertilizer	99	99	71	92	92	92	64	120	120	120	64	21	28	28	7	
- Nitrogen (N)	131	131	87	131	131	131	87	87	87	87	87	178	167	167	78	
- Phosphorus (P)	40	40	30	128	128	128	89	20	20	20	49	84	84	84	42	
- Potassium (K)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Insecticide	2,059	2,059	1,515	1,811	1,811	1,811	1,328	1,897	1,897	1,897	1,321	1,312	1,346	1,346	739	
- Weedicide	1,818	1,872	1,422	1,854	1,854	1,854	1,458	1,998	1,998	1,998	1,422	1,296	1,344	1,344	888	
- Rodenticide	446	448	448	498	498	498	498	498	498	498	498	415	415	415	415	
- Sub-total	0	0	0	166	166	166	166	0	0	0	133	234	134	134	134	
b) Labor Force	4,325	4,379	3,385	4,329	4,329	4,329	3,450	4,383	4,383	4,383	3,374	3,157	3,239	3,239	2,177	
c) Animal	8,116	8,816	5,286	9,866	9,866	9,866	5,598	9,933	9,933	9,933	5,287	9,548	10,236	10,236	4,739	
d) Machinery																
e) Total	11,935	12,705	7,700	10,528	10,528	10,528	7,520	13,329	13,329	13,329	32,582	19,800	13,365	13,365	4,488	
3. Net Production Value	270	270	270	338	338	338	338	1,629	1,629	1,629	4147	-	-	-	65	
1. Gross Production Value	271	447	474	540	540	540	391	973	973	973	1785	744	473	473	0	
a) Yield (ton/ha)	25	50	176	127	127	127	76	357	357	357	1605	382	0	0	0	
b) Unit Price (Peso/kg)	0	0	48	21	21	21	14	99	99	99	445	35	0	0	0	
c) Gross Production Value	33	56	89	440	440	440	318	109	109	109	327	0	0	0	0	
2. Production Cost	11	21	42	100	100	100	67	0	0	0	0	0	0	0	0	
a) Materials	610	844	1099	1566	1566	1566	1204	3167	3167	3167	8308	1161	473	473	65	
- Seed	1,236	1,308	936	1,170	1,170	1,170	945	1,350	1,350	1,350	2,124	1,944	2,016	2,016	570	
- Fertilizer	374	374	374	374	374	374	374	75	75	75	75	433	1793	1793	581	
- Nitrogen (N)	0	0	0	0	0	0	0	0	0	0	0	2224	0	0	0	
- Phosphorus (P)	2,219	2,525	2,409	3,110	3,110	3,110	2,523	4,592	4,592	4,592	10,507	5,763	4,282	4,282	1,216	
- Potassium (K)	9,716	10,180	5,291	7,418	7,418	7,418	4,997	8,737	8,737	8,737	22,075	14,037	9,083	9,083	3,272	
- Insecticide																
- Weedicide																
- Rodenticide																
- Sub-total																
b) Labor Force																
c) Animal																
d) Machinery																
e) Total																
3. Net Production Value	9,716	10,180	5,291	7,418	7,418	7,418	4,997	8,737	8,737	8,737	22,075	14,037	9,083	9,083	3,272	

Remarks: 1) Quantity of sugar cane juice (lit/ha)  
2) Price of base (pesos/lit)

Table 3.7 (2/2) ECONOMIC CROP BUDGET (proposed condition)

Rice Description	Bonga #1		Bonga #2		Bonga #3		Alcala-Amulang		Solana	
	WS	DS	WS	DS	WS	DS	WS	DS	WS	DS
1. Gross Production Value										
a) Yield (ton/ha)	4.5	5.0	4.5	5.0	4.5	5.0	4.5	5.0	4.5	5.0
b) Unit Price (Peso/kg)	3.77	3.77	3.77	3.77	3.77	3.77	3.85	3.85	3.85	3.85
c) Gross Production Value	16,965	18,850	16,965	18,850	16,965	18,850	17,325	19,250	17,325	19,250
2. Production Cost										
a) Materials										
- Seed	311	311	311	311	311	311	270	270	270	270
- Fertilizer										
Nitrogen (N)	1,014	1,082	1,014	1,082	1,014	1,082	1,016	1,084	1,016	1,084
Phosphorus (P)	891	891	891	891	891	891	880	880	880	880
Potassium (K)	247	247	247	247	247	247	242	242	242	242
- Insecticide	982	982	982	982	982	982	1,003	1,003	1,003	1,003
- Weedicide	296	296	296	296	296	296	317	317	317	317
- Rodenticide	125	125	125	125	125	125	106	106	106	106
- Sub-total	3,867	3,935	3,867	3,935	3,867	3,935	3,834	3,901	3,834	3,901
b) Labor Force	2,250	2,430	2,250	2,430	2,250	2,430	1,500	1,620	1,500	1,620
c) Animal	498	498	498	498	498	498	415	415	415	415
d) Machinery	166	166	166	166	166	166	112	112	108	108
e) Total	6,781	7,029	6,781	7,029	6,781	7,029	5,861	6,048	5,856	6,044
3. Net Production Value	10,184	11,821	10,184	11,821	10,184	11,821	11,464	13,202	11,469	13,205
Rice										
Description	Libmanan-Cabusao		Garlic		Tamaro		Sugar Cane			
	WS	DS	Bonga#1	Bonga#2	Bonga#3	Bonga#1	Bonga#2	Bonga#3	Bonga#2	Bonga#3
1. Gross Production Value										
a) Yield (ton/ha)	4.5	5.0	4.5	4.5	4.5	10.0	10.0	10.0	15.00/L	10.13/L
b) Unit Price (Peso/kg)	3.76	3.76	14.81	14.81	14.81	3.42	3.42	3.42	1.32/L	1.32/L
c) Gross Production Value	16,920	18,800	66,645	66,645	66,645	34,200	34,200	34,200	19,800	13,365
2. Production Cost										
a) Materials										
- Seed	257	257	20,750	20,750	20,750	875	875	875	-	-
- Fertilizer										
Nitrogen (N)	1,012	1,079	1,622	1,622	1,622	1,352	1,352	1,352	744	473
Phosphorus (P)	889	889	2,547	2,547	2,547	2,165	2,165	2,165	382	0
Potassium (K)	246	246	706	706	706	600	600	600	35	0
- Insecticide	1,100	1,100	546	546	546	873	873	873	0	0
- Weedicide	334	334	0	0	0	0	0	0	0	0
- Rodenticide	113	113	0	0	0	0	0	0	0	0
- Sub-total	3,951	4,018	26,171	26,171	26,171	5,865	5,865	5,865	1,161	473
b) Labor Force	1,875	2,025	3,708	3,708	3,708	3,762	3,762	3,762	1,844	2,016
c) Animal	415	415	0	0	0	0	0	0	433	1,793
d) Machinery	137	137	166	166	166	166	166	166	2,224	0
e) Total	6,378	6,595	30,045	30,045	30,045	9,793	9,793	9,793	5,763	4,282
3. Net Production Value	10,542	12,205	36,600	36,600	36,600	24,408	24,408	24,408	14,037	9,083

Remarks: 1) Quantity of sugar cane juice (lit/ha)  
2) Price of basi (pesos/lit)

Table 3.8 IRRIGATION BENEFIT

Firmed-up Area	Bonga #1		Bonga #2		Bonga #3		Alcala-Amulung*		Alcala-Amulung**		Solana		Libmanan-Cabusao		
	W	W/O	W	W/O	W	W/O	W	W/O	W	W/O	W	W/O	W	W/O	
	1 Area (ha)														
Wet Season															
Paddy															
Irrigated	298	0	634	0	187	0	1,652	803	1,652	0	1,100	0	1,838	0	
Rainfed	0	298	0	634	0	187	0	849	0	1,652	0	880	0	1,838	
Dry Season															
Paddy	228	0	499	0	147	0	1,652	1,006	1,652	0	1,100	0	1,838	0	
Diversified Crops															
Garlic	10	0	40	0	15	0	0	0	0	0	0	0	0	0	
Tomato	60	0	95	0	25	0	0	0	0	0	0	0	0	0	
Sugar Cane	0	0	40	40	15	15	0	0	0	0	0	0	0	0	
Corn	0	0	0	0	0	0	0	0	0	0	0	220	0	0	
2 Unit Net Production Value (Pesos/ha)															
Wet Season															
Paddy															
Irrigated	10,184	-	10,184	-	10,184	-	11,464	9,548	11,464	-	11,469	-	10,542	-	
Rainfed	-	5,286	-	5,598	-	5,297	-	4,753	-	4,753	-	5,291	-	4,997	
Dry Season															
Paddy	11,821	-	11,821	-	11,821	-	13,202	10,236	13,202	-	13,206	-	12,205	-	
Diversified Crops															
Garlic	36,600	-	36,600	-	36,600	-	-	-	-	-	-	-	-	-	
Tomato	24,408	-	24,408	-	24,408	-	-	-	-	-	-	-	-	-	
Sugar Cane	-	-	14,037	14,037	9,083	9,083	-	-	-	-	-	3,272	-	-	
Corn	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3 Project Benefit (1,000 Pesos)															
Wet Season															
Paddy															
Irrigated	3,035	0	6,457	0	1,904	0	18,939	7,667	18,939	0	12,616	0	19,376	0	
Rainfed	0	1,575	0	3,549	0	991	0	4,035	0	7,852	0	4,656	0	9,184	
Dry Season															
Paddy	2,695	0	5,899	0	1,738	0	21,810	10,297	21,810	0	14,527	0	22,433	0	
Diversified Crops															
Garlic	366	0	1,464	0	549	0	0	0	0	0	0	0	0	0	
Tomato	1,464	0	2,319	0	610	0	0	0	0	0	0	0	0	0	
Sugar Cane	0	0	561	561	136	136	0	0	0	0	0	0	0	0	
Corn	0	0	0	0	0	0	0	0	0	0	0	720	0	0	
Total	7,561	1,575	16,700	4,111	4,938	1,127	40,748	22,000	40,748	7,852	27,143	5,376	41,809	9,184	
Incremental Benefit (1,000 Pesos)															
	5,985	-	12,589	-	3,811	-	18,748	-	32,896	-	21,757	-	32,625	-	

Maximum Service Area	Bonga #1		Bonga #2		Bonga #3		Alcala-Amulung*		Alcala-Amulung**		Solana		Libmanan-Cabusao		
	W	W/O	W	W/O	W	W/O	W	W/O	W	W/O	W	W/O	W	W/O	
	1 Area (ha)														
Wet Season															
Paddy															
Irrigated	426	0	-	-	-	-	2,158	803	2,158	0	1,960	0	3,085	0	
Rainfed	0	426	-	-	-	-	0	1,355	0	2,158	0	1,568	0	2,195	
Dry Season															
Paddy	326	0	-	-	-	-	2,158	1,006	2,158	0	1,960	0	3,085	0	
Diversified Crops															
Garlic	10	0	-	-	-	-	0	0	0	0	0	0	0	0	
Tomato	90	0	-	-	-	-	0	0	0	0	0	0	0	0	
Sugar Cane	0	0	-	-	-	-	0	0	0	0	0	0	0	0	
Corn	0	0	-	-	-	-	0	0	0	0	0	392	0	0	
2 Unit Net Production Value (Pesos/ha)															
Wet Season															
Paddy															
Irrigated	10,184	-	-	-	-	-	11,464	9,548	11,464	-	11,469	-	10,542	-	
Rainfed	-	5,286	-	-	-	-	-	4,753	-	4,753	-	5,291	-	4,997	
Dry Season															
Paddy	11,821	-	-	-	-	-	13,202	10,236	13,202	-	13,206	-	12,205	-	
Diversified Crops															
Garlic	36,600	-	-	-	-	-	-	-	-	-	-	-	-	-	
Tomato	24,408	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sugar Cane	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Corn	-	-	-	-	-	-	-	-	-	-	-	3,272	-	-	
3 Project Benefit (1,000 Pesos)															
Wet Season															
Paddy															
Irrigated	4,338	0	-	-	-	-	24,739	7,667	24,739	0	22,479	0	32,522	0	
Rainfed	0	2,252	-	-	-	-	0	6,440	0	10,257	0	8,296	0	10,968	
Dry Season															
Paddy	3,854	0	-	-	-	-	28,490	10,297	28,490	0	25,884	0	37,652	0	
Diversified Crops															
Garlic	366	0	-	-	-	-	0	0	0	0	0	0	0	0	
Tomato	2,197	0	-	-	-	-	0	0	0	0	0	0	0	0	
Sugar Cane	0	0	-	-	-	-	0	0	0	0	0	0	0	0	
Corn	0	0	-	-	-	-	0	0	0	0	0	1,283	0	0	
Total	10,755	2,252	-	-	-	-	53,229	24,405	53,229	10,257	48,363	9,579	70,174	10,968	
Incremental Benefit (1,000 Pesos)															
	8,503	-	-	-	-	-	28,824	-	42,972	-	38,784	-	59,206	-	

Remarks: W : with project condition  
W/O : without project condition  
\* : before useful life of pump  
\*\* : after useful life of pump

Table 3.9 IRRIGATION BENEFIT FLOW

Year in Order	(Unit : 1,000 Pesos)									
	1	2	3	4	5	6	7	8	9	10
<b>1. Firmed-up Area</b>										
Bonga Pump #1	0	0	0	2,394	3,292	4,190	5,087	5,985	5,985	5,985
Bonga Pump #2	0	0	0	5,036	6,924	8,812	10,701	12,589	12,589	12,589
Bonga Pump #3	0	0	0	1,524	2,096	2,668	3,239	3,811	3,811	3,811
Alcala-Amulung	0	0	0	7,499	10,311	13,124	27,962	32,896	32,896	32,896
Solana	0	0	0	8,707	11,972	15,237	18,502	21,767	21,767	21,767
Libmanan-Cabusao	0	0	0	13,050	17,944	22,838	27,731	32,625	32,625	32,625
<b>2. Maximum Service Area</b>										
Bonga Pump #1	0	0	0	3,401	4,677	5,952	7,228	8,503	8,503	8,503
Bonga Pump #2	-	-	-	-	-	-	-	-	-	-
Bonga Pump #3	-	-	-	-	-	-	-	-	-	-
Alcala-amulung	0	0	0	11,530	15,853	20,177	36,526	42,972	42,972	42,972
Solana	0	0	0	15,514	21,331	27,149	32,966	38,784	38,784	38,784
Libmanan-Cabusao	0	0	0	23,682	32,563	41,444	50,325	59,206	59,206	59,206

Table 3.10 FARM ECONOMY

Description	Bonga #1		Bonga #2		Bonga #3		Acala-Amulung		Solana		(Unit : Pesos)	
	Owner		Tenant		Tenant		Owner		Tenant		Libmanan-Cabusao	
	W	W/O	W	W/O	W	W/O	W	W/O	W	W/O	W	W/O
Family size <sup>(1)</sup>	4.9	4.9	5.1	5.1	5.1	5.1	5.4	5.4	5.6	5.6	5.8	5.8
1. Area [ha]	0.21	0.21	0.27	0.27	0.49	0.49	0.82	0.82	0.99	0.99	2.04	2.04
Paddy												
-Wet	0.21	0.21	0.25	0.25	0.45	0.45	0.82	0.82	0.99	0.99	2.04	2.04
-Dry	0.16	-	0.19	-	0.35	-	0.82	-	0.99	-	2.04	-
Diversified Crop												
-Garlic	0.01	-	0.02	-	0.04	-	-	-	-	-	-	-
-Tomato	0.04	-	0.04	-	0.06	-	-	-	-	-	-	-
-Sugar cane	-	-	0.02	0.02	0.04	0.04	-	-	-	-	-	-
-Corn	-	-	-	-	-	-	-	-	-	-	0.20	-
2. Net farm income	8,879	4,561	9,785	4,585	15,097	5,449	17,965	7,261	21,354	6,908	34,413	8,796
Paddy												
-Gross income	6,119	1,691	7,263	2,100	13,213	3,623	23,682	4,487	28,591	4,803	56,008	11,791
-Production cost	2,208	579	2,655	735	4,792	1,277	7,883	1,493	9,468	1,510	22,526	4,329
-Net income	3,911	1,111	4,607	1,365	8,421	2,345	15,798	2,994	19,123	3,293	33,483	7,462
Diversified Crop												
-Gross income	2,297	-	3,717	477	6,301	640	-	-	-	678	-	-
-Production cost	597	-	1,079	95	1,864	77	-	-	-	99	-	-
-Net income	1,710	-	2,638	382	4,437	564	-	-	-	579	-	-
Livestock												
-Net income	3,258	3,450	2,520	2,838	2,239	3,104	2,167	4,267	2,231	3,036	930	1,334
3. Non-farm income <sup>(2)</sup>	7,655	8,285	8,456	9,637	7,227	8,039	4,310	5,489	5,174	6,782	3,387	5,771
4. Total Farmer's Income <sup>(2+3)</sup>	16,534	12,846	18,221	14,222	22,324	13,489	22,275	12,750	26,528	13,690	37,800	14,567
5. Living expense <sup>(3)</sup>	13,608	11,905	14,540	13,606	15,274	10,784	17,849	12,534	16,006	12,730	18,409	12,256
6. Tenant fee	-	-	1,811	437	3,215	727	-	-	3,697	823	2,756	1,866
7. Land tax	40	14	-	-	-	-	139	37	-	-	-	-
8. Net reserve (4-5-6-7)	2,886	927	1,870	179	3,836	1,978	4,287	179	6,826	136	16,635	446
(Irrigation fee) [P/hr/ha]	3,500	-	3,500	-	3,500	-	2,824	-	4,900	-	2,100	-
(Irrigation fee) [P/yr]	735	-	945	-	1,715	-	2,152	-	4,851	-	4,284	-

Remarks:

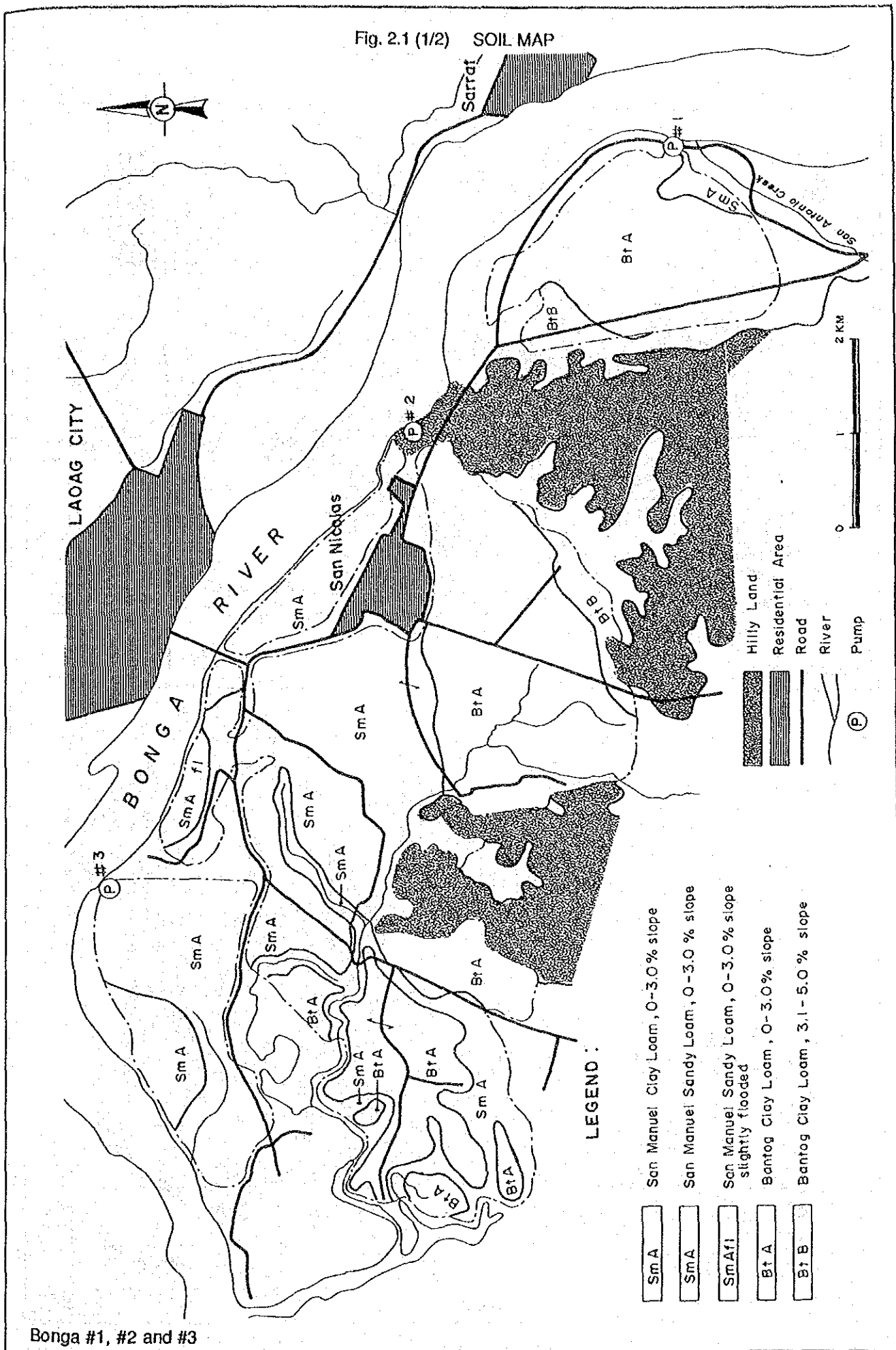
W : with project W/O : without project

<sup>(1)</sup> : Average family size at municipality level

<sup>(2)</sup> : Non-farm income comprises earnings from employment, other economic activities, gifts and remittance, etc.

<sup>(3)</sup> : Survey result has been modified according to the average family size.

Fig. 2.1 (1/2) SOIL MAP



LEGEND :

- SmA San Manuel Clay Loam, 0-3.0% slope
- SmA San Manuel Sandy Loam, 0-3.0% slope
- SmAfi San Manuel Sandy Loam, 0-3.0% slope slightly flooded
- BtA Bantog Clay Loam, 0-3.0% slope
- BtB Bantog Clay Loam, 3.1-5.0% slope

- Hilly Land
- Residential Area
- Road
- River
- Pump

Bonga #1, #2 and #3





Fig. 2.2 (1/2) LAND CLASSIFICATION MAP

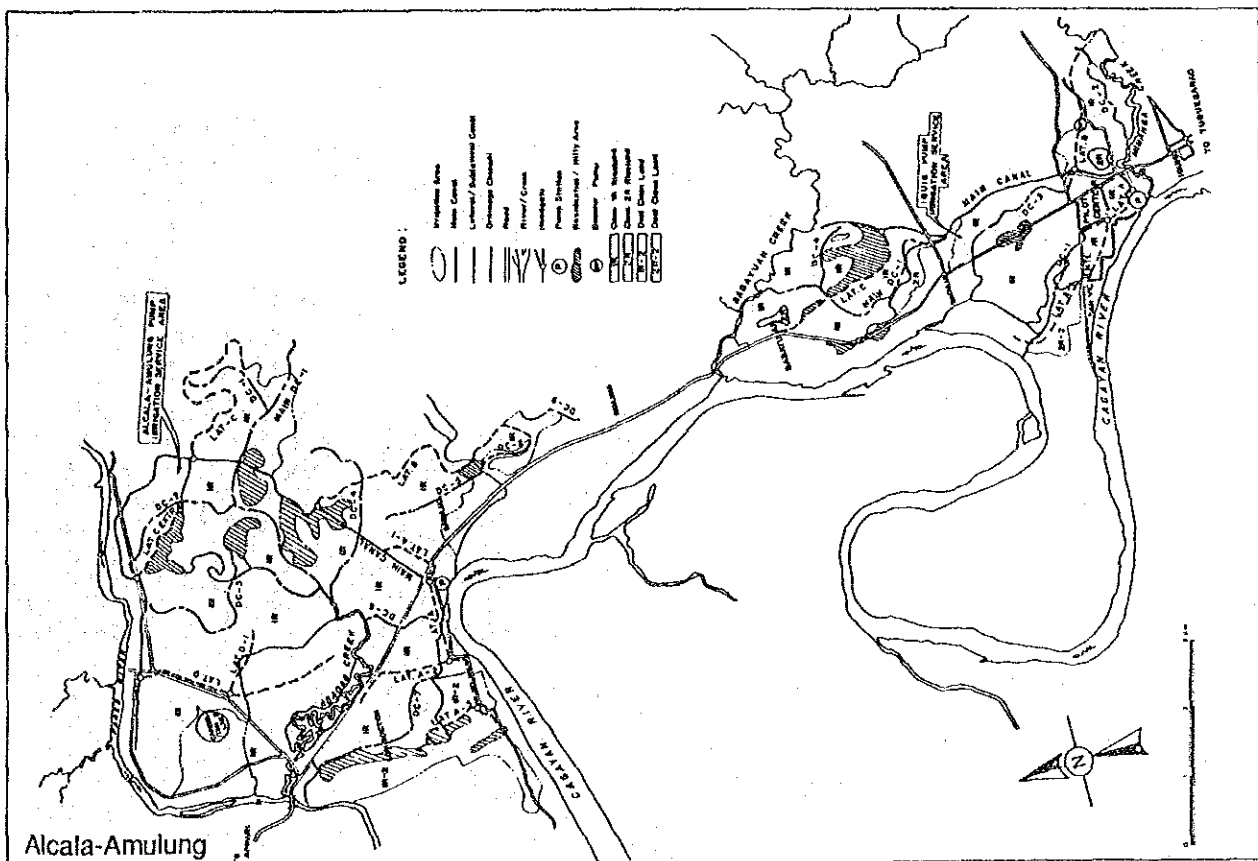
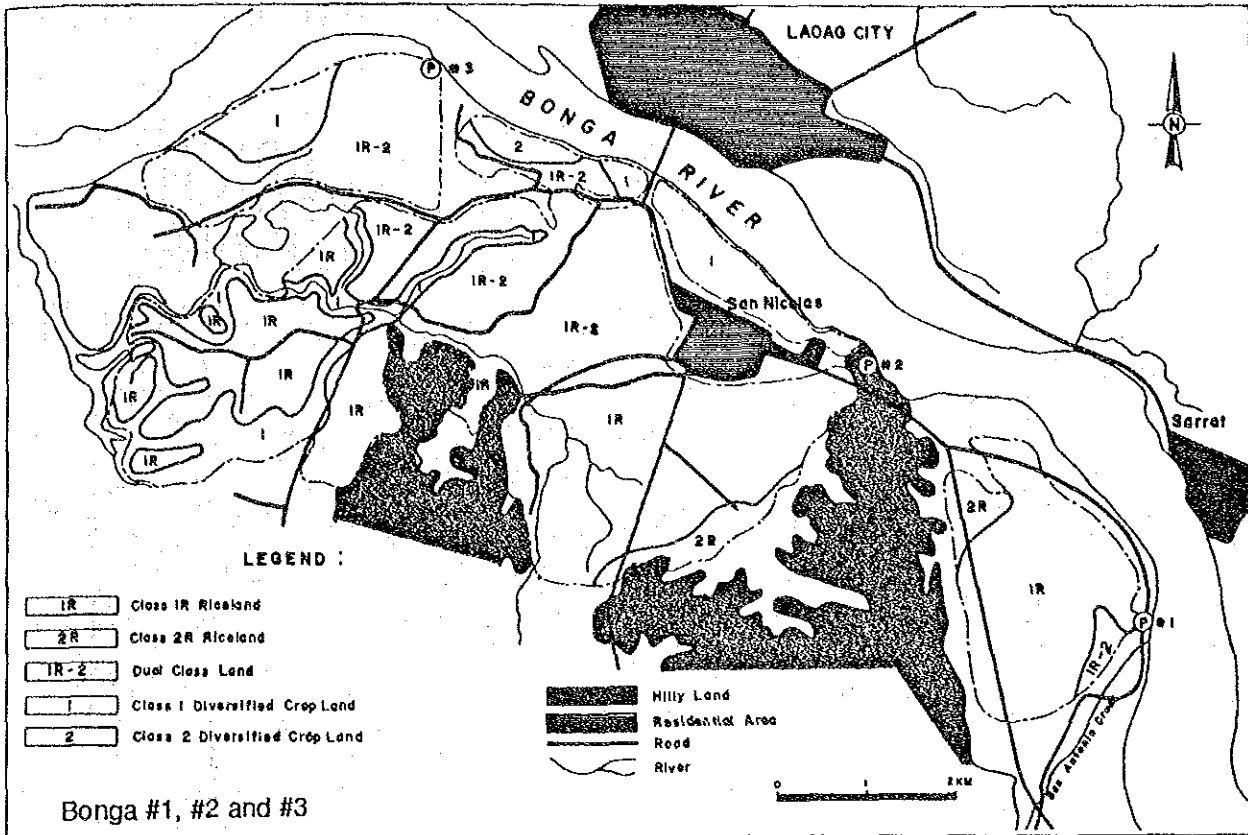


Fig. 2.2 (2/2) LAND CLASSIFICATION MAP

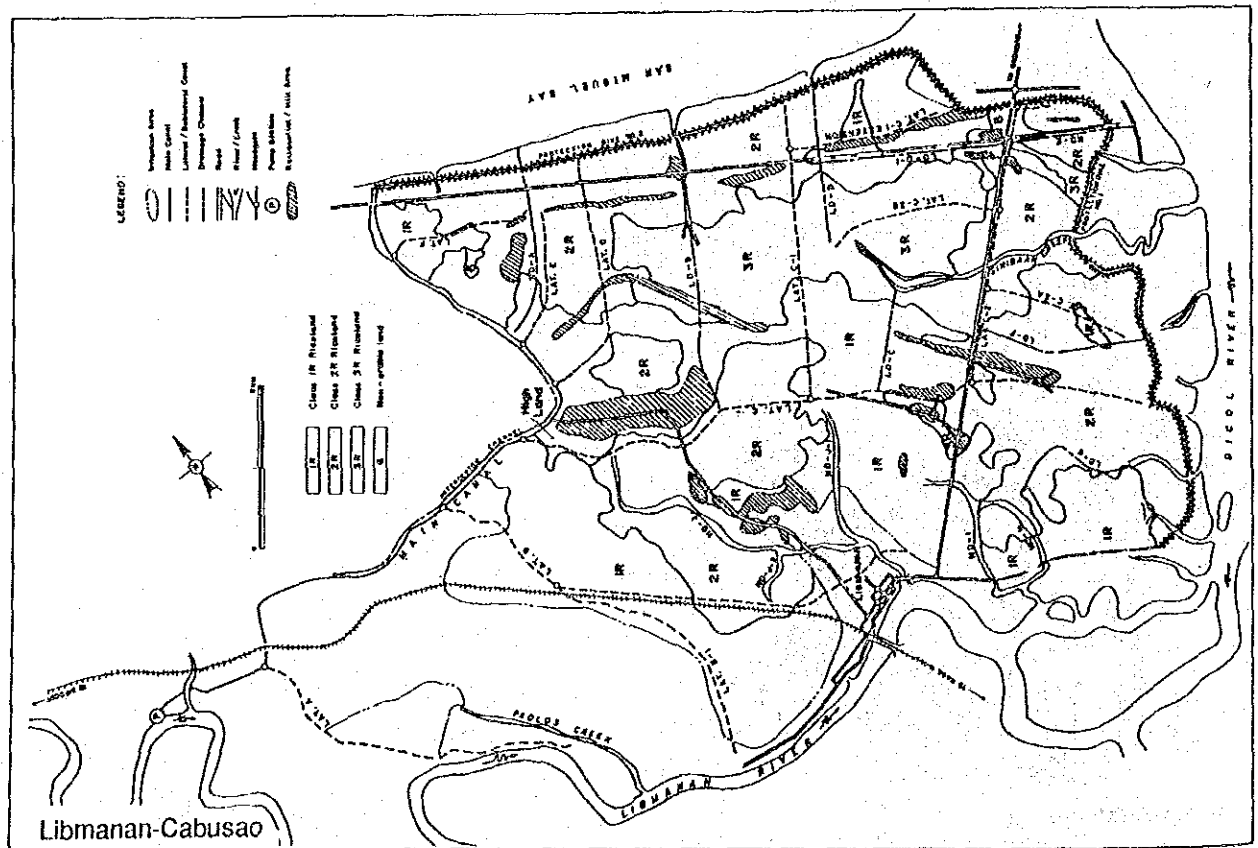
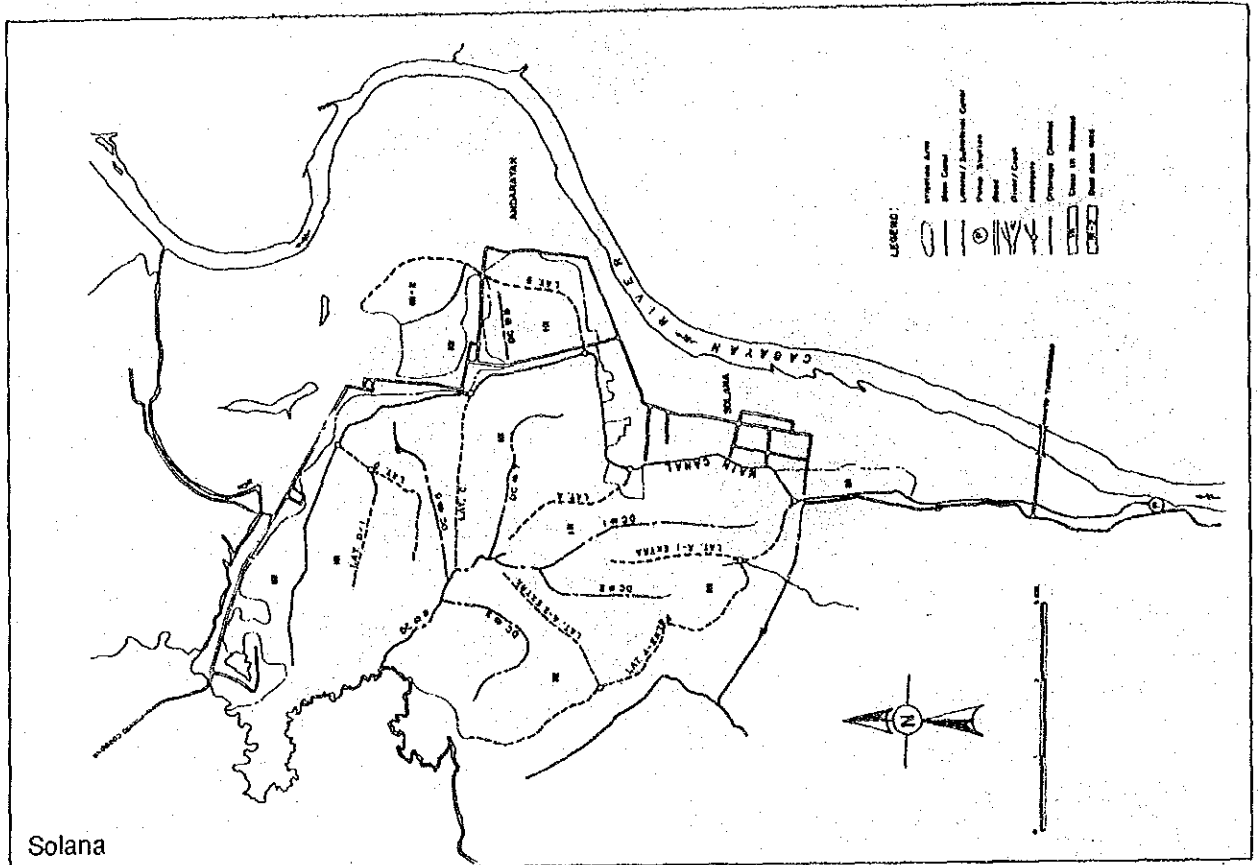


Fig. 2.3 (1/3) LAND USE MAP

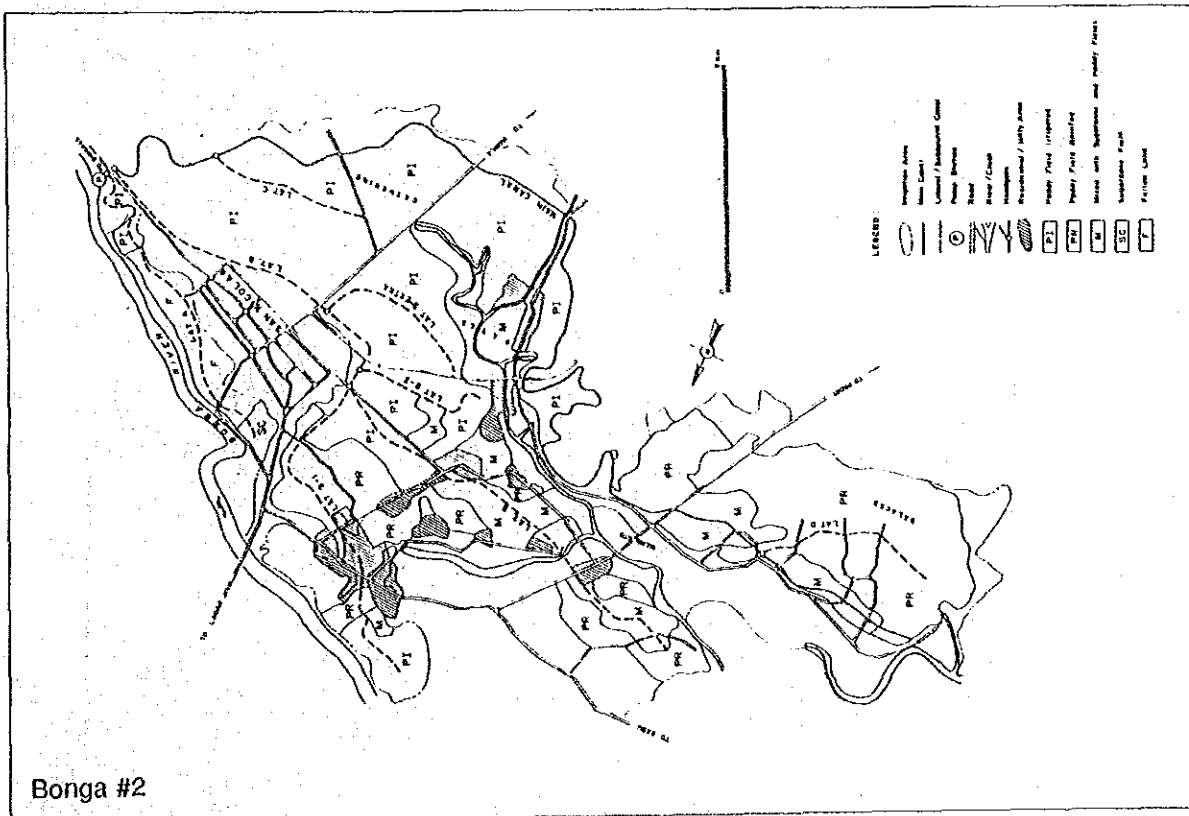
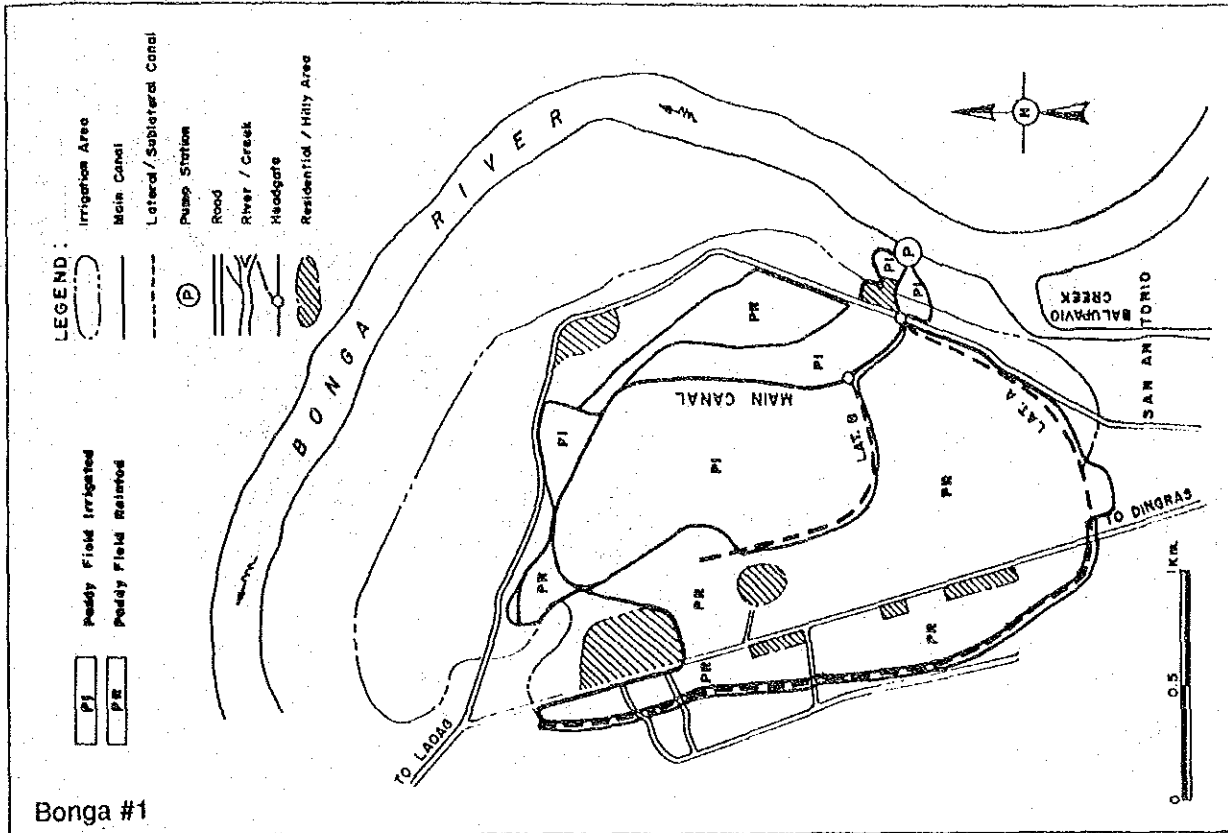


Fig. 2.3 (2/3) LAND USE MAP

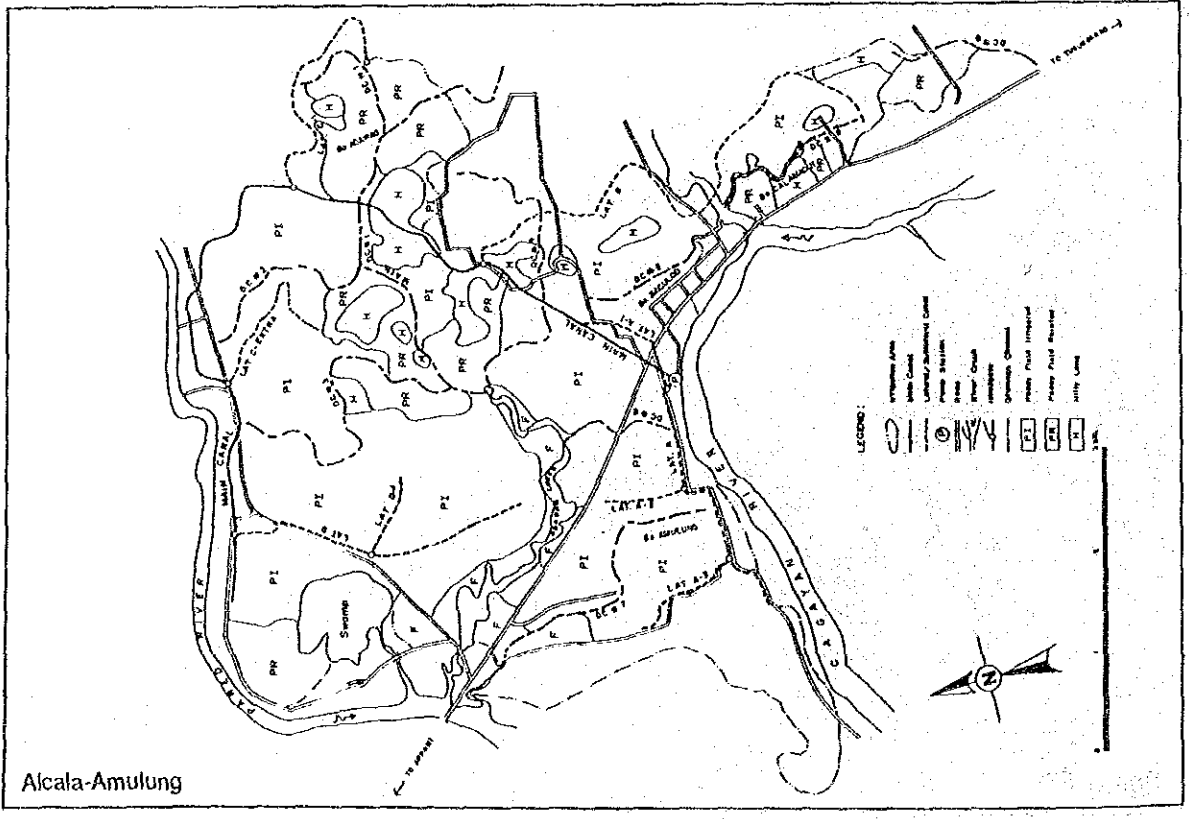
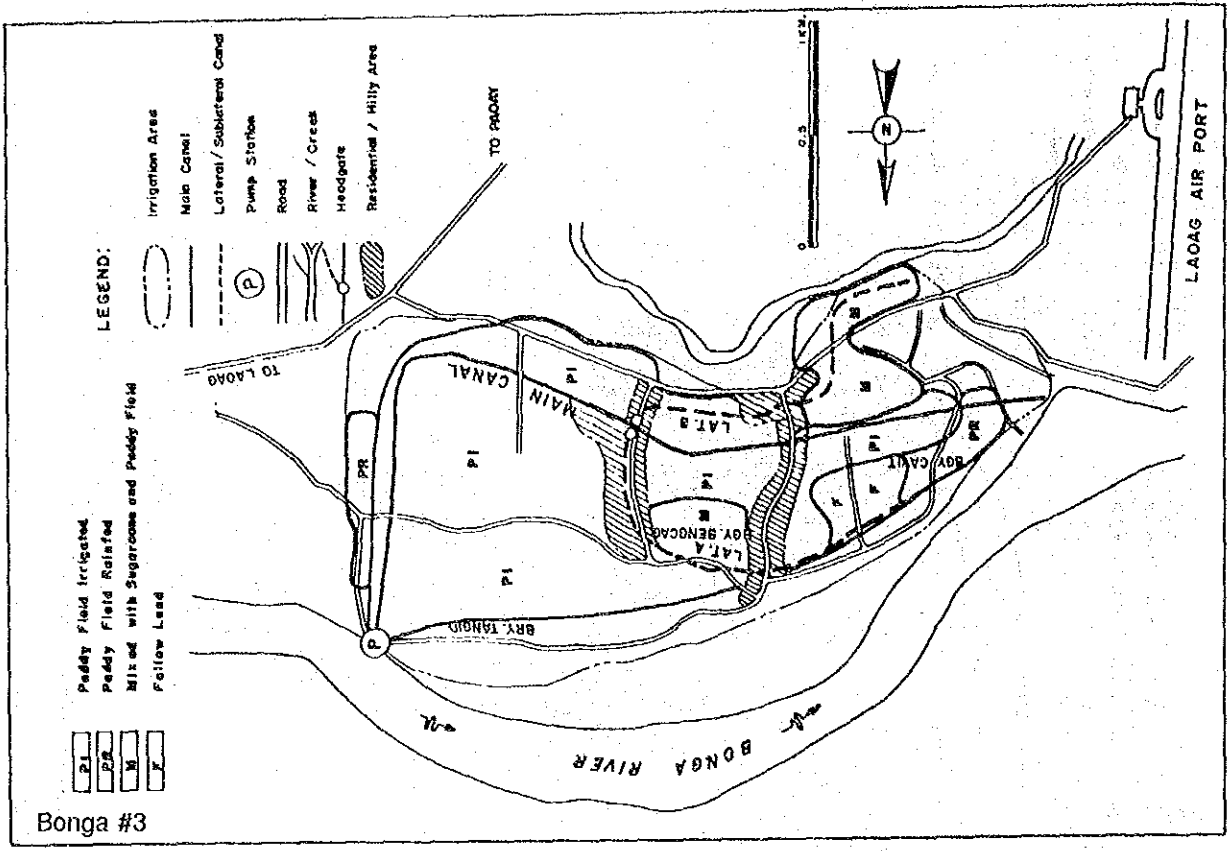


Fig. 2.3 (3/3) LAND USE MAP

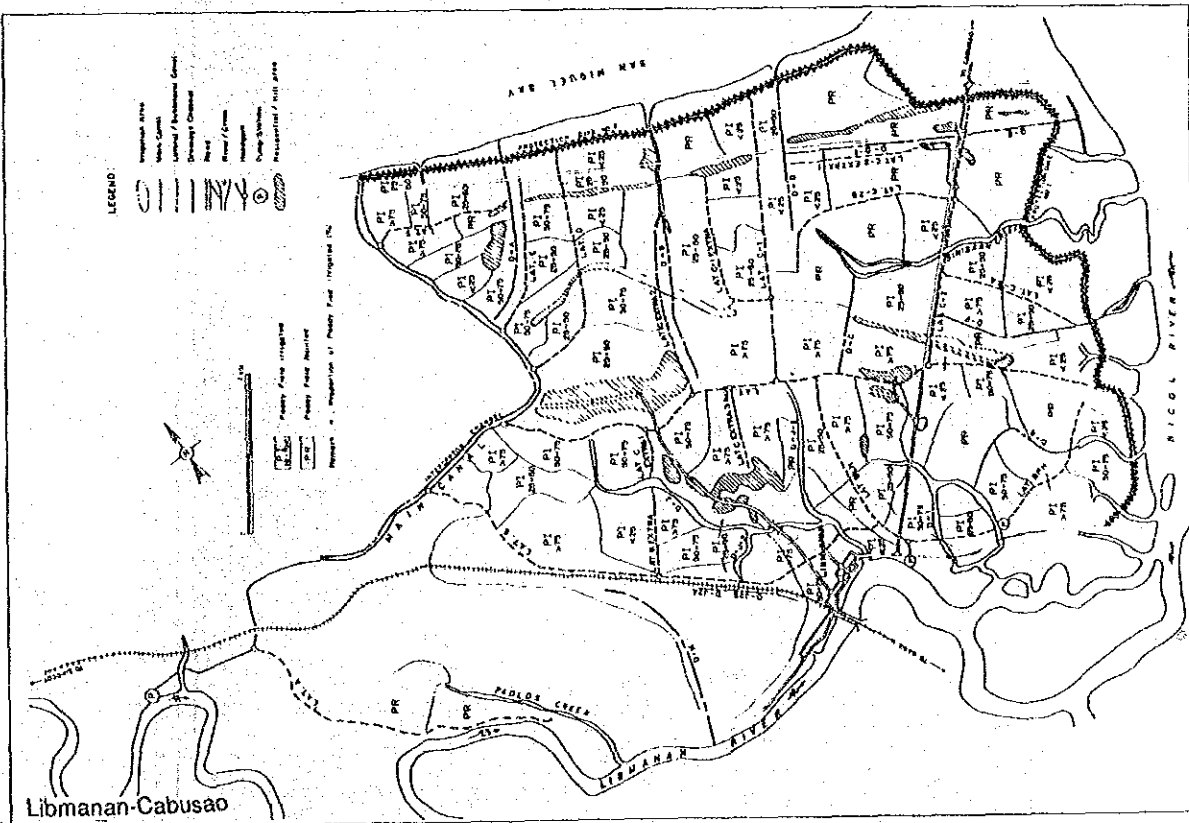
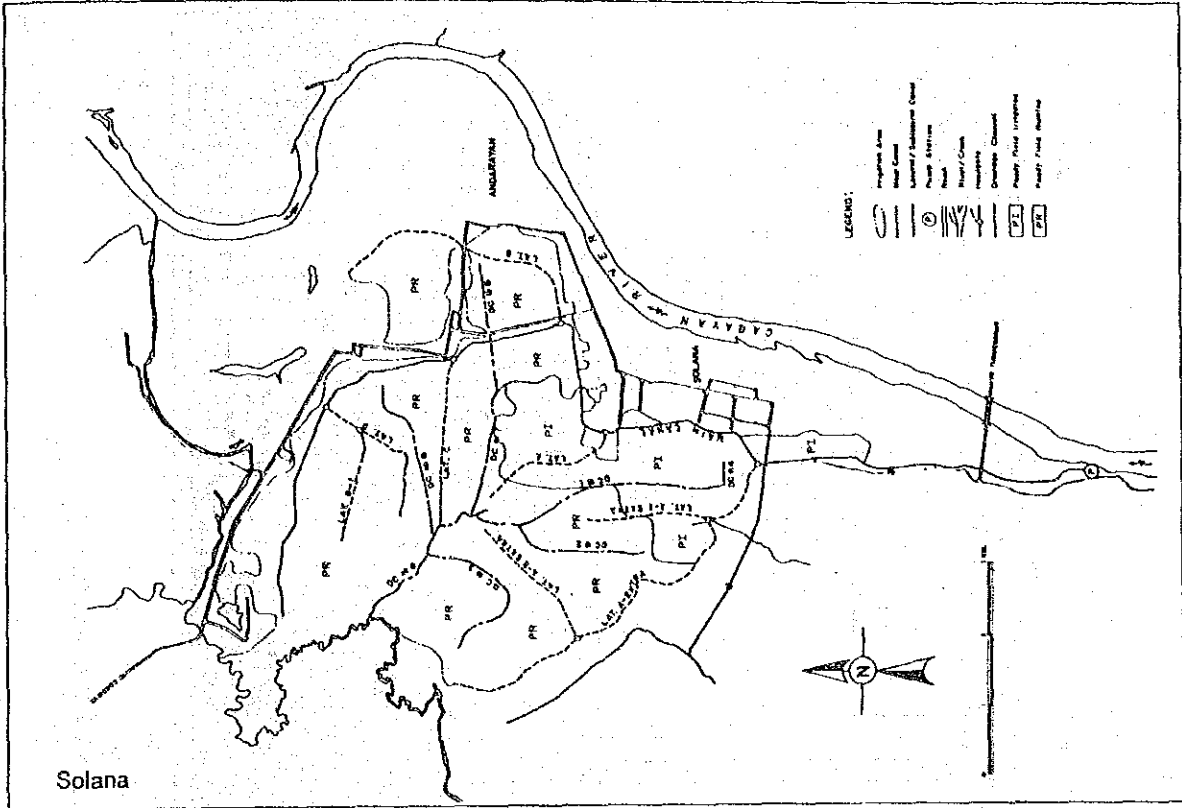
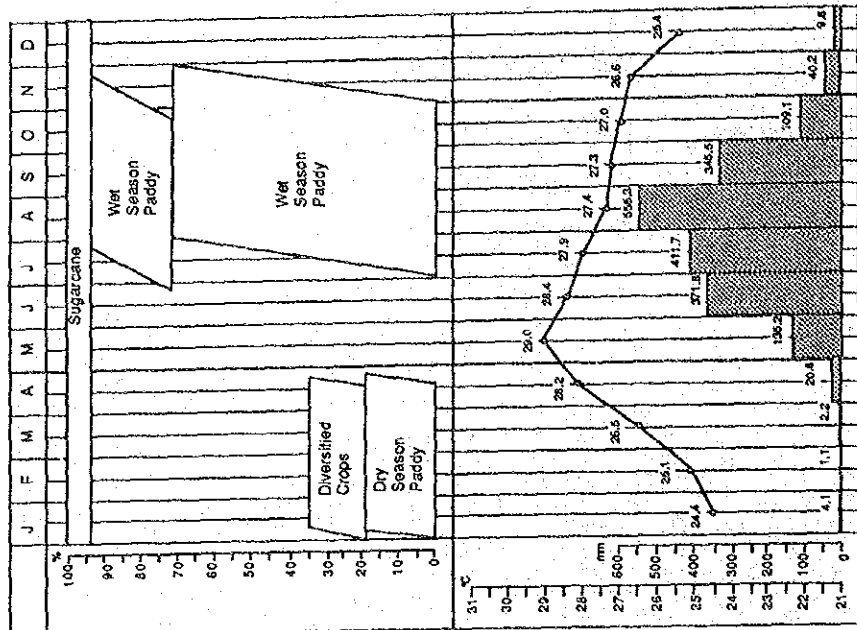
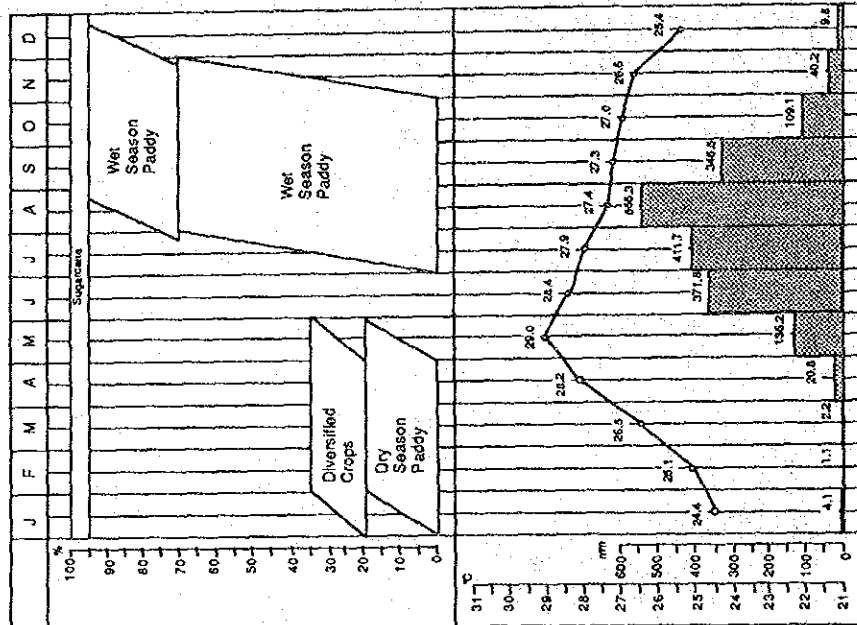
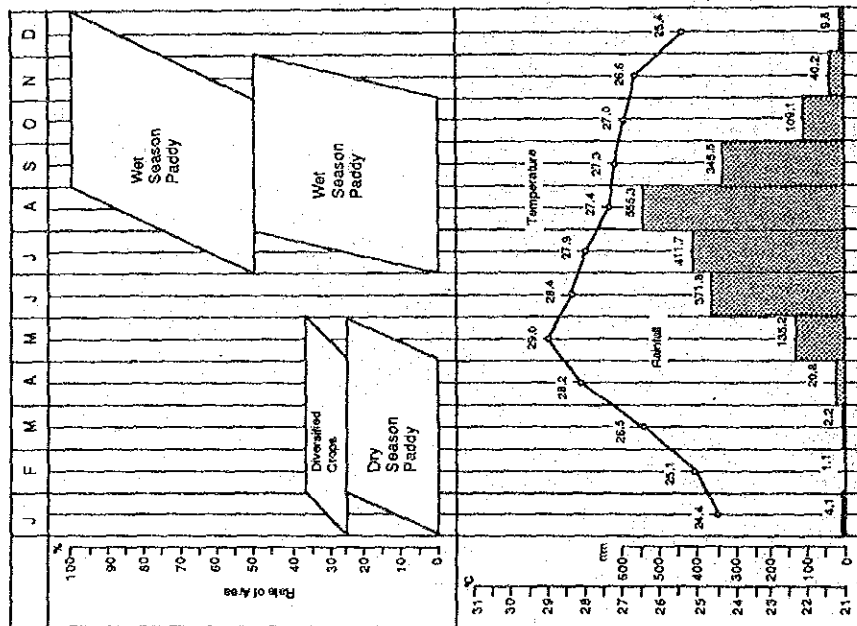


Fig. 2.4 (1/2) PRESENT CROPPING PATTERN

BONGA #1

BONGA #2

BONGA #3



Land Soaking Period  
Land Preparation Period

Fig. 2.4 (2/2) PRESENT CROPPING PATTERN

LIBMANAN-CABUSAO

SOLANA

ALCALA-AMJUNG

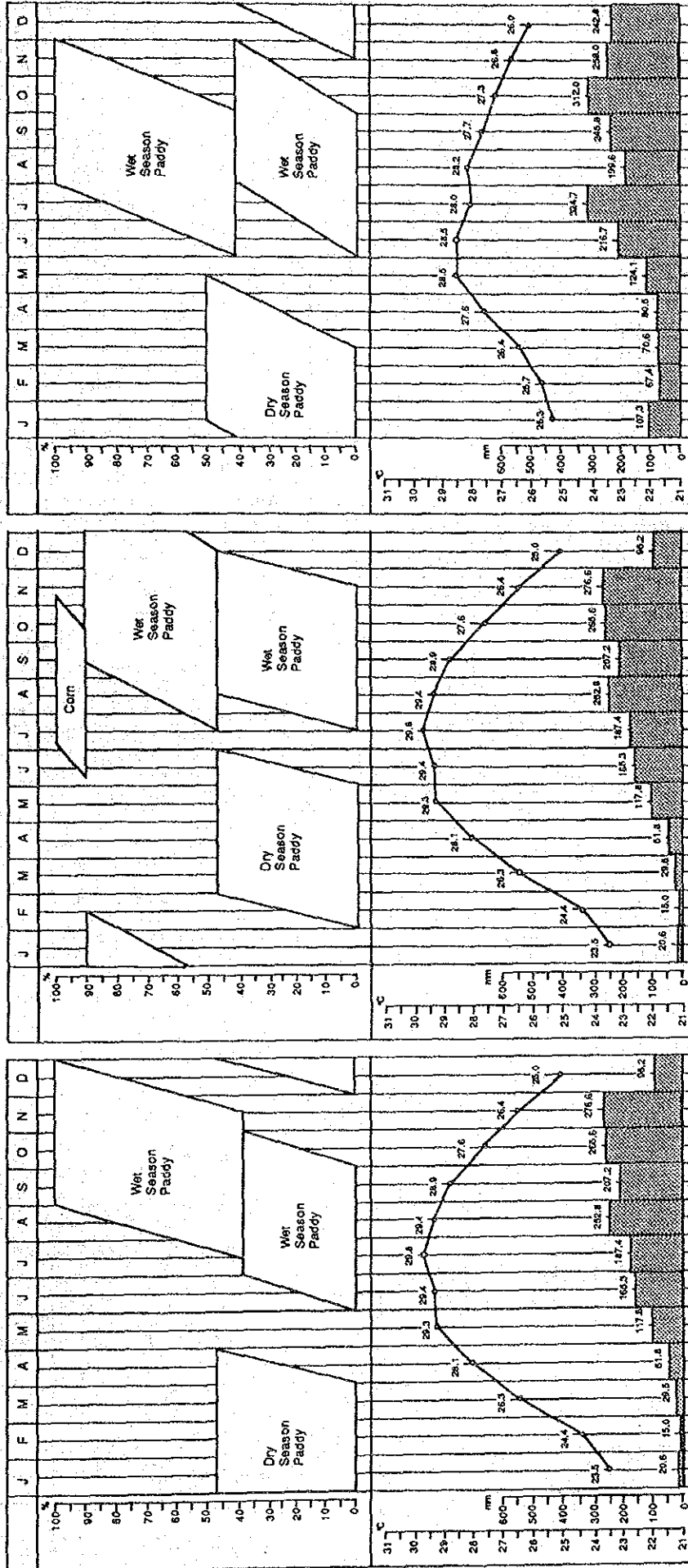
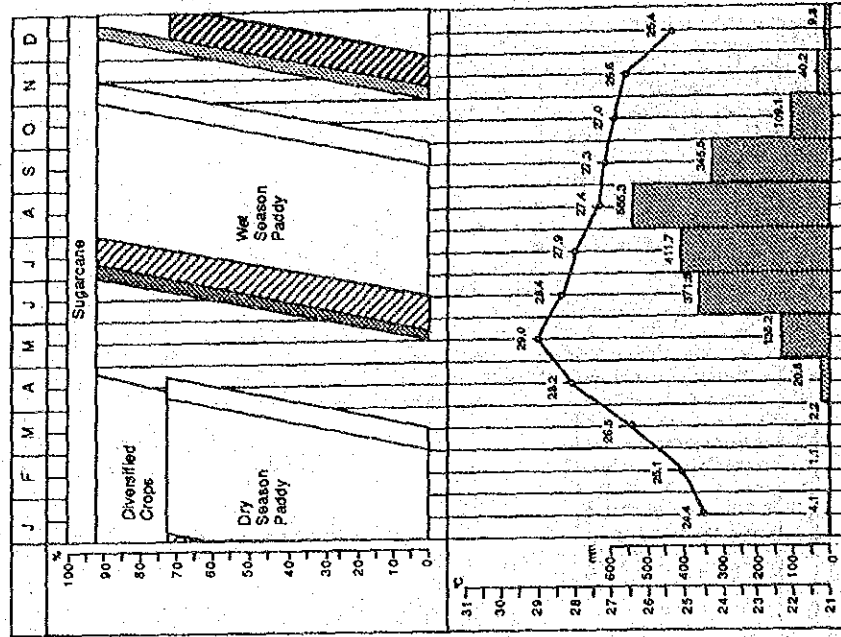
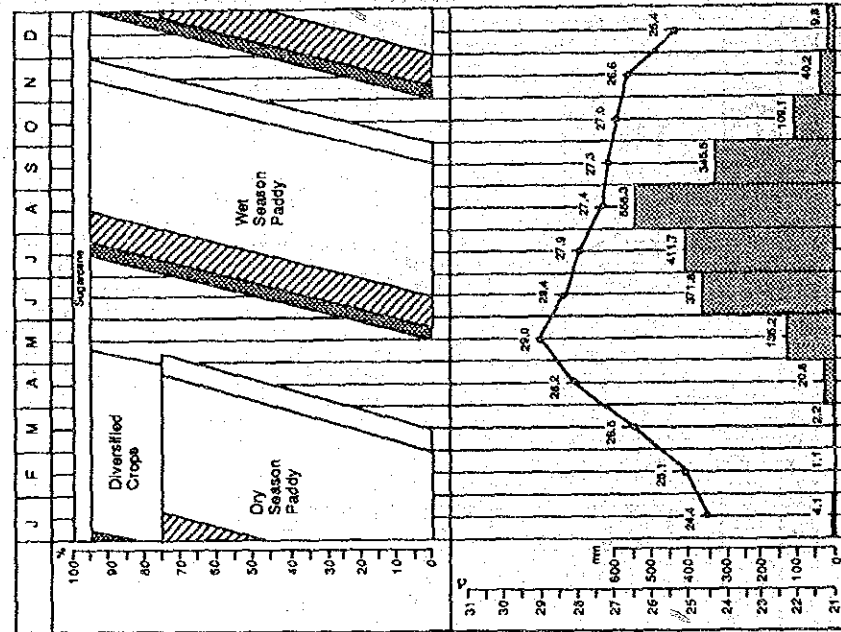


Fig. 3.1(1/2) PROPOSED CROPPING PATTERN

BONGA #3



BONGA #2



BONGA #1

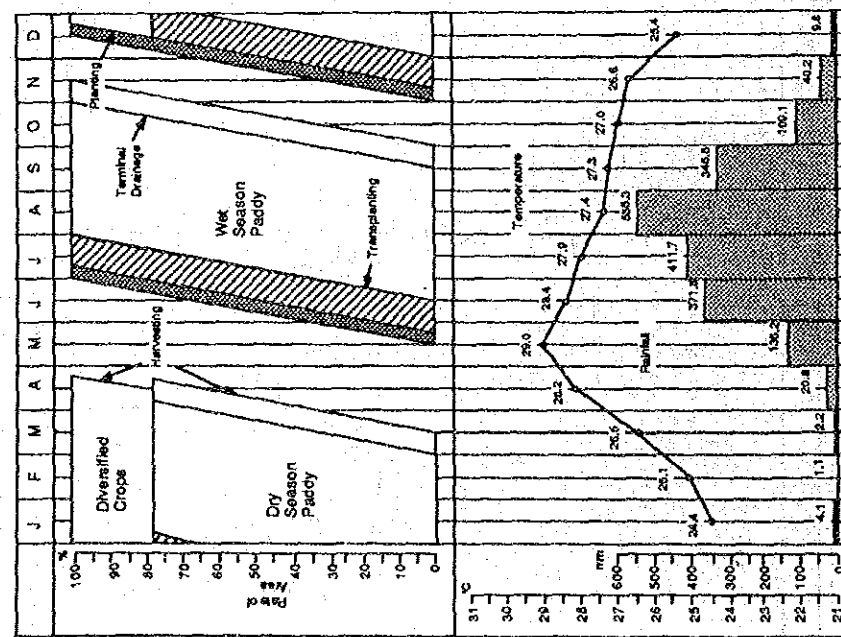
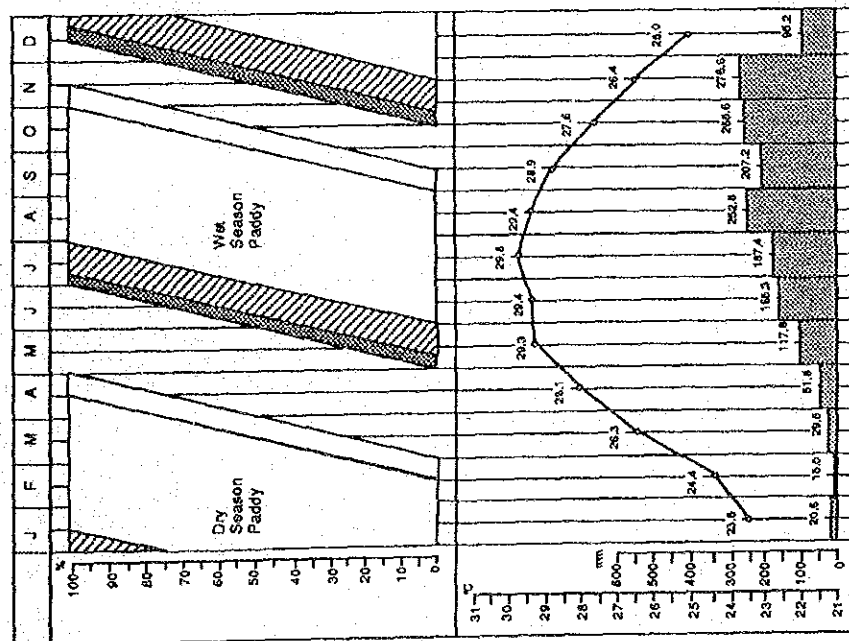


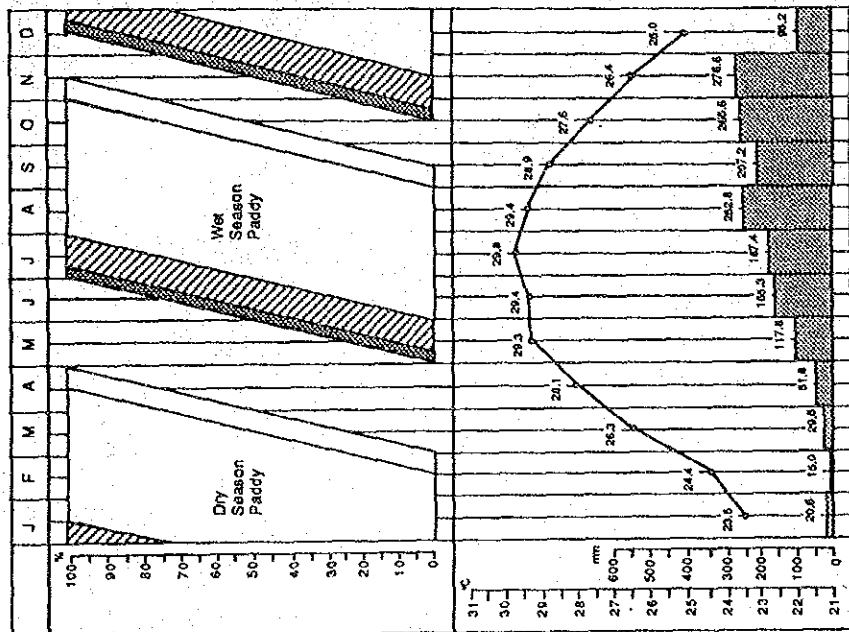


Fig. 3.1 (2/2) PROPOSED CROPPING PATTERN

ALCALA-AMULUNG



SOLANA



LIBMANAN-CAGUSAO

