3.2 Socio-Economic Conditions

3.2.1 Demographic Structure

The Study Area includes the whole area of Concepcion and a part of Bamban and Capas municipalities with a total land area of 39,400 hectares and covering 73 barangays. Ten percent of the total land area or 4,000 hectares is a sugarcane plantation including Hacienda Luisita. The 1989 population of the area is estimated at 178,000 of which 37,000 are engaged in farming activities. The number of household is estimated at 26,900 with the family size average of 6.7 persons which is 0.5 persons more than the provincial average of 6.2 persons. Among these households, 11,000 equivalent to 43 percent of the total are considered as farm households. The annual average population growth rate in the Study Area between 1989-2000 and 2000-2010 is estimated at 1.74 percent and 1.17 percent, respectively. The provincial average population growth rate is estimated at 1.44 percent between 1985-1990 and national average at 2.41 percent in 1987; the above growth rates suggest there were emigration from the Study area. The labor force (age groups 15 to 64 years) is about 113,000 persons out of which 52,000 persons or 46 percent belong to unemployment and underemployment.

3.2.2 Economic Structure

Industry and service sectors are the predominant industry in Region III. The regional economy has performed above par as indicated by the gross regional domestic product (GRDP).

As of 1988, the GRDP grew by 8.12 percent. This is over the planned growth rate of 7.33 percent. However, the employment improved by 3.1 percent over the 1987 level which brought down the total number of unemployment and underemployment by 32.6percent. Planned decrease in un- and underemployment level was 8.4 percent. There is no detail breakdown of GRDP for recent years, but more or less 20 percent of total is considered to be a share of primary sector and 40 percent each to be a share of industry and service sector, respectively.

The economic slump during the third quarter of 1983 brought about an alarming increase of unemployment and underemployment workers. Although, there still remains 46 percent of unemployment and underemployment in the Study Area, the ratio is being gradually improved by the persistent investment from the government and private sectors.

Since 1983, area of paddy field has increased, while sugarcane area has declined. The increasing scarcity of land in the Study Area has had, and will have, three major consequences for agricultural development and future prospects. Firstly, increase in agricultural production will be realized increasingly by improved productivity, not by the expansion of agricultural area. Second, the pressure of population on land has increased; rural population increased by 50 percent and agriculture employment by 36 percent from 1970 to 1984 compared with an increase in total land area of 15 percent (national average). The population pressure has forced farmers onto marginal land resulting in serious degradation of

the agricultural environment. Third, farm size has declined by increasing population and, as a result, the growth of per capita income is constrained. About 50 percent of farms were less than one hectare. This reduces considerably the potential for alleviation of rural poverty because such small holdings can hardly support the average family of 6.7 persons.

3.2.3 Administration

The formulation and implementation of the regional development plan for the economic and social development, are primarily a concern of the public sector, mainly dealt with by the Tarlac province.

Each central government agency has generally one provincial office for his provincial administration, and the office takes responsibility for identifying development projects to meet the needs and potentials of the area in cooperation with the local government.

To realize the Government's policy of administration decentralization, the transfer of responsibility for development from central government to local government is being adopted.

Three municiparities are involved in the Study Area. Budget allocation of three municiparities have mushroomed since new administration; for example, the municipal budget of Concepcion in 1985 at 3.8 million pesos grew to 4.8 million pesos in 1986, to 5.2 million pesos in 1987. The 1989 municipal budget of Concepcion attained about 1.7 times of that in 1985, amounted to 6.7 million pesos. Per capita local budget in 1988 ranged from 42 pesos in Bamban Municiparity to 71 pesos in Capas Municiparity and averaged at 55 pesos in three municiparities. (refer to Appendix K)

(2) Procedure of Development Planning

Each central government office formulates project proposal with the consensus of local government. The project proposals are submitted to the regional office of NEDA, which is responsible for review and formulation of the regional development plan as secretariat of Regional Development Council (RDC). Also, the submission is likewise made to the central government headquarters. The decentralization of planning procedure is achieved through the reorganization and strengthening of RDC as amended in Executive Order No.308 dated 11 September, 1987. All development plans pertaining to the regional development are to be reviewed and approved by RDC.

After the above mentioned procedure, NEDA headquarters will be in charge of establishing the regional development plan by way of consulting with all the concerned governmental agencies. In accordance with its planning guidelines, NEDA headquarters integrates the regional plans, which come up with the Philippine Development Plan.

(3) Procedure of Implementation of Development

An approved development plan is implemented by the government agency concerned. After completion of the project, such as roads, water supply system and so on, the operation and maintenance will be turned over to the local government which suffers from lack of fund, equipment and staff. As for development and investment, the local government has been and will be inevitably dependent on the central government. It is observed that local government budget covers only current expenditure and more than 60 percent of development investment has been financed by the central government.

3.3 Agriculture

Generally rice and sugarcane are planted in the Study area. The irrigated rice cropping is predominant.

Farmers have willingness of rice crop under conditions of sufficient irrigation water supply during the dry season. In case of insufficient irrigation water supply for rice crop during the dry season, mango and corn are planted dominantly for the easiness of sale and cultivation.

There is no service road in the paddy fields, so the use of machinery is difficult during the rice growing period.

Harvesting is carried out by manpower. This operation and transplanting service are principal income sources for landless farmers.

One of the most important problems during the wet season is treatment of threshed paddy. Since the farmers in the area sundry their paddy on cemented roads and the like, the threshed paddy is often wetted by rain and destroyed. As a result, great quantities of threshed paddy are lowered their market value.

Sugarcane flourishes in the area where is convenient for transport the crop to sugarcane mills.

3.3.1 Present Farming

(1) Cropping Pattern

The principal agricultural occupation in the Study Area is rice culture, and irrigation rice-rice is dominant.

Rice is planted all seasons, but main cropping months are June, July and August in wet season and November, December and January in dry season, according to data on the planted and harvested areas recorded in from May 1984 to April 1989 in the Tarlac province (Refer to Table H.1.1 and Figure H.1.1 in Appendix H).

In the Study Area, rice is the major crop grown. Around 81 percent (7,522 hectares) of the 19 CISs area are planted with rice in the wet season; the remaining 10 percent (900 hectares) are planted with sugarcane and 9 percent are flooded (Refer to Table 3-3-1).

In the dry season, around 67 percent (6,144 hectares), 10 percent (900 hectares) and 12 percent (1,125 hectares) are planted to rice, sugarcane and diversified crops, respectively. Around 11 percent (1,056 hectares) are under fallow due to lack of water.

In the wet season, rice is planted from June to August and harvested from September to November. In the dry season, it is planted in the period between November and January, and harvested from February to April. Rice is planted in the irrigable area from the upper stream to the lower stream in turn for three months.

The irrigation method of rice are by gravity and pumps in the dry season, but some area are irrigated by pump due to lack of water during dry season. In this area, planting rice is sometimes two to three weeks earlier than gravity irrigation area.

According to the general farming practiced in the area, farm are prepared for the dry season one to two weeks after harvesting the wet season crop.

Sugarcane in the Study Area is planted about four thousand hectares. Out of this, sugarcane with the area of 900 hectares flourishes in 19 CISs area where is convenient for transport the crop to sugarcane mills. Sugarcane is harvested generally from November to March.

Regions with the highest production of the diversified crops are Ilocos, Southern Tagalog and Central Luzon, during three years from 1985 to 1987. The major diversified crops are onion, sitao, mango, cabbage, eggplant, garlic, mustard, tomato and up in the Central Luzon Region (Refer to Table H.1.2 in Appendix H).

In Tarlac province in 1989, the vegetable planted with more than 100 hectares are sweet potato (1,927 hectares), mango (635 hectares), tomato (425 hectares), eggplant (240 hectares), squash (128 hectares) and bitter gourd (126 hectares). Other crops are corn (4,598 hectares) and peanuts (485 hectares) (Refer to Table H.1.3 in Appendix H).

Harvested areas of corn, sweet potato, tomato and peanuts are substantially increased during the crop year 1989 compared to 1985. Other crops with minimal increase in area harvested like bitter gourd, squash, etc.

Mango and corn are cultivated under rainfed condition, and are planted just after harvest of the wet season rice to take advantage of the soil which is still moist.

Figure 3-3-1 gives a graphical presentation of the existing cropping pattern in the CISs area.

The cropping intensity is ranged from 112 percent to 200 percent (Refer to Table 3-3-2).

(2) Farming Practices

Rice cultivation is carried out in labor extensive form from the stage of seeding to harvesting.

High yield variety of rice are widely grown, nearly 99.8 percent (Refer to Table H.1.4). The predominant varieties are IR32, IR36, IR60, IR66, IR72 and IR74 which are more than 110 days maturing. The present rate of seed utilization in the Study Area is about 75 kilograms per hectare on an average in the wet season and about 90 kilograms per hectare in the dry season.

Wet bed method of raising seedling is the most commonly adopted in the area. Seedling are transplanted randomly. In the dry season, however, more than 50 percent have practiced the direct-seeding.

Land preparation consists of plowing and harrowing several times by using both animal power and machine power at 55 percent. Plowing the rice-field once then harrowing it twice is the common practice in the area.

The basal application of fertilizer is employed by one fifth of the farmers. This method enhances the recovery of the transplanted seedling and promotes tillering. The most common practice is side dressing 92 percent of the farmers. During the reproductive stage of crop growth, 61 percent of the farmers apply additional fertilizer by topdressing. Quantity of fertilizer applies 70 kilograms (ranges from 42 kilograms to 99 kilograms) for N and 14 kilograms (ranges from 7 kilograms to 21 kilograms) each for P_2O_5 and K_2O per hectare.

Weeding method most commonly used is manual weeding. The use of chemical is less popular possibly because of its high cost.

Pests and diseases prevention control agro-chemicals are applied 30 days and 45 days after transplanting by 100 percent of the farmers. At 60 days after transplanting, a third application is done by 61 percent of the farmers and at 70 days after transplanting, by 40 percent of the farmers. Average quantity of agro-chemicals applied per hectare is one quart for liquid type and 15 kilograms for granular type.

Harvesting of matured crops is accomplished at 10 percent by family labor, at 68 percent by hired labor and at 22 percent by a combined family and hired labor. Harvesting fee is normally one cavan of paddy per 10 to 12 cavans harvested.

The use of mechanical threshers is most commonly observed and the threshing fee is from seven to eight percent of threshed paddy bags.

Sugarcane is usually harvested manually, and then, stable shaving is usually done by manual in order to ensure rationing. Fertilizing consists of side applications, and the total application fertilizers range from 90 kilograms to 120 kilograms for N per hectare. No insecticides are used.

Planted areas covered by 19 CISs are corn, mango, sitao, eggplant, tomato and water melon etc. Most farmers in this areas are not using enough agricultural inputs like fertilizer and insecticides (Refer to Table H.1.5 in Appendix H), because of high cost and very few farmers can afford to buy.

Almost the same crops are planted in the study area as compared to the 19 CISs , but soybean of about 160 hectares are planted in the areas of People's Livelihood Foundation Inc. (PLF), in Capas, Tarlac.

Though they planted with soybean for the first time, no agricultural technician is available in the area, and farmers at present don't know the cultural method of soybean crop some farmers in the area are contract

grower of soybean with NESTLE Philippines. Farmers in the PLF rely with the NESTLE farm technician on the management of the crop.

Diversified crops like vegetables are grown only on a limited scale. One of the reasons is intensive care and management low marketability and profitability.

(3) Agricultural Production

In the Study Area, the total area planted to rice is about 18 thousand hectares in the wet season. Of this area 12 thousand hectares are irrigated while six thousand hectares are rainfed (Refer to Table 3-3-3). In the dry season, however, only 10 thousand hectares are planted to irrigated rice. The water supply from the existing irrigation systems is not sufficient that only a limited area is assured with irrigation during the dry months. Consequently, many productive areas are not used to plant rice.

In 19 CISs area,the total area planted to rice is about 7,500 hectares in the wet season. Of this area, 7,100 hectares are irrigated and 400 hectares are rainfed in wet season, while 6,100 hectares are planted with rice irrigated in dry season.

According to our interviews with farmers, the yield of paddy ranges from 2.00 metric ton(40 cavans) to 4.75 metric ton (95cavans) per hectare in the wet season and 2.50 metric ton (50cavans) to 5.50 metric ton (110cavans) per hectare in the dry season (Refer to Table H.1.6 in Appendix H). Some have stepped up their productivity recently, but others still remain low. A higher yield is obtained in dry season than that in wet season. It seems solar radiation favors and enhances the production of more rice grains and the occurrence pest disease.

If water is sufficient year round, the wet season crop is riskier than the dry riskier season crop, because of typhoon that usually occurs during the flowering and harvesting season of the rice crop.

In irrigated areas, the average production is estimated 3.70 metric ton (74cavans) per hectare in the wet season and 4.10 metric ton (82cavans) per hectare in the dry season.

The estimated total annual rice production in the Study Area is about 100 thousand metric ton. The total annual rice production in the CISs area is about 50 thousand metric ton. In the CISs area, rice is produced about 50 percent of that of the Study Area (Refer to Tables 3-3-3 and 3-3-4).

Sugarcane occupies 900 hectares in 19 CISs area. The yield of cane is about 85 metric tons per hectare. The total annual sugarcane production in 19 CISs area at present is about 77 thousand metric tons.

Fresh vegetables are the main products in mountainous provinces in Luzon, the temperate variety of vegetables like baguio-bean, garden-bean, chinese cabbage, lettuce, pechay, cerely and cauliflower etc. are generally cultivated.

Almost all of the products are sold in the Metro Manila, however, some of them are sold in Tarlac, where is along the way between Baguio and Manila. According to data for import of agricultural production in 1988, about 25 thousand metric ton of corn and about 8 thousand metric ton of mango were imported. The other imported crops were white bean, red bean, peanut and mushroom etc (Refer to Table H.1.7. in Appendix H).

Diversified crops are planted about two thousand hectares in the Study Area and planted one thousand hectares in 19 CISs area. Table 3-3-3 are shown with representative crops, which are mango and corn of the diversified crops. The yield of the diversified crops grown in the area is generally low; mango is 0.85 metric ton and corn is 2.70 metric ton (60 sacks of Cob Ear). The total annual production of mango and corn in 19 CISs area at present are about 740 metric tons and 700 metric tons, respectively. These crops are sold easily by the farmers, buyer normally comes to buy to their farm gate during harvesting period.

3.3.2 Farm Size and Land Tenure

Of the 39,400 hectares of the total land area, 26,000 hectares equivalent to 66 percent of the total is classified as agricultural land which is composed of about 4,000 hectares of sugarcane plantation, 19,000 hectares of palay field and 3,000 hectares being planted to perennial crops. Within 19,000 hectares of palay field, 8,200 hectares or 43 percent are covered by 19 CISs. Hacienda Luisita with a total acreage of 6,449 hectares shares about 2,000 hectares within the 4,000 hectares of sugarcane plantation in the Study Area.

The average farm size including the 4,000 hectares of sugarcane area is estimated at 2.8 hectares per farm household, while that is reduced to 2.3 hectares if exclude the subject area. Sugarcane plantation area fully covers three barangays namely, Pando, Parang and Mabilog and partially includes Sta. Rosa and Tinang with 900 tenant farm households.

There are four tenure classes in the Study Area, namely, owner cultivator, amortizing owner, leaseholder, and share tenant. Amortizing owners constitute the highest percentage of 50 percent and biggest aggregate area (14,000 hectares) followed by owner cultivators, lease holders and share tenant in this order. The share of four tenure classes is estimated at 45 percent for owner-cultivator, 50 percent for amortizing owner, 3 percent for leaseholder, and 2 percent for share-tenant, respectively.

3.3.3 Extension Services and Research

A total of 82 personnel from various agencies, which are Department of Agriculture, Land Bank of the Philippines, Rural Banks, Department of Agrarian Reform, Cooperative Rural Bank of Tarlac and National Irrigation Administration are assigned in the Study Area (Refer to Table H.1.8 in Appendix H).

This present number are highly insufficient to meet the demands of, and to satisfactorily serve, the farmers. Area ratio of the present plant pest control worker and agricultural production technologist are 1:8,652 hectares and 1:811 hectares, respectively.

The preferred agricultural areas of investment for 1988 is identified by Board of Investments (BOI).

For production of food crops are legumes including whitebeans and redbeans and other vegetables including mushroom and asparagus for vegetables, irish potatoes and be for rootcrops, cashew and peanuts for edible nuts. Oil palm, castor bean and sunflower are recommended for plantation and the others were medicinal herbs, yellow corn, sorghum and soybeans.

For ingredients and feeds crops are recommended as a animal feed for livestocks, especially for the ruminate feeds.

Proposed diversified crops for exports are cloves, garlic, ginger, pepper, onion and mints for spices and okra and squash for vegetables.

Recommended crops of DA PAO in Tarlac are corn, mango, eggplant and other beans from the viewpoints of increase of farm income and improvement of nutrition. Seed of sitao, bitter gourd, squash, chines cabbage, okra, etc., are distributed in 1989 for horticulture purpose.

Research activities on mango, corn and cassava are carried out at CLSU, Munoz, Nueva Ecija. Research activities on tomato, peanuts and chines cabbage are also carried out without extension purpose because of constraints of marketing.

Based on the information from Dr. Rillon, research activities on mango and soybean will be strengthened in the future for the extension purpose. Soybean production for soy milk will be emphasized from the viewpoints of improvement of nutrition.

All kind of crops except rice are researched at IPB, Los Banoz, Laguna, Major subject crops are chines cabbage, tomato, mango, soybean, peanuts and sorghum (Refer to Table H.1.9 in Appendix H).

3.3.4. Agro-related Production

Livestock in the Study Area are carabaos, cattle, swine, chicken and ducks etc. Carabaos are usually utilized as draft animals in land preparation, hauling for agricultural materials and production, and other jobs. Cattle are raised for fattening. They are raised on available farm feeds, corn and rice straw, and grasses which grow on road side, idle areas and paddy fields where after harvested.

Hogs and poultry are raised with farm grown feed such as whole grain corn and commercial feed. In the Study Area, ducks are usually raised for the production of eggs for "balut".

Live hogs, chicken and ducks and eggs are sold in the local markets or used for home consumption.

Most livestock are grazed on a small scale in and around the farm land or home yard. However, livestock play an important role not only in farm operation as motive power but also in protein food supplies to the local people.

3.3.5 Farm Machinery and Post Harvest Facilities

(1) Farm Mechanization and Post Harvest Technology

Major crops cultivated in the Study Area are rice and sugarcane, and diversified crops such as vegetable, bean or corn are minor produce. Present situation of farm mechanization focused mainly on rice and sugar cane are studied as the following :-

a) Rice Farming

i) Seedling Preparation

Wet-bed method is most popular in the Study Area. First of all, puddled plots with one to one and a half meter wide of any convenient length are prepared. Before sowing the pre-germinated seeds, plots are mixed with complete fertilizer (14-14-14) or ammonium phosphate (16-20-0). About one kilogram of seeds per ten square meter (1kg/10 m^2) are sowed uniformly. when seeds have two to three centimeter sprouts, shallowing but continuous irrigation is started. The seedlings are ready for transplanting at twenty to thirty five days after sowing.

For rainfed lowland areas where the frequency and amount of rainfall during the planting seasons are unpredictable, the dry -bed method of growing seedings is preferred. First, dry beds of light textured soil about one and a half meter wide and any convenient length are prepared. One kilogram dry seeds per ten square meter plot is sowed. Then seeds are covered with thin layer of soil. After three to six weeks after sowing, seedlings are transplanted.

All works for seedling preparation are carried by manpower.

ii) Land Preparation

One plowing and two to three harrowings are applied for land preparation in the Study Area. Thenafter, puddling and leveling are done thoroughly. Plowing is done either with the use of bottom plow pulled by carabao or disc plow pulled by power tiller and puddling by rakes.

There are four kinds of methods for contract land preparation in the Study Area such as by traditional carabao, by hand tractor, by 4-wheel tractor and by combination of carabao and machine. Land preparation ready for transplanting by carabao is costed P60-P100/day or P640/ha consisting of one plowing plus two harrowings, of which charge difference being caused with or without lunch at different Barangay. Most popular

operation ready to transplant is by hand tractor, average P1,000/ha from P500/ha to P1,800/ha also consisting of one plowing and two harrowings. In case of 4-wheel tractor, only one plowing is done costing average P700/ha. Thenafter plowed land is harrowed by carabao or hand tractor. Charge of combination carabao plowing and hand tractor harrowing is P500/ha to P1,200/ha (see APPENDIX J.1.16 Present Terms of Contract Farming).

iii) Transplanting

Majority of farmers are adopting the transplanting method and seedlings are transplanted randomly at age 26 to 30 days.

In both irrigated and rainfed lowland where labor and water are problems during planting season, rice is usually established by directly sowing pre-germinated seeds in puddled soil.

Both transplanting and direct seedling are carried by manpower.

Contract transplanting locally called "Cabecilla" is employed near around Study Area, on which system totally up to four hectares can be transplanted within one day by 25 to 30 neighboring farmers with charge of P 400/ha (APPENDIX J.1.16 Present Terms of Contract Farming can be referred).

iv) Fertilizer Application

The most popular practice is manual side dressing. Basal and additional fertilizer application are seldom. All related works are conducted by manual.

v) Weeding

Weeding is accomplished in three ways such as manual, mechanical or by the use of herbicides. The commonest practice is manual weeding over 50 percent of farmers in project area. Common chemicals are spread by manual within one month after planting to prevent weeds.

vi) Pest and Disease Control

After transplanting or direct seeding, early preventive control measure is spread by hand sprayer.

vii) Harvesting and Threshing

Harvesting including cutting, gathering, bundling, and stacking of matured crops requires the greatest manpower input, which has historically close relationship with threshing operation.

Two systems of rice harvesting, one called the Tilyadore system and the other called the Hunusan system, had traditionally been used in Central Luzon before the 1970s.

In the Tilyadora system, rice is cut with sickles and piled in a large stack by workers employed under a daily wage contract, locally called Upahan, and is then threshed by the large Tilyadora thresher that is pulled by a 40 to 60 horsepower tractor. The Hunusan system is a community type arrangement in which, when a farmer specifies the time of harvesting, every villager is allowed to participate in harvesting. Harvesters cut rice and receive a certain share of the harvested crop.

A major change in rice harvesting systems has been the rapid diffusion of IRRI-designed portable axial-flow threshers. No case was found of hand beating being used to any significant extent in project area. Tilyadora had been overtaken by portable threshers relative to Tilyadora is their utility in wet rice fields. While Tilyadoras were usually owned by local businessmen such as machinery dealers and rice millers, those who owned and provided custom services of portable threshers were mostly relatively large farmers. Services of farmer-owned threshers employ five to six workers to operate one machine and receives share of seven percent threshed paddy. Threshing fee is paid by either farmers or harvest workers, or is shared equally (harvesters' share is given after deducting the threshers' share). Areas in which the fixed daily wage (Hunusan) contract had been practiced in association with the use of Tilyadora continues to use the same contract, even after the Tilyadora had been replaced by portable threshes.

viii) Transportation

Threshed paddy at rice field is carried by manpower up to Barangay road, average 100 meters distance, after sacking by charge of one and a half to two pesos per bag, then being proceeded from the field to farmer's yard, average five hundred meter distance, also by manpower with charge of two to three pesos per bag, and then the farmer's yard to rice millers near around municipality, average three kilometers, distance, by jeepny, tricycle or truck with charge of three to five pesos per bag. Total transportation cost from field to rice millers is at the range from six and a half pesos to ten pesos per bag.

ix) Drying

Solar drying is the most common method with the paddy spread thinly on road not welcome as part of public highway, concrete slabs, pavement or canvas without any underlay. Only private uses canvas as an underlay.

In the Study Area, the existing mechanical dryers have a combined capacity of only 16 tons per batch, which are owned by Corazon de Jesus Multi-Purpose Cooperatives eventhough being under installation. This simply indicates that all paddy produced in the Study Area should be dried on sun-drying, which causes almost always the farmgate price of this commodity is lower in the wet season than that in the dry season.

Drying cost is one peso per bag in the Study Area, which consisting of 35 centavos per bag, 35 centavos per bag and 30 centavos per bag respective for unloading from transportation vehicle, loading to transportation vehicle and sun drying operation.

Remarkable quantitative losses (minimum 10% in rainy season and annual average 1-5%) and qualitative losses (annual average 0.9 peso/kg) during drying operation are caused while sun drying under bad weather condition enabling high moisted paddy to dry up. It is officially reported on the PAGASA data that average numbers of rainfall days are 30 and 48 respectively in dry and wet season in Philippines.

How to dry wet paddy in rainy season with the reasonable operation cost is the most important and urgent matter for small farmers in the Study Area to solve.

x) Milling

Four (4) alternative milling technologies are employed in project area like as follows: -

	Hulling Method	Whitening Method
a)	Engelberg	Engelberg
b)	Rubber roll	Engelberg
c)	Disk	Abrasive
d)	Rubber roll	Abrasive
e)	Rubber roll	Friction

Monotype milling unit by Engelberg huller and whitener is locally called as "Kiskisan", small-scaled combination milling unit employing rubber roll type huller as "Baby Cono" or "Semi-Cono", and large-scaled combination system employing abrasive whitener as "Cono". Also traveling mills stop at farmer's yard and relieve him of the cost and trouble of delivering paddy to mill site for his home rice consumption.

Fees charged for milling are based on three criteria (modes of payments) per kilogram of milled rice as payment by milled rice, bran or cash. In case of cash, thirty five centavo per kilogram of milled rice is charged.

b) Sugarcane Farming

Land preparation in sugarcane farming is generally mechanized. Plowing, harrowing and furrowing are accomplished by tractor drawn attachments. Planting is, however, done totally by manual. Ratooning is practiced in about a half of sugar farmers in order to do a way with a usual cost of land preparation, canetops preparation and planting.

(2) Inventory of Pre-and-Post Harvest Equipment and Facilities

a) Government Sector

Existing population of pre-and-post harvest equipment and facilities belonging to Government sector i.e. National Food Authority (the NFA) is recognized as shown in APPENDIX J.1.1.

In project are, only 50 thousand bags or 2.5 thousand metric tons storable warehouse together with 3.5 metric tons per hour rice mill, 160 bags or eight metric ton per batch dryer and two metric tons per hour

Parboiling plant are prepared at NFA Conception Grains Infrastructure Development (GID) as paddy buying station, eventhough all facilities except warehouse are under installation and not yet operational for buying paddy from farmers.

Anyhow, the full capacity of the said NFA warehouse is not enough for buying paddy effectively produced in the Study Area.

On the other hand, in project backyard area at Aguso and La Paz, total 385 thousand bags or 19 thousand metric tons warehouses are installed together with such facilities as nine metric tons per hour rice mills, 8.5 metric tons per batch and four metric tons per hour dryers. Farmers in the Study Area, however, are not willing to bring their paddy to NFA because mainly of hard access, complicated administration, slow payment infrastructure and not ideal price.

b) Private Sector

Also existing population of pre-and-post harvest equipment and facilities including carabao are estimated by CIS and by Barangay in the Study Area. APPENDIX J.1.2, J.1.5, and J.1.6 can be referred.

Carabao is the most popular farm power both in CISs and the Study Area. Almost every farmer keeps a carabao in CISs area eventhough a half of farmers holding a carabao in the Study Area. The highest population rate among farm machinery and post harvest facilities is water pump following to hand tractor.

c) Population Rate

Population rate of pre-and-post harvest equipment and facilities per farm household and per hectare in project area are studied in APPENDIX J.1.3.

d) Farm power

APPENDIX J.1.4 indicates input of machinery power and capacity in project area.

3.3.6 Agro-processing and Marketing

(1) Grain Post Harvest Losses

Through investigation of the Study Area and hearing and studies with the institutions concerned on post harvest action program such as International Rice Research Institute (IRRI), Philippine Rice Research Institute (PHILRICE), National Postharvest Institute for Research and Extension (NAPHIRE), University of the Philippines at Los Baños (UPLB), National Food Authority (NFA), National Food and Agricultural Council (NFAC), Philippine Council for Agriculture, Forestry and Resources Research and Development (PCARRD), Central Luzon State University (CLSU), Quedan Guarantee Fund Board (QGFD), National Agricultural and Fishery

Council (NAFC) and Land Bank of the Philippines (LBP), current grain post harvest losses in Philippines are summarized as follows: -

a) Rice Post Harvest Losses

i) Rice Post Harvest Losses in Quantity

Quantitative rice post harvest losses are ten to thirty five percent in the Philippines and average twenty three point five percent. On the other hand, average rice post harvest losses in Study Area are investigated to be twenty two point five percent (refer to APPENDIX J.1.32).

ii) Rice Post Harvest Losses in Quality

Qualitative rice post harvest losses consist mainly of moisture content, whiteness, brokens, shape and chalkiness strongly affecting to sale price. Especially inability or dry high moisture paddy during unfavorable weather condition for sun drying, which leads to poor quality grains and consequently low returns for farmers.

Farmgate price difference between higher and lower quality paddy is investigated to be 1.5 pesos per kilogram as 4.70 pesos per kilogram for dry, 4.00 pesos per kilogram for skin dry and 3.20 pesos per kilogram for wet paddy dealt at Study Area in 1989.

Qualitative rice post harvest losses both in the Study Area and in the Philippines are summarized to be average ninety centavos per kilogram.

b) Corn Post Harvest Losses

i) Corn Post Harvest Losses in Quantity

Quantitative corn post harvest losses both in project area and in the Philippines are estimated to be 10 to 12 percent and average 11 percent.

ii) Corn Post Harvest Losses in Quality

Qualitative corn post harvest losses both in the Study Area and in the Philippines are also estimated to be 60 centavos per kilogram of shelled corn.

(2) Agricultural Input and Output

a) Agricultural Input

i) General View

Agricultural input such as seed, fertilizer, insecticide/ pesticide, equipment and other input materials are commonly purchased not by bulk but by individual farmer from private traders. Current prices of input materials are reported in APPENDIX J.1.24.

Organization like as Samahang Nayong (the SN) or cooperatives are not aggressive and agricultural inputs are purchased by means of direct trade between farmers and private traders individually.

ii) Supply-Demand of Certified Seed

Total area of agricultural rice land in Tarlac province is approximately 123 thousand hectare in 1990. At an estimated 1.5 cavan of seed per hectare, about 185 thousand cavans are needed per year as potential demand. Casual survey has shown that only around 29 thousand cavans of certified seed are used by Tarlac farmers under the RPEP-II promoted specially by DA in 1990, which recover still 16 percent of the potential. At present, most of farmers use uncertified seed, taking higher risk on their production, even though accelerating the program by DA saying "plus 20% increase of production by the use of certified seed". More often, in their desire to increase their production, they prepare their seeds from unreliable sources who will take advantage farmers by passing their seeds as certified and at higher prices.

Despite seeds are more fundamental requirement than any organization of institutions to farmers, as of now, no establishment like seed processing or marketing station has been surveyed to exist in Tarlac province, even though 48 members grow seeds at their 300 hectares under Tarlac Seed Growers Association. Their production targeted in 1990 is 60 thousand cavans or 2,700 metric ton, which may cover the one third of the potential demand.

Ten seed inspectors are, however, assigned to supervise the full seed land of Tarlac province under Provincial Agricultural Office (PAO) by the support of PHILRICE at Maligaya in Nueva Ecija.

Viewing the total area of Agricultural rice land in project area, there are about 28,000 hectares, which requires potential demand of about 42,000 cavans or 1,900 metric ton of certified seed per year as shown in APPENDIX J.1.44.

About 20,000 cavans or 900 metric ton are required at least in CISs area to guarantee higher production. In compliance with the demand, Conception Seed Producers Multi-Purpose Cooperative, Inc. is registered just on Conception belonging to Lucong CIS area gathering 26 members and 134 covering hectares. Their production target of certified seed in 1990 is 8,000 cavans, which assures only 40% supply of the potential in CISs area.

Current marketing channel of certified seeds is recognized as shown in APPENDIX J.1.46.

On the other hand, price of seed guided by the Government is as shown in APPENDIX J.1.45 effective from December 16, 1990.

Average sowing volume required per hectare is reported as foundation seed 15 kg/ha, registered seed 45 kg/ha and certified seed 68 kg/ha, respectively. Average yield of certified seed by growers is also reported as 100 cavans or 4.5 metric ton per hectare per cropping. As tungro-

resistant variety, it is recommended to grow IR-60, IR-68, IR-70, IR-72 and IR-74.

b) Agricultural Output

i) Rice Marketing

Rice distribution structure in the Study Area is summarized as shown in APPENDIX J.1.18 "Rice Marketing Channel in Southern Tarlac". 85 percent of paddy produced by farmers are sold to middlemen and eight percent to paddy buying stations in or near Barangay, three percent to NFA especially in wet season and the remained four percent preserved for their self-consumption and seed for next production. The reasons why farmers do not distribute their paddy to NFA are problem of hard transportation access, not enough paddy buying amount budgeted to NFA, longer days for payment administration or buying only fair dried paddy.

ii) Farmgate Price of Paddy

Paddy produced in the Study Area is sold at range from two to four point one pesos per kilogram in wet season and from three point three to five pesos per kilogram in dry season on the basis of farmgate price as reported in APPENDIX J.1.20. Current Paddy Farmgate Price (1988/1989). The Government support price is three and a half pesos per kilogram.

iii) Annual Price Fluctuation of Paddy

Annual price fluctuation of farmgate price of paddy in southern Tarlac is shown in APPENDIX J.1.19, Which requires the policy how to stabilize the price of paddy and let farmers enjoy fair price.

iv) Sugarcane Marketing and Price

Cane farmers harvest 80 to 90 tons cane per hectare and deliver straight to miller of Central Azucarera de Tarlac at Hacienda in the backyard area by truck or railroad. Trucking cost is ninety three pesos per ton cane and double than 47 pesos per ton cane by railroad. The miller pays 500 to 600 pesos per picle sugar to farmers. One ton cane equals one picle sugar and also 63 kilogram.

v) Diversified Products

Minor products such as mungbean,eggplant, corn, peanut, cowpea, water melon, bloom corn, sweet potato and etc. are sold directly to collectors or buyers or to market.

vi) Farmers Must Sell Products Immediately after Harvest

The reasons why small farmers have to sell their products immediately after harvest are recognized that ;

a) To re-pay credit.

b) Immediate personal usage such as educational expenses for their students or children, clothing, repair of living house or farm implement, buying electric appliance and / or saving.
c) No storage facilities.
d) To buy farm input for next production.

vii) Wholesale and Retail Price of Rice

Wholesale and retail market price of paddy and rice are reported officially in "Wholesale Market Price Bulletin" and "Retail Market Price Bulletin" respectively which are weekly publication of comparative wholesale and retail prices of selected agricultural commodities serialized by the Bureau of Agricultural Statistics (BAS). Rice retail prices are simultaneously monitored from retailers at towns of Bamban, Capas and Conception in the Study Area. Current retail prices are at the range from the highest glutinous rice 13 pesos per kilogram to the Lowest 100 percent broken rice five pesos per kilogram.

(3) Credit for Agricultural Input

Purchasing credit requirements for agricultural input of farmers in the Study Area are provided mainly by Land Bank of the Philippines (LBP) and subsistantly private lenderers.

(4) Training and Technology Transfer

Extension services are indispensable for getting success of improvement of farming and income in individual farmers or in cooperatives. Eventhough the DA's long run efforts, extension services are furthermore required.

APPENDIX J.1.49 shows the present training structure for farmers in the Study Area. Its main object is, however, to train how to grow. It is required to strengthen extension organization and to train on post harvest technology to reduce post harvest losses, to improve quality and to increase net income in cooperation with existing Governmental Agencies, like NAPHIRE, NFA, PHILLRICE, CLSU together with extension services division of DA.

(5) Credit and Program supported by the Government

a) Credit Availability

DA as the leading governmental agency in the field of agriculture in the Philippines conducts the following measures to strengthen rural financial markets and to enhance the flow of rural credit to farmers ;

i) The Comprehensive Agricultural Loan Fund (CALF)
ii) The Philippine Crop Insurance Corporation (PCIC)
iii) The Quedan Guarantee Fund Board (QGFC)
iv) The Guarantee Fund for Small and Medium Enterprise (GFSME)

b) Government Support Program

DA conducts also the following programs to increase production and improve farmer's income ;

i) Livelihood Enhancement for Agricultural Development Program (LEAD Program)

In response to the call of the national government to give priority to employment generation in the rural areas, DA came up with the LEAD program since the second quarter of 1988. The program assists farmer's groups in establishing and sustaining viable livelihood enterprises. The LEAD assistance takes the form of project packaging, tapping private business groups to provide professional managers for the projects, and linking up farmers' groups with private banks for start-up capital.

ii) Rice Production Enhancement Program II (RPEP-II)

The program had been commenced on November 7, 1989 and was ended on April 30, 1990 aiming at increasing the country's 1990 paddy production to 9.7 million metric tons from the projected 9.3 million metric tons in 1989. The target of the RPEP-II covered approximately 897 thousand hectares of irrigated rice land and provided participating farmers four bags of fertilizer and one cavan of certified seed per hectare. In exchange, farmers are required to turn over three cavans or bags to NFA.

iii) Regional Marketing Assistance Centers

The regional marketing assistance centers were set up nationwide to facilitate marketing linkages between farms and end users of agricultural products.

iv) Rice Action Program

Following to the RPEP-II, DA has started newly an aggressive Rice Action Program (RAP) from April, 1990 designed to ;

a) Increase the 1990 production of rice by three to three point five percent over that of 1989, inspire of the drought being experienced ;
b) Stabilize the 1990 prices of rice at levels equitable to both consumers and producers ; and
c) Initiate continueing actions to promote rice productivity and price stability over the long term.

More specifically, the program seeks to increase rice yields through better availability and more efficient use of water, fertilizer, and quality seed, reduce post harvest losses, provide farmers with the price incentives to continue producing rice, and stabilize prices and supplies for consumers.

v) Agricultural and Fishery Councils (the AFCs)

AFCs were activated by DA at the regional, provincial and municipal levels to encourage more participation in the planning, implementation and monitoring of DA programs. These AFCs are chaired by private sector representatives and about 60 percent of AFC members are from the privated sector ; farmers, fishermen, traders, businessmen and the clergy. There councils participated in six planning sessions to identify the locality-specific priorities and projects that form part of DA program of action for the next five years.

vi) Tarlac Provincial Government Support

Also provincial Government supports agricultural cooperatives through the Rural Industrialization Can Happen (RICH) in the Tarlac province. As of July 31, 1989, total loans of 32 million pesos were released to 35 institutions, of which 22 million pesos loan was granted to 23 clients in agricultural sector. Institutions received loan including for urgent improvement of post harvest facilities are three and total loan amount eighteen point five million pesos as shown in APPENDIX J.1.18.

3.3.7 Farm Economy

(1) Input Supplies

The sale of fertilizers and pesticides is undertaken by private sector dealers. Insufficient quantity of commercial inorganic fertilizer is used upon crops in the Study Area. Agricultural chemicals are available but used sparingly in the area. The input dealers are distributed mostly in the town proper where the farmers can hardly access at their convenience due to ill road conditions.

The non-availability of market is one of the constraints to prevent the crop diversification in the area. The production of palay seed is undertaken by the Concepcion Seed Growers Cooperative Inc. (CSGCI). The CSGCI is partly concerned with the production of registered and certified rice seed in the area although its organization has just started in 1988. The seed producers, based in the area with 26 registered growers, produce about 2,500 cavans of certified seed every year which is sold to farmers both within and outside the area. DA staff provide field inspection services for all seed crops and germination and purity tests.

The major constraints to expanding the demand for planting materials are inaccessibility of short-term credit for annual crop materials and unavailability of medium- and long-term credit for perennial crop materials. Further, the supply of planting materials is constrained by a lack of seedstock for annual and perennial crops. Substantial support is required to expand the supply and generate demand for planting materials for intensification of palay areas. Institutional and technical support needs to be provided to technical agencies and farmers' groups, and credit lines must be provided for the establishment of long gestation crops.

(2) Marketing

The marketing of food crops is localized but some of the cash crops as well as rice are sold outside the Study Area. A number of middlemen are intervening in the marketing systems of almost all commodities. Palay dealers purchase from farmers for sale to millers or another traders and thus, two to four dealers are making their businesses between the farmgate and market. A price of palay in wet season increases from 2.0-3.5 pesos/kg at farmgate to 3.1-4.7 pesos/kg at mill. It means that about 25 percent of income increase could be expected only if the farmers were able to thresh, dry up, and carry the production by themselves. Sugar milling factory is locating in Hacienda Luisita with a capacity of 7,800 metric tons of sugarcane per day. Some farmers outside the Hacienda carry their production by themselves, but most of farmers entrust its transportation to private carriers. One ton of sugarcane at the farmgate price of 47 pesos is refined to one picul of sugar with equivalent value of 443 pesos, of which most of profit is returnable to sugar miller. Some eggplant growers are selling the product directly to the wholesalers in Manila on the contract basis. They usually hire the jeepneys and forward it by their own expenses. The contract price of eggplant is 80 pesos/bag (one bag equivalent to 23kg), which is 60 percent higher than the farmgate price in locality at 50 pesos/bag.

The perennial crop production (except sugarcane) is mostly consumed in the area, and only a few farmers are selling their product to market. Some fruit productions, especially mango are planted in large scale farms on contract basis and sold to ice-cream factory of Magnolia.

The NFA purchases about three per cent of the palay production but this procurement level is not sufficient to influence prices received by farmers. Palay is processed locally and warehouse space is not adequate for present levels of production.

River and pond fishing are occasionally performed for sideline purposes. Only a few fish dealers purchase a portion of the river catch from part-time fishermen at low prices. The high quality fish are transported to town proper for sale. Due to the pollution by fertilizers and agro-chemicals, the fishing catch is not constant. Terapia and mud-fish are the main spices to be caught and sold to market at 35-50 pesos per kilogram.

Livestock and livestock products are sold in the municipal markets. Some basic meat processing facilities are located in Tarlac, Tarlac. Meat processing to sausage is very common in the area and counted as one of special productions in locality. The processing is made on household bases and consumed by the family members.

Duck raising is getting popular year by year, which is counted as one of the major sidelines for the farmers in the area. In the CISs covered area, about 400 farms are raising 153 thousand ducks in total. The average raising head of 400 per farm lay 300 eggs everyday, which generate subsidiary income at 700 pesos a day (300 x @2.4 pesos/egg).

The organization of farmer groups would strengthen the negotiating power of farmers in selling production to traders. The establishment of cottage and small-scale processing industries for crops, livestock and fisheries would add further value to products, provide employment opportunities and encourage an expansion of production. The major constraints to expansion of the agro-processing industry are unavailability of finance, lack of appropriate technology, poor marketing and irregular raw material supply. Individual smallholders and subsistence farm-workers can only improve their economic bargaining power, and consequently their standards of living, through organized groups.

(3) Income and Nutrition

The 1985 estimate of per capita income in the province was 4,500 pesos, about 6,000 pesos for urban households and 3,300 pesos for rural households. About 10 percent of households earned less than 10,000 pesos annually, 55 percent earned over 10,000 pesos but less than 30,000 pesos annually and 35 percent earned over 30,000 pesos annually. Total family expenditures are distributed as follows; 58 percent for food and beverages, three percent for education, four percent for closing, six percent for fuel and electricity, two percent for medical care and the remainder for other expenditures. About 60 percent of the families had no savings.

The per capita income in Tarlac was the lowest of all provinces in Region III in 1985 according to NCSO census. An estimated 55 percent of the families was living below the poverty line, 47 percent of urban families and 63 percent of the rural families. The regional incidence of poverty was 42 percent, 26 percent for urban families and 53 percent for rural families, respectively.

The nutritional status of children of six or less years of age in Tarlac Province is poor. About four percent are severely malnourished, 18 percent are moderately malnourished, and 43 percent are mildly malnourished, according to the statistics in 1988 from the Provincial Health Office (PHO) in Tarlac, Tarlac. Only about 35 percent of the children are receiving adequate nutrition. These figures are more disconcerting from the viewpoint of family nutrition when it is considered that families give priority to the nutrition generally to the youngest family members.

The socio-economic situation of the province vis-a-vis the Study Area is rapidly improving both absolute and comparative terms recently. The income level which was further behind from other provinces is deemed to have caught up or already overwhelmed. As income level goes up, nutritional situation is considered to be improved. Although however, the area itself might economically grew up, there remains an unfavorable risk of imbalance incurred from resource distribution between a bundle of inhabitants who can control economic resources and a bulk of inhabitants who can not.

(4) Progress of CARP

a) Basic Concept of CARP

The Comprehensive Agrarian Reform Program (CARP), enacted in June 27th, 1988 composed four land transfer programs and three non-land transfer programs as summarized below;

Program		Target
i) Land Transfer Programs		
- Program A	-	Tenanted rice and corn lands
- Program B	-	Idle and abandoned, foreclosed, equestered and voluntarily offered lands
- Program C	-	Tenanted non-rice and non-corn lands and landed estates under labor administration
- Program D	-	Public alienable and disposable lands suitable for agriculture
ii) Non-Land Transfer Programs		
- Production sharing		
- Corporate stock transfer		
- Integrated social forestry program		

Land Transfer Programs cover 3.8 million hectares with 2.1 million of beneficial farmers and farmworkers, while Non-land Transfer Programs deal with 3.5 million hectares of land coverage and 1.5 million of beneficial farmers and landless workers.

The DAR, in cooperation with the Presidential Agrarian Reform Council (PARC) is planning and programming the acquisition and distribution of all agricultural lands through a period of ten years from the effectivity of this act. Lands are acquired and distributed in accordance with the following priorities;

Phase One: Rice and corn lands under Presidential Decree No.27 (Tenant Emancipation Act) ; all idle or abandoned lands; all private lands voluntarily offered by the owners for agrarian reform; all lands foreclosed by government financial institutions; all lands acquired by the Presidential Commission on Good Government (PCGG); and all other lands owned by the government devoted to or suitable for agriculture, which shall be acquired and distributed immediately upon the effectivity of this Act, with the implementation to be completed within a period of not more than four years;

Phase Two: All alienable and disposable public agricultural lands, all arable public agricultural lands under agro-forest; pasture and agricultural leases already cultivated and planted to crops; all public agricultural lands which are to be opened for new development and resettlement; and all private agricultural lands in excess of 50 hectares,

insofar as the excess hectarage is concerned, to implement principally the right of farmers and regular farmworkers, who are landless, to own directly or collectively the lands they till, which shall be distributed immediately upon the effectivity of this act, with the implementation to be completed within a period of not more than four years.

Phase Three: All other private agricultural lands commencing with large landholdings and proceedings to medium and small landholdings under the following schedule:

i) Landholdings above 24 hectares up to 50 hectares, to begin on the fourth year from the effectivity of this Act and to be completed within three years; and

ii) Landholdings from the retention limit up to 24 hectares, to begin on the sixth year from the effectivity of this act and to be completed within four years; to implement principally the right of farmers and regular farmworkers who are landless, to own directly or collectively the lands they till.

b) Progress of CARP

Unfinished proceedings and unresolved questions in the Operation Land Transfer for rice and corn lands under PD.27 are slowing down the implementation of CARP.

A major problem which cropped up for CARP implementors here is the fact that some rice and corn lands which supposedly have already been transferred to tenant farmer-beneficiaries under the PD.27 have not yet been paid for by the Government. Another problem posed by PD.27 on CARP is the difficulty of identifying location and documenting some lands which have been passed on the tenants on the basis only of verbal deals with landowners. The PD.27 is inherited by CARP as Program A, which is prioritized as first step program to be achieved up to 1989. As mentioned above, the payment by the Government is not yet completely undertaken, however the progress of Program A in Tarlac vis-a-vis in the Study Area is more progressive compared to the other provinces. As of December 1988, 417 farmer beneficiaries out of 501 targets have gotten the issuance of Emancipation Patents (EPs) in the area, and its area coverage rate to the target is also counted at 85 percent.

Other sub-programs of CARP classified as Program B, Program C and Program D are further delayed and being confronted with many problems. Program D which deals with consolidation and development for the public A & D lands for agriculture has achieved few constructive progress (refer to Appendix M).

(4) Farmers' profile in CISs covered Area

About 70 percent of farmer inhabitants are living in the same barangay since their birth. Immigrant dwellers from the other provinces are less than five percent. It is estimated that a household has 1.5 persons working on farm and one child studying at elementary school with a distance of 400 meters from the residence.

One third of farming operations is done through hired labor. On the other hand, more or less 25 percent of the farmers are employed as laborers in palay cultivation for 40 days in planting season and for 30 days in harvesting season per year.Daily wage is averaged at 50 pesos in planting and 80 pesos in harvesting.

Sharing arrangement prevailing between a land owner and a tenant is averaged at 17 cavans (palay) per hectare per annum, or 30 percent of total productions or approx. 2,900 pesos.

Carabaos are owned by 40 percent of the farmers and are used for draft and milking purposes. Pigs and ducks are also raised by 40 percent of the farmers. Average number of these animals per farm is; two carabaos, three pigs, 16 chicken and 41 ducks. Dogs are regarded as useful livestock because they are eaten as "kalderetang aso". 40 percent of the farmers are raising three dogs per family.

54 percent of the farmers belongs to Irrigator's Association (IA), 31 percent to Samahang Nayon, 20 percent to Area Marketing Cooperative and five percent to Agrarian Reform Beneficiaries Association. Six percent of the farmers indicated that the IA is not necessary; those who are living in the areas where irrigation water can be provided even in dry season with no difficulty.

More than half of the farmers are not following irrigation water delivery schedule. It could generate the idea that most of them are compromising on the present water availability. According to the farm economy survey, about seventy percent of farmers are thinking that irrigation water is adequate or occasionally insufficient.

30 percent indicated that water is insufficient. About 20 percent of the farmers have an account in the banking institutions and 30 percent are saving deposits at an average amount of 1,000 pesos per month. Income from agriculture is less than the sum of off-farm and non-farm income in 75 percent of farm households. The major off- and non-farm income sources are day-labor in others' farm, public service, remittance from other family members and sari-sari store in this order.

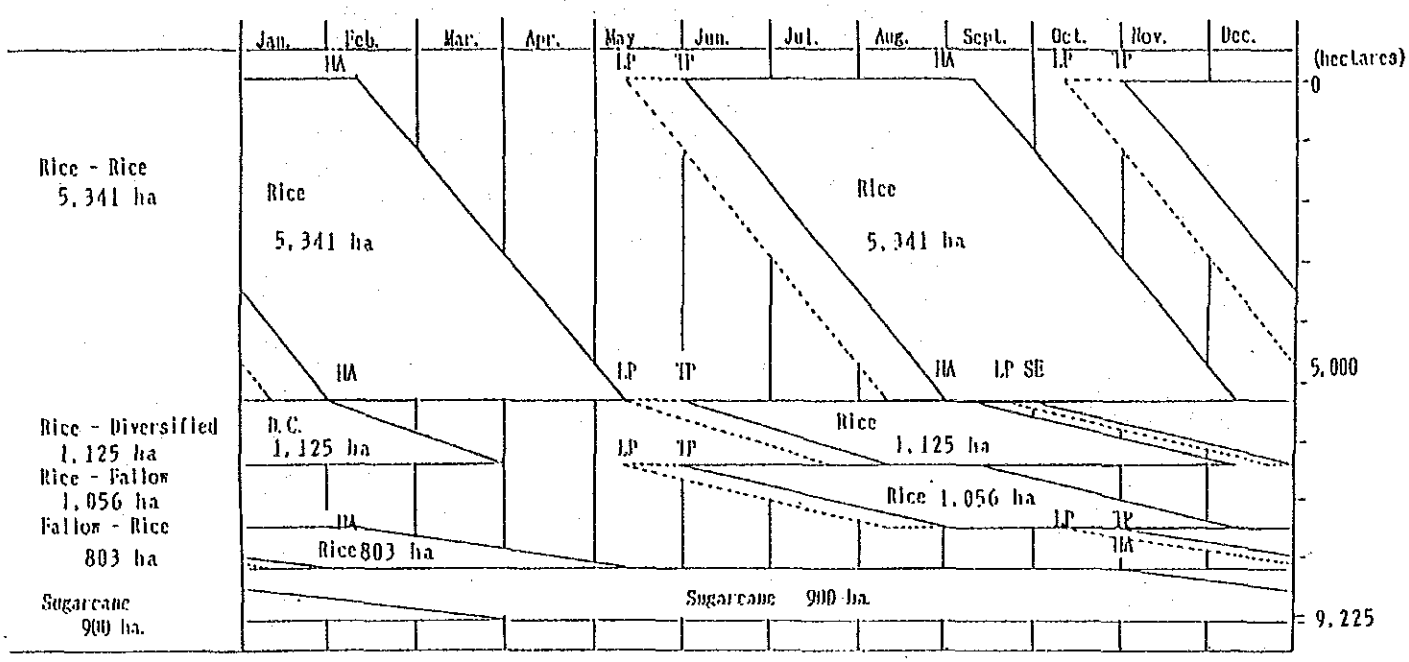
More than 50 percent of the farmers are borrowing money either from private businessmen, friends or relatives. Despite the fact that the interest rate is lower in the banks and cooperatives, the borrowers from such credit institutions account for only 20 percent.

Average household expenditure per year is 40,000 pesos wherein about 26,700 pesos equivalent to 67 percent of the total is consumed for food and beverage items. Thus, the 67 percent Engel's coefficient is higher than the provincial average of 58 percent recorded in 1985.

Almost all of the inhabitants are using tubewell as a source of drinking water. Although, they do not purify the tubewell water before drinking, inhabitants are seldomly affected by water-borne diseases.

The proportion of energized households is 80 percent, but the kitchen fuel is being provided not from electricity butfrom firewood, gas and other sources.

Figure 3-3-1 Present Cropping Pattern in CISs Area



Remarks : LP - Land Preparation. TD - Terminal Drainage
TP - Transplanting. HA - Harvesting
SE - Seeding. D.C. - Diversified Crops.

a The crops before the hyphen are wet season crops; those after the hyphen are dry season crops.

Table 3-3-1 Present Cropping Area by Pattern in CISs Area

Wet Season / Dry Season	Agricultural Area (HA)					
	Rice Rice	Rice Diversi.Crops	Rice Fallow	Fallow Rice	Sugarcane Sugarcane	Total
No. Name of CIS						
1. Bamban	532	-	219	-	300	1,051
2. San Pedro	120	-	-	-	-	120
3. Malonzo	179	-	-	61	-	240
4. Bangcou	500	-	200	-	-	700
5. Susuba	8	-	32	-	-	40
6. Telebanca	364	25	-	-	-	389
7. Sta. Rita	80	35	-	-	-	115
8. Marita	65	20	15	-	-	100
9. San Martin	80	80	80	-	-	240
10. Baluto	320	280	-	-	-	600
11. Lilibangan	200	40	-	-	-	240
12. San Bartolome	260	90	-	-	-	350
13. San Isidro	330	120	-	-	-	450
14. Lucong	1,240	400	360	150	-	2,150
15. Magao	468	-	-	152	-	620
16. Tinang	100	-	150	-	600	850
17. Sto. Rosario	150	-	-	-	-	150
18. Sta. Monica	300	-	-	440	-	740
19. Caluluan	45	35	-	-	-	80
Total	5,341	1,125	1,056	803	900	9,225

Source : Consultants' estimate using the folowing data.
: NIA, Tarlac PIO
: Interview data from president of each CISs.

Table 3-3-2 Present Cropping Intensity in CISs Area

Wet Season / Dry Season	Agricultural Area (HA)					
	Rice Rice	Rice Diversi.Crops	Rice Fallow	Fallow Rice	Sugarcane Sugarcane	Total
No.Name of CIS						
1. Bamban	51	-	21	-	29	151
2. San Pedro	100	-	-	-	-	200
3. Malonzo	75	-	-	25	-	175
4. Bangcou	71	-	29	-	-	171
5. Susuba	20	-	80	-	-	120
6. Telebanca	94	6	-	-	-	200
7. Sta. Rita	70	30	-	-	-	200
8. Marita	65	20	15	-	-	185
9. San Martin	33	33	33	-	-	167
10. Baluto	53	47	-	-	-	200
11. Lilibangan	83	17	-	-	-	200
12. San Bartolome	74	26	-	-	-	200
13. San Isidro	73	27	-	-	-	200
14. Lucong	58	19	17	7	-	176
15. Magao	75	-	-	25	-	175
16. Tinang	12	-	18	-	78	112
17. Sto. Rosario	100	-	-	-	-	200
18. Sta. Monica	41	-	-	59	-	141
19. Caluluan	56	44	-	-	-	200
Total	58	12	11	9	10	170

Source : Consultants' estimate using the folowing data.
: NIA, Tarlac PIO
: Interview data from president of each CISs.

Table 3-3-3 Present Agricultural Area & Production in Study Area

Crops	Area (Hectares)			Production (Metric ton)			Yield
	CIS	Others	Total	CIS	Others	Total	
Rice							
Irrigated							
Wet Season	7,078	5,248	12,326	26,961	19,418	46,379	3.7 (2.25 - 4.50 MT.)*
Dry Season	6,144	3,601	9,745	25,783	14,764	40,547	4.1 (2.25 - 4.50 MT.)*
Rainfed	444	5,521	5,965	888	11,042	11,930	2.0
(Sub Total)	13,666	14,370	28,036	53,632	45,224	98,856	
Subercane	900	3,090	3,990	76,500	262,650	339,150	85
Dry Crops **							
Mango	866	809	1,675	736	688	1,424	0.85
Corn	259	239	498	699	345	1,345	2.70
(Sub Total)	1,125	1,048	2,173				
Idles	710	1,968	1,968	-	-	-	
(Sub Total)	710	2,256	2,966				
Total	16,408	20,764	37,165				

* Refer to production of CISs area.
** The dry crops are selected mongo and corn which are common crops in the study area.
Source : Consultns' estimate using the folowing data.
: DA PAO, Tarlac.
: Interview data from president of each CISs.

Table 3-3-4 Agricultural Production in CISs Area

No. Name of CIS	Paddy Area(has.)		Yield (MT.)		Production(MT)		Mongo Area Production		Corn Area Production	
	W.Season	D.Season	W.Season	D.Season	W.Season	D.Season	(has.)	(MT.)	(has.)	(MT)
1. Bamban	751	532	2.7	3.0	2,034	1,596	-	-	-	-
2. San Pedro	120	120	3.8	4.3	456	516	-	-	-	-
3. Malonzo	179	240	2.3	3.3	412	792	-	-	-	-
4. Bangcou	700	500	3.3	4.3	2,275	2,150	-	-	-	-
5. Susuba	40	8	3.0	3.0	120	24	-	-	-	-
6. Telebanca	389	364	3.0	3.8	1,142	1,383	19	16.2	6	16.2
7. Sta. Rita	115	80	4.0	4.5	460	360	27	23.0	8	21.6
8. Marita	100	65	3.8	4.5	380	293	15	12.8	5	13.5
9. San Martin	240	80	3.8	4.3	912	344	62	52.7	18	48.6
10. Baluto	600	320	4.3	4.5	2,580	1,440	216	183.6	64	172.8
11. Lilibangan	240	200	4.5	5.0	1,080	1,000	31	26.4	9	24.3
12. San Bartolome	350	260	3.8	4.8	1,330	1,248	69	58.7	21	36.7
13. San Isidro	450	330	3.8	4.3	1,710	1,419	92	78.2	28	75.6
14. Lucong	2,000	1,390	4.0	4.2	8,000	5,838	308	261.8	92	248.4
15. Magao	468	620	3.8	4.5	1,778	2,790	-	-	-	-
16. Tinang	250	100	4.3	4.5	1,075	450	-	-	-	-
17. Sto. Rosario	150	150	4.3	4.5	645	675	-	-	-	-
18. Sta. Monica	300	740	3.8	4.5	1,140	3,330	-	-	-	-
19. Caluluan	80	45	4.0	3.0	320	135	27	23.0	8	21.6
Total	7,522	6,144	3.7	4.1	27,849	25,783	866	736.1	259	699.3

* Yield of rainfed paddy is 2.0 metric tons.
Rainfed areas are Bamban CIS:219 hectares. Bangcou CIS:200 hectares and Telebanca CIS:25 hectares.
Source: Consultants estimate using the following data.
Production data from MAO (Bamban, Capas & Concepcion)
Interview data from president of each CISs.

3.4 Non-Agricultural Sector

3.4.1 Small Scale and Cottage Industries

Despite that foreign investors especially of Taiwanees firms are strongly invited by Tarlac Provincial Government through Lingkod Foundation, most small scale and cottage industries in the Study Area are still such agro industries related to major crops of rice and sugarcane as shown in Table J.5.1.

Two big sugar mills operation in project backyard area i.e. Paniqui Sugar Mill and Central Azucarera de Tarlac. The former has a capacity of 1,500 metric tons cane and 68 metric tons brown sugar per day while the latter has a capacity of 7,600 metric tons cane and 300 metric tons refined sugar per day. Sugarcane crushers are not recognized inside the Study Area .

3.4.2 Financial and Insurance Services

(1) Financial Service

a) Rationale

An analysis of formal credit in the the Study Area reveals that there are adequate short-term (less than one year) funds available but borrowers have difficulty in gaining access to funds. The information from bank officials indicated that total deposit (August 1989) of 233 million pesos exceeded total loans of 205 million pesos for all financial institutions in the area. However, those are limited medium-term and long-term credit facilities, and as a result, it makes hard for the expansion of crop areas and cottage, small-scale and medium-scale industries as well as the investment to futures such as animal raising and perennial crop cultivation. Almost all the banks offer medium-term credit facilities, but in fact few medium-term loans are made.

An example of "market failure" existed in the financial sector in the area. The market failure incurred from inequitable ownership of resources in the Philippines, which resulted in the transfer of the savings of the poor population to large corporations and wealthy individuals living in urban areas. Credit-worthy borrowers are those corporations and individuals who are able to provide collaterals; viz. few credit mechanisms exist to provide non-collateral formal credit.

b) Credit Facilities

The major credit facilities which provide production loan are PNB(under Maisagana Program), and Rural Banks (under Ordinary Agricultural Loan Program), Land Bank of the Philippines (LBP), Tarlac Development Bank, Development Bank of the Philippines, Cooperative Rural Bank of Tarlac, National Food Authorty (under the Quedan Financing Program), Department of Trade and Industry (under the Self-Employment Loan Assistance Program), and so on.

Prevailing production loan in LBP entitled Supervised Credit Program is commonly used by the palay and cash crop cultivators, because LBP can authorize the emancipating patents as the collateral of the subject loan, and also debt-equity is exempted if the borrowers are belonging to the Agrarian Reform Beneficiaries. The maximum production loan defined by LBP is classified by crop as follows;

Crop	Max. Loan Amount per Hectare
Palay	3,750 Pesos
Sugarcane	9,000 Pesos
Corn	4,000 Pesos
Mungo Beans	3,000 Pesos
Other Vegetables	3,000 Pesos

Loaning period of palay production loan is limited up to 180 days with 12.0 percent of annual interest, but 75 pesos per hectare as the crop insurance premium are deducted from total loan amount. This premium is sent to Philippine Crop Insurance Company (PCIC). The borrowers are to be inspected by LBP's field representatives and DA's production technicians who are responsible to advice the borrowers to utilize the loan properly. The touchstone on utilization of the palay production loan is defined as below;

Loan Utilization	Amount
Seeds and Labors	1,640 Pesos
Crop Insurance (deducted from the handed amount)	75 Pesos
Fertilizers and Chemicals	2,035 Pesos
Total	3,750 Pesos

If the borrowers utilize the loan improperly, the crop insurance is not undertaken in case of damage.

c) Credit Availability

The farm economy survey conducted in the area revealed that about 75 percent of the farmers are renting production loan from the banks above mentioned and/or private businessmen. As compared with 20 per cent borrowers from the banks, more than 50 percent of the farmers are asking their production loan to the private businessmen in spite of high interest rate at about 10 percent per month. The primary reasons are explained as; i) slow processing of loan applications by the banks, ii) no restrictions of loan usage, iii) lesser penalties in case of corruption, and iv) easier procedure for loan application.

In the wet season in 1989, a total of 30 million pesos were loaned out from the banks to some 2,000 farmers covering 9,500 hectares. According to the bank officials, loan repayment percentage is quite higher in wet season loan than in dry season loan with average of 80 percent to 60 percent. It could generate the idea that due to the insufficient irrigation water in dry season, unstable production incomes with no affordability to pay back are incurred.

(2) Crop Insurance

Although the support services for agricultural credit have been formally organized, the substantial results are hardly observed. The Philippine Crop Insurance Corporation (PCIC) is expected to play an important role in the smooth implementation of the Comprehensive Agricultural Loan Fund (CALF) which were integrated from 17 various credit systems of DA under Executive Order No, 113 in February 1987.

The insurance charge of PCIC for palay production is defined approximately as eight percent of the total production cost. The average insurance amount paid during the period from 1981 to 1987 is estimated as 10.6 percent of the total production cost in the whole Philippines. The PCIC is thus running its services while spending the fund by itself. Furthermore, the Government has paid 183 million pesos for the fund of PCIC, but the supplies from NGOs at 200 million pesos have not been transferred yet. The availability of enough funds and the proper techniques to determine the extent of damage to crops are considered essential requirements for the proper functioning of crop insurance services.

There exists another crop insurance service, the "Industrial Guarantee and Loan Fund (IGLF)". However due to its low coverage rate ranging from 40 to 60 percent of the total damage, only very few avail of these insurance.

The technology on crop insurance in Japan is one of the best in the world as crop insurance as well as agricultural loan are widely utilized by the farmers and/or farmer's organization. Therefore, it is recommended that the technical and financial assistances in this field would be accelerated.

3.5 Agricultural Infrastructure

3.5.1 Irrigation

Out of the total irrigable area of 14,300 hectares in the Study area under a national irrigation system (San Miguel-O'Donnell River Irrigation System: SMORIS), only 4,300 hectares or 92 percent of the potential area of 4,670 hectares in SMORIS and 7,760 hectares or 79 percent of the 19 CISs of 9,785 hectares were under irrigation in wet season. There are also 27 units of diversion works and 31 units of intakes, the total length of the main canals is 96.5 kilometers, while that of the lateral canals is 48.8 kilometers (refer to Table 3-5-1).

(1) Bamban CIS

The agricultural land under Bamban CIS is 1,051 hectares, of which a 751 hectares is paddy field and a 300 hectares is sugarcane field. However, during dry season 219 hectares at the downstream portion of the irrigated paddy field cannot be planted to paddy due to insufficient irrigation water. The main source of the irrigation water is Bamban river.

By an intake of the brush dam through the main canal with a total length of 12.6 kilometers including bench-flume of 0.2 kilometer, 532-hectare paddy field and 300-hectare sugarcane field are irrigated.

The brush dam located mostly at a place with rapid stream and temporarily provided by a bulldozer in the last wet season. The intake of a brush dam is easily moved or washed away by flood frequently due to its instability.

On the other hand, plenty of sediment occurs in Bamban river during floods. Likewise, the irrigation canals through the intake, particularly the upstream portion of the road crossing culvert, were clogged by a sediment. Hence, the canal capacity is decreased by sediment to cause over-flowing the roads.

(2) San Pedro CIS

The agricultural lands of San Pedro CIS is 120 hectares which is all paddy field. The main source of irrigation water is Bamban river. Since the intake is located at immediately just downstream of Bamban CIS intake, water supply in dry season is easily made.

The area of 120-hectare paddy field can be irrigated by one (1) intake through the main canal with a total length of 4.4 kilometers. The intake of the brush dam is unstable as well as the conditions of Bamban CIS. Irrigation canal capacity is decreased by sediment.

(3) Malonzo CIS

The agricultural land of Malonzo CIS is 240 hectares which is all paddy field. The main source of he irrigation water is Bamban river which supplies the water by two intakes of the brush dam. The 240hectare paddy field is supplied with irrigation water by 4.8 kilometer long of main canal and 0.1 kilometer long of lateral canal.

The brush dam No.1 is frequently washed away by flood resulting unstable intake. Through brush dams No.1 and No.2, the paddy field of 179 hectares or 75 percent is irrigated during wet season, while during dry season, that is 240 hectares or 100 percent. The main canal capacity is insufficient due to irregular longitudinal slope. The main canal is to be rehabilitated to keep proper hydraulic cross-section.

(4) Bangcu CIS

The agricultural land of Bangcu CIS is 700 hectares which is all paddy field. The main source of the irrigation water is Bamban river. However, during dry season, about 200 hectares located at the downstream portion of the paddy field is not planted to paddy due to insufficient irrigation water.

Out of 700 hectares, 500 hectares of paddy field located at the upstream portion is irrigated through an intake of brush dam and 3.5 kilometers of main canal. The intake is rather unstable, because the brush dam is often washed away by flood. Sediment load at the main canal in the area is comparatively less compared to other CISs, because this brush dam consists of long feeder canal in the river bed, where suspended load is mostly deposited before the main canal.

(5) Susuba Cutcut CIS

Susuba Cutcut CIS covers the agricultural land of 40 hectares which is all paddy field. The main source of the irrigation water is a tributary of Cut-Cut river. The water is not enough during dry season, and irrigate only eight hectares of paddy field at the lower area in elevation.

A diversion dam with intakes on the both side irrigates 40 hectares of paddy field through 1.8 kilometers of main canal. The existing diversion dam is O'gee type weir with stop-logs. This tributary is not so wide and the capacity is insufficient for flood flow. Improvement of the tributary and diversion dam is required.

(6) Telabanca CIS

The agricultural land of Telabanca CIS is 389 hectares of paddy field. The main source of the irrigation water is Bamban river which supplies the water throughout the area excluding area at downstream. The downstream area is planted to the diversified crops during dry season due to insufficient irrigation water supply.

The 364 hectares of paddy field are irrigated through the three intake of the brush dam the 5.6 kilometers main canals and 1.5 kilometers of laterals canals. The intake is unstable because the brush dam is frequently washed away by food. The canal capacity is decreased due to sediment.

(7) Sta. Rita CIS

The agricultural land of Sta. Rita CIS is 135 hectares, of which 115 hectares are planted to paddy. The remaining 20 hectares is idle due to defective irrigation facilities. The diversified cropland of 35 hectares located at the downstream area is not irrigated due to insufficient irrigation water in dry season.

Through a diversion dam, the main canal of 1.8 kilometers including lined canal of 1.3 kilometers and 1.3 kilometers of lateral canals including lined canal of 0.6 kilometers, 115 hectares paddy field is irrigated.

The existing diversion dam is O'gee type weir with wooden slide gates (1.5 m x 2.5 m x 6 sets). This dam and the lined canal of 61 percent of the total length are normally functioned. On the other hand, during insufficient flow of irrigation water, irrigation in the area is supplemented by private owned pumps in dry season.

(8) Marita CIS

The agricultural land of Marita CIS is 100 hectares of paddy field. The main source of the irrigation water is Bamban river. Although irrigation water during dry season is insufficient, only 35 hectares of paddy field and 20 hectares of the diversified crop field are planted and supplemented by private owned pumps.

The CIS consists of a brush dam with intake, 2.9 kilometers of main canal and 0.9 kilometers of lateral canals irrigates 100 hectares of paddy field. The water supply is unstable, because the brush dam is often washed away by flood. Due to heavy sediment load in the irrigation canals, the capacity of the canals is substantially decreased.

(9) San Martin CIS

The agricultural land of San Martin CIS is 280 hectares, of which 240 hectares are planted to paddy. Due to defective irrigation facilities, the remaining 40 hectares is left idle. The main source of the irrigation water is Bamban river which is not sufficient in discharge to irrigate during dry season, however, 30 hectares of the paddy field are irrigated by seepage water from Bamban river. Thus, 80 hectares of the diversified cropland and 50 hectares of paddy field are irrigated by private owned pumps.

The CIS consists of the brush dam with four intake and 7.4 kilometers of main canals irrigates about 240 hectares of the paddy field. The water supply is unstable, because the brush dam is frequently washed away by

flood. The capacity is substantially, decreased due to heavy sediment load in the irrigation canals.

(10) Baluto CIS

The agricultural land of Baluto CIS is 740 hectares, of which 600 hectares are planted to paddy. Due to defective irrigation facilities, the remaining 140 hectares is left idle. Sapang Balen creek is a supplemental water source to the main source of Bamban river.

The paddy field of 381 hectares is irrigated by the CIS consists of an intake of the brush dam, two diversion dams, 9.5 kilometers of main canal including 1.9 kilometers of lined canal, and 4.4 kilometers of lateral canals.

The private owned pumps supplements the irrigation 219 hectares of paddy field during wet season and and 320 hectares of paddy field and 280 hectares of diversified crops during dry season. The intake with the brush dam is unstable. Due to heavy sediment load in the irrigation canals, the canal capacity is decreased.

(11) Lilibangan CIS

The agricultural land of Lilibangan CIS is 240 hectares of paddy field. The main source of the irrigation water is Bamban river. Since, there is little water available in the river in dry season, paddy field of 90 hectares are irrigated by the return flow discharge from San Martin CIS and the seepage from Bamban river, and the other 110 hectares of paddy field are irrigated by private owned pumps.

The CIS consists of an intake of the brush dam 2.5 kilometers of main canal and 2.4 kilometers of lateral canals several 240 hectares of paddy field. The intake is unstable, because the brush dam is often washed away by flood. The capacity of the canals is substantially decreased by heavy sediment loads in the irrigation canals.

(12) San Bartolome CIS

The agricultural land of San Bartolome CIS is 375 hectares, of which 350 hectares are planted to paddy. Due to defective irrigation facilities, the remaining 25 hectares is left idle. The Sapang Balen creek, which is the source of the irrigation water is insufficient in discharge during dry season. Hence, the 90 hectares of the diversified croplands and 140 hectares paddy field are irrigated by private owned pumps.

The CIS has a system of two diversion dams, 2.6 kilometers of main canals and 3.2 kilometers of lateral canal and normally irrigates 350 hectares of paddy field. The downstream embankment of the dam No.1 was soured and the center part of the dam crest of No.2 was broken by heavy flood, which are required to rehabilitate.

(13) San Isidro CIS

The agricultural land of San Isidro CIS is 635 hectares, of which 450 hectares are paddy field and 185 hectares is idle in wet season due to the chronical inundation by Chico river. The return flow from San Bartolome CIS is the principal source for irrigation. The diversified croplands of 120 hectares and paddy field of 330 hectares are irrigated by private owned pumps in dry season because there is little water available for irrigation in this area.

Paddy field of 450 hectares are served by 2.7 kilometers of main canal which is normally functional.

(14) Lucong CIS

The agricultural land of Lucong CIS is 2,250 hectares, of which 2,000 hectares is paddy field and 250 hectares is left idle in wet season by the chronical inundation from Chico river. The main source of the irrigation water is Lucong river which the irrigates paddy field of 1,200 hectares and diversified croplands of 400 hectares. Furthermore, paddy field of 190 hectares is irrigated by private owned pumps in dry season.

A 2,000 hectares of paddy field is served by an irrigation network consists of a diversion dam, 10.5 kilometers of main canal and 23.3 kilometers of lateral canals.

The diversion dam is O'gee type weir with a flap gate, which malfunctioning to cause water leakage. The back water from the dam gives damage to the upstream embankment due to malfunction of the weir. The irrigation canals is normally functional.

(15) Magao CIS

The agricultural land of Magao CIS is 620 hectares which is all paddy field. Some areas along Chico river are not cropped in wet season due to inundation from the river. The main source of the irrigation is Lucong river. Abundant water is available from the river, and thus, 468 hectares of paddy field are irrigated by the CIS and another 152 hectares by private owned pumps.

A 468 hectares of paddy field is served by two diversion dams, main canal of 6.2 kilometers in the total length and lateral canals of 5.3 kilometers in total. The diversion dams and the irrigation canals are normally functional.

(16) Tinang CIS

The agricultural land of Tinang CIS is 850 hectares of which 250 hectares are paddy field and 600 hectares sugarcane field. The main source of the irrigation water is Tinang river, and only 100 hectares of the paddy field are irrigated by the CIS because the irrigation water is insufficient in dry season.

A 850 hectares of agricultural lands is irrigated by the system of a diversion dam and 7.7 kilometers of main canal.

The diversion dam is O'gee type weir with flap gates, which is malfunctional in water supply, and the downstream embankments of the dam are scoured. So, the flap gates and the scoured portion at the downstream riprap is required to rehabilitate. The irrigation canals is normally functional.

(17) Sto. Rosario CIS

There are 200 hectares of agricultural land in Sto Rosario CIS, of which 150 hectares are paddy field, and 50 hectares are idle land due to the defective irrigation facilities. The main source of the irrigation water is Tinang river, which is able to irrigate only 100 hectares of paddy field, and 50 hectares are irrigated by private owned pumps because the irrigation water is insufficient in dry season.

The CIS to be irrigated 150 hectares of agricultural lands consists of a diversion dam, 3.6 kilometers of main canal including 1.4 kilometers of the lined canal, and 2.6 kilometers of lateral canals.

The diversion dam is O'gee type weir with flap gates, which is malfunctional with water leakage, and back water causes inundation and gives damage to the upstream embankment by overflowing on the banks. The downstream embankments and riprap are scoured and washed away by flood. The dambody as a whole and the downstream embankment are exposed to danger. The irrigation canals are normally functional.

(18) Sta Monica CIS

The agricultural land of Sta. Monica CIS is 740 hectares, all of which are paddy field. There are 440 hectares of idle lands with chronical inundation from Chico river in wet season. The main source of the irrigation water is Tinang river. A 150 hectares of paddy field is irrigated by the CIS on dry season, and the other 590 hectares of paddy field is irrigated by private owned pumps.

A 300 hectares of the agricultural lands is irrigated by the CIS consists of a diversion dam, 6.5 kilometers of main canal including 0.8 kilometers of lined canal, and 3.0 kilometers of lateral canals.

The diversion dam is O'gee type weir with flap-gates, which is malfunctional to cause water leakage, and back water from the dam causes flood to give damage to the upstream embankment by overflowing the banks. The downstream embankment and riprap are scoured and washed away by flood. The dambody as a whole and the downstream embankment are exposed to danger.

The irrigation canals areas normally functional.

(19) Caluluan CIS

The agricultural land of Caluluan CIS is 80 hectares, all of which are paddy field. The main source of the irrigation water is Caluluan creek. The creek has little water available in dry season. And thus, a 45 hectares of paddy field is irrigated by private owned pumps.

The CIS of diversion dam and 3.4 kilometers of canals serves 80 hectares of the agricultural lands. The diversion dam is required to improve with the widening of the creek for augment of the capacity. The irrigation canals are normally function.

3.5.2. Drainage

Tinang, Lucong and Bamban rivers are major drainage systems and drainage water flows down through creeks in the Study area. Water is able to drain from the upstream portion and agricultural lands to Tinang and Lucong rivers because of low elevation of river bed, while in Barangay Bangcu located in the low portion water is not able to drain from agricultural lands to the river to the high elevation of Bamban river bed. So, the water from the agricultural lands is mostly drained through Caluluan and Sapang Balen creeks in the Study area. Lucong and Bamban rivers are considered as medium scale of river. The catchment areas are ranged between 118 and 148 square kilometers. Three creeks are considered as small scale of river, which the catchment area are varied between 10 and 68 square kilometers.

The flood control dike located between Barangay San Pedro and Barangay Magao along the Bamban river was constructed in the late 1985. Due to erosion control works in the upstream parts of Bamban river, sediment loads moved down freely, and such movement caused the incessant river bed rise. The embankment of the flood control dikes was made with groins and sandy soils and the scouring of the toes by floods is continuous.

The major drainage facilities on the agricultural lands are dependent only on the creeks. Out of 19 CISs, three CISs, such as Telabanca, Sta. Rita and Sta. Monica, have their own drainage canals and plot-to-plot drainage is practiced in the area. The average density of the drainage canals is 23.1 m/ha (2.5 m/ha ~ 67.9 m/ha). The density of the drainage canals has no correlation with farm productivity, and the length of the existing drainage canal seems enough density with functional normally (refer to Table 3-5-2).

In wet season, the water level of Chico river is higher than the agricultural lands along the river. About two kilometers area from Chico river in Sta. Monica and Magao CISs cannot be utilized for cropping during wet season due to the flood from the river. The area can be cropped only during dry season by pump irrigation.

3.5.3 Farm Roads

There are a few farm roads in the Study area. Out of 19 CISs, seven CISs of Sta. Rita, San martin, Lucong, Tinang, Sto. Rosario and Sta. Monica, have trunk farm roads. Those trunk farm roads run along the irrigation canal and length of the road is not enough for the purpose. The height of embankment is low and in wet season, cars are not allow to pass on the farm roads due to flood. No branch farm roads in provided and all farming works depend on man power and animals.

3.5.4 On-Farm Facilities

Because a few farm ditches in 19 CISs area are provided, irrigation on farm in the area are practiced by direct intake from the canals or plot-to-plot irrigation. No drainage ditch on farm is provided and drainage on farm is used through irrigation ditches or from the plot directly to the creek resulting bard drainage operation.

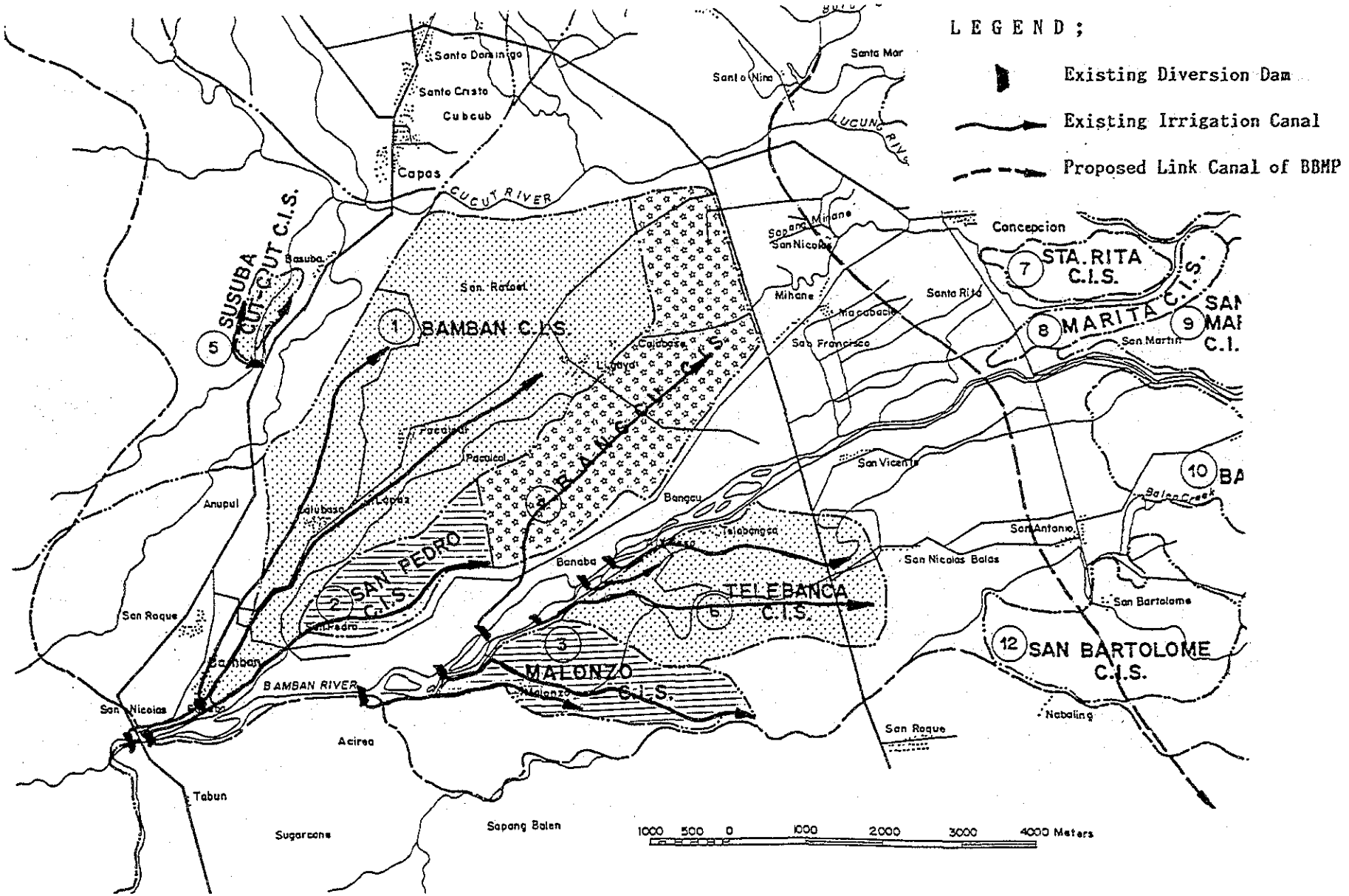


Figure 3-5-1 Location Map of Bamban District

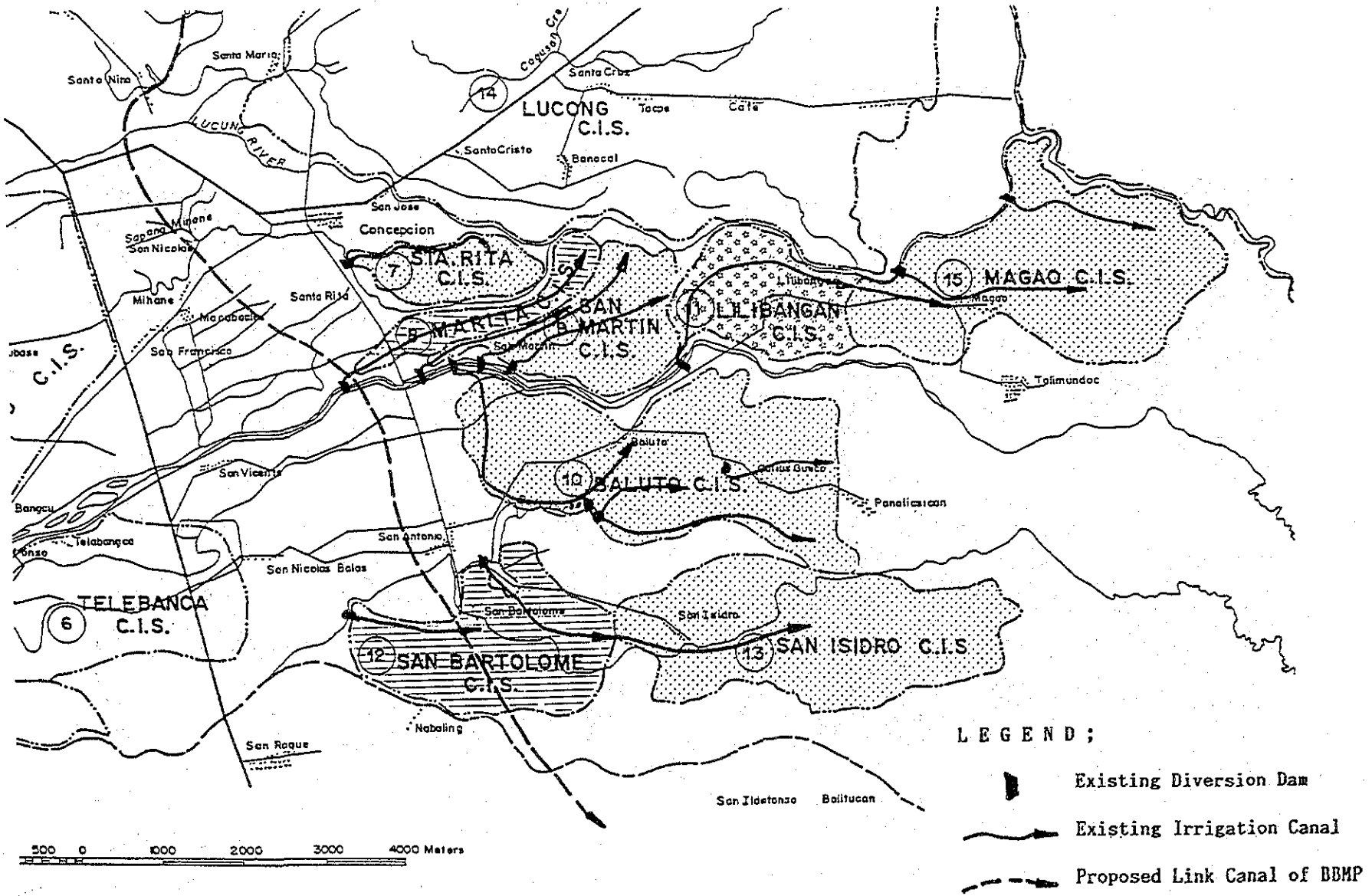


Figure 3-5-2 Location Map of Concepcion District

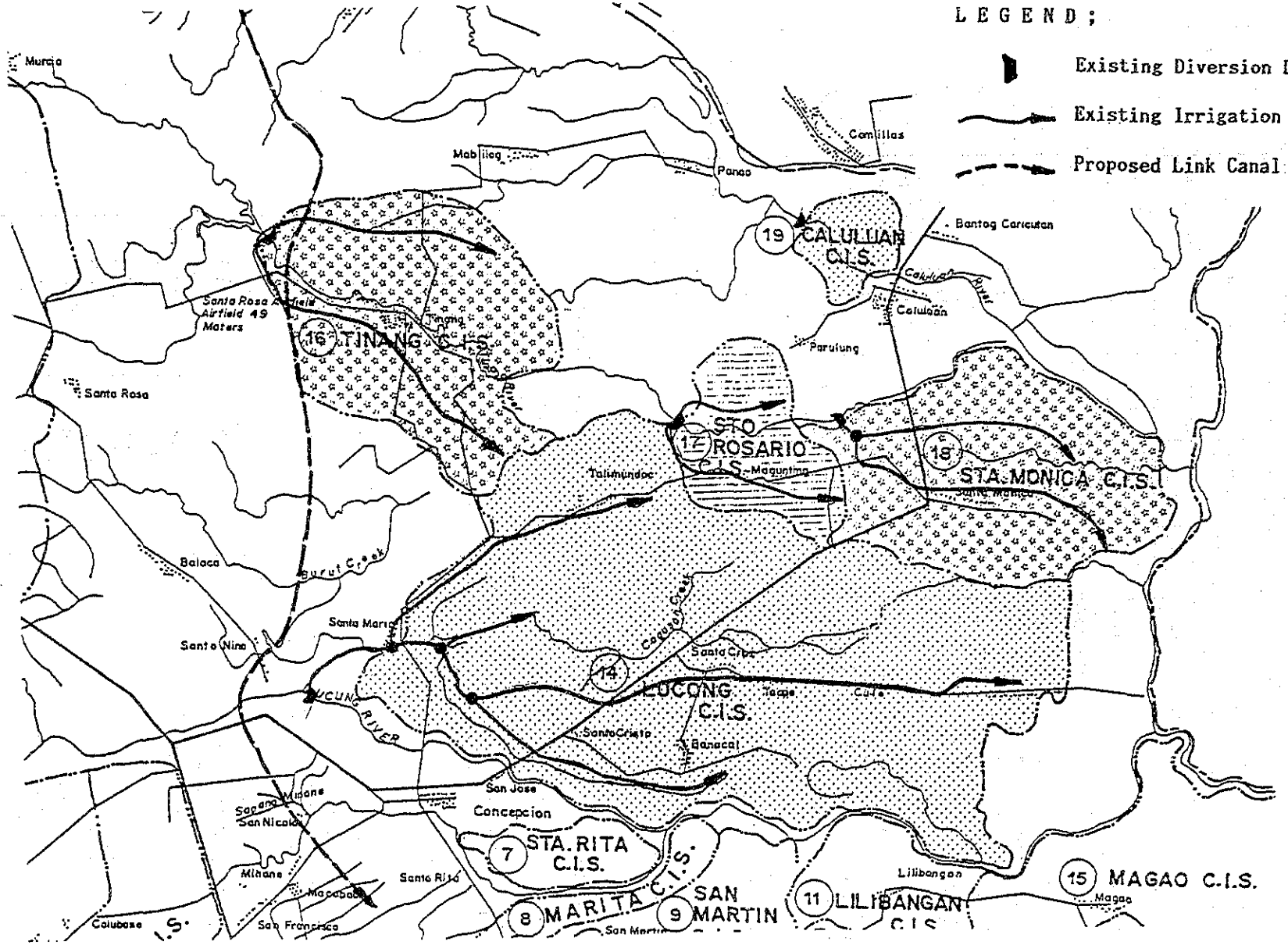


Figure 3-5-3 Location Map of Tinang District

Table 3-5-1 Dimension of Existing CIS

note) ( ) : sugarcane

No	Name of CIS	Irrigated Area				Potential Area	Number of Intake	Length of Main Canal	Length of Lateral Canal	Water Source
		Wet Season		Dry season						
		Gravity	Pump	Gravity	Pump					
		has		has	has	has	places	km	km	
1	Bamban	(300)		(300)						
		832	-	832	-	1,051	1	12.57	-	Bamban R.
2	San Pedro	120	-	120	-	120	1	4.40	-	Bamban R.
3	Malonzo	178	-	240	-	240	2	4.76	0.92	Bamban R.
4	Bangcu	500	-	500	-	700	1	3.50	-	Bamban R.
5	Susuba Cut-Cut	40	-	8	-	40	2	1.82	-	Cut-Cut R.
6	Telabanca	364	-	364	-	389	3	5.55	1.54	Parua R.
7	Sta. Rita	115	-	80	20	135	1	1.83	1.25	Cuartel CR.
8	Marita	100	-	30	35	100	1	2.86	0.80	Parua R.
9	San Martin	240	-	30	30	280	4	7.43	-	Parua R.
10	Baluto	381	219	-	320	740	2	9.48	4.38	Parua R.
11	Lilibangan	240	-	90	110	240	1	2.46	2.38	Parua R.
12	San Bartolome	350	-	120	140	375	2	2.85	3.24	Sapang Belen CR.
13	San Isidro	450	-	-	330	835	-	2.74	-	Dalandanua CR.
14	Lucong	2,000	-	1,200	190	2,250	1	10.47	23.29	Lucong R.
15	Magao	468	-	468	152	620	2	6.18	5.34	Balico CR.
16	Tinang	(800)		(800)						
		850	-	700	-	850	2	7.70	-	Tinang Cr.
17	Sto. Rosario	150	-	100	30	200	2	3.82	2.80	Ceagusan CR.
18	Sta. Monica	300	-	150	590	740	1	8.52	3.05	Ceagusan Cr.
19	Caluluan	80	-	-	45	80	2	-	-	Caluluan CR.
	Total	(900) 7,759	219 -	(900) 5,012	2,032	8,785	31	98.52	48.77	

Table 3-5-2 Dimension of Existing Drainage Canal

	Name of C.I.S.	Length of D.C.	Length of Creek	Density of D.C.
		km	km	m/ha
1	Bamban	-	9.0	16.9
2	San Pedro	-	0.3	2.5
3	Malonzo	-	7.2	30.0
4	Bangcu	-	16.0	32.0
5	Susuba Cut-Cut	-	1.1	2.75
6	Telabanca	3.4	21.3	67.9
7	Sta. Rita	0.5	2.3	24.3
8	Marita	-	-	-
9	San Martin	-	-	-
10	Baluto	-	15.0	39.3
11	Lilibangan	-	5.1	21.3
12	San Bartolome	-	7.0	20.0
13	San Isidro	-	18.5	41.1
14	Lucong	-	13.6	6.8
15	Magao	-	6.0	12.8
16	Tinang	-	13.0	52.0
17	Sto.Rosario	-	1.8	12.0
18	Sto.Monica	4.7	11.0	52.3
19	Caluluan	-	1.3	16.3
Total		8.6	149.5	23.1

3.6 Rural Infrastructure

3.6.1 Road and Transportation System

(1) Road

a) General

Road is categorized by its function into four types; National, Provincial, Municipal and Barangay as shown below.

Type	Function	Organization
National	Province to province	DPWH
Provincial	Municipality to municipality	PPDO
Municipality	Municipal proper	MPDO
Barangay	Barangay to municipality and Barangay to Barangay	DPWH

Note: PPDO: Provincial Planning and Development Office
MPDO: Municipal Planning and Development Office

b) Road Profile

The first class national highway runs northward in the western edge of the Study Area linking Tarlac provincial capital in the north and Manila Metropolis in the south. Provincial road, a core road in the Study Area, runs eastward linking the national road of Capas to Lapaz and to the Concepcion municipal proper.

This road plays a crucial role in commuting people and transporting commodities or other agricultural products to the nearby markets. On the other hand, Barangay-Barangay road, Barangay-farm road and farm -market road still remain bumpy or muddy especially in the rainy season.

According to the existing road profile, road density (total road length/total land area) in Capas, Bamban and Concepcion is 0.51, 1.24 and 1.36 Km/Km2, respectively. These density is rather higher than national level of 0.51 Km/Km2. However, Barangay road condition is so poor that paving rate is 0 percent in Capas, 0.8 percent in Bamban and 11 percent in Concepcion (refer to Table G-2-4 in Appendix G).

Road concreting is often seen elsewhere on provincial road and municipal proper area.

c) Existing Constraints

The Barangay road to municipality or other Barangay is so rough and undulated that vehicles cannot run at their proper speed. Several parts of the roads are often flooded or muddied by heavy rain in rainy season and become dusty in dry season. Bumpy Barangay roads often impede immediate communication or smooth transportation of agricultural products but also retard timely medical and health care service or proper postal service and communication service.

Although provincial roads and municipal roads still remain rough in several parts, they have been improved to concrete anywhere in the Study Area.

(2) Transportation System

Land transportation system is only available because the study area is located deep within the vast granary in the Central Plain of Luzon.

Vehicles locally called as tricycle and Jeepney are mostly utilized for public transportation purposes. Hand tractors or pick-up trucks are also used for goods transportation purposes.

There is only one bus terminal in Bamban from which bus route is connected to other provinces. Local bus transportation service is provided by the two daily regular lines between Concepcion and Bamban, Jeepney service route is connected with every municipality or Barangay.

Vehicles are registered in each municipality. Tricycle and Jeepney are common transportation means (refer to Table G-3-22 in Appendix G).

(3) Traffic Volume

Traffic volume survey was conducted in both rainy and dry seasons (refer to Tables G-2-8 and G-2-9 in Appendix G). The results of the comparative study on socio-economic activities in both rainy and dry seasons are summarized as follows;

a) Traffic volume in Sta.Monica in dry season is larger than that of rainy season because concreting work is mostly completed. Thus,it can be said that road concreting gives a great impact on socio-economic activities.

b) The people in San Antonio area are obliged to use the Aquino Memorial bridge in commuting to Concepcion due to the inaccessibility of Bamban river during rainy season.

c) In general, agricultural productives are similarly positive in both rainy and dry seasons because transplanting and growing in the fields are actively being done by pumping up groundwater for irrigation.

3.6.2 Rural Water Supply

(1) Classification of Water Supply Level

Water supply system is classified in the Philippines into the following three levels;

a) Level-I (Point Source)

A protected well in a developed spring with an outlet, but without distribution system, generally adaptable for rural areas where the houses are thinly scattered. A level-I facility serves around 15 to 25

households and its outreach must not be more than 250 meters from the farthest user. The yield or discharge is generally 40 to 150 liters per minute.

b) Level-II (Communal Faucet System)

A system composed of a source, a reservoir, a piped distribution network and communal faucets at not more than 25 meters from the farthest house. This system is designated to deliver about 40 to 80 liters of water per capita per day to an average of 100 households with one faucet per four to six households. This system is generally suitable for rural and urban fringe areas where houses are clustered densely to justify a simple piped system.

c) Level-III (Waterworks System or Individual House Connection)

A system with a source, a reservoir, a piped distribution network and household taps. It is generally suited for densely populated urban area.

(2) Administrative Organization

There are four government agencies which undertake water supply services. They are LWUA, RWDC, DLG and DPWH, which have different administrative jurisdiction over different area and/or aspects of the water supply system.

a) LWUA (Local Water Utilities Administration)

Its present delineated area are cities and municipalities with a population of at least 20 thousand which have different administrative jurisdiction of the MWSS (Metropolitan Waterworks and Sewerage Authority).

b) RWDC (Rural Waterworks Development Corporation)

Its present administrative jurisdiction includes all area not covered by the LWUA and MWSS.

c) DLG (Department of Local Government)

The administrative functions in connection with water works are the following;

- To oversee the phase-out of the Barangay Water Program (BWP) upon its completion in 1986.
- To assist in the organization aspect of the rural water supply program.
- To provide assistance in institutional development, a process of strengthening local RWSAs (Rural Waterworks and Sanitation Associations) and the training of its members.

d) DPWH (Department of Public Works and Highways)

It is responsible for the development of water sources for large communities and other settlements that are beyond the capacity of the

RWSAs or WDs (Water Districts), in accordance with the overall rural water supply plan. Level-I water supply system is a common case in Barangays. There exist 30 wells in Capas, 24 wells in Bamban and 60 wells in Concepcion constructed by DPWH for public use as schools, market or church. Barangay are situated on the flood plain where groundwater level is relatively high with a little fluctuation in rainy and dry seasons. Barangay people enjoy in drawing groundwater from shallow or deep wells by hand pump or some jetmatic pump for domestic purposes like drinking, washing, cooking and bathing. 40 to 90 percent of the houses in every Barangay have their own well in the yard. The remainder have a communal well being used by several people.

(3) Present Water Supply Level

a) Barangay

Level I water supply system is a common case in Barangays. There exist 30 wells in Capas, 24 wells in Bamban and 60 wells in Concepcion constructed by DPWH for public use as schools, market or church. Barangay are situated on the flood plain where groundwater level is relatively high with a little fluctuation in rainy and dry season. Barangay people enjoy in drawing groundwater from shallow or deep wells by hand pump or some jetmatic pump for domestic purposes like drinking, washing, cooking and bathing.

40-90 percent of the houses in every Barangay have their own well in the yard. The remainder have a communal well being used by several people.

b) Municipality

Level-II or III water supply system is served only in the Concepcion municipal proper area by WD formed in 1987 (refer to Table G-3-2 in Appendix G) and in the Bamban market.

(4) Existing Constraints

Most of individual wells are 20 to 30 feet deep in average, so that there is a high possibility in being easily polluted by waste water. At present there are not serious problems in both quantity and quality. However, those areas with high density of population have been gradually polluted by waste water effluented from houses.

3.6.3 Rural Electrification

(1) Electric Power Supply System

The government of the Philippines has taken up promotion of energy self-sufficiency and rural electrification as an important administrative target.

NPC is in charge of developing the large scale power generation and providing the power plants and necessary power grid throughout the country

to meet the large demand. On the other hand, NEA is in charge of promoting rural electrification and developing mini-hydropower generation and dendro-thermal plants by providing throughout the country with ELCOs, ELCOs are responsible for electric power supply and it's management for the rural electrification.

Electric power in Tarlac province is provided by TARELCO I (Tarlac Electric Cooperation I) covering the northern towns and part of Nueva Ecija, TARELCO II in the south and Tarlac Electric Company in the capital town.

TARELCO II was founded in June 1981 and serves the municipality of Capas, Concepcion, Bamban and Lapaz by purchasing power from 2.5 MVA NPC substation (refer to Tables G-3-10 and G-3-11 in Appendix G).

(2) Rural Electrification

Electricity is exclusively provided by TARELCO II in the whole study area. Power source is provided by NPC substation located at Sta.Rosa which is adjacent to VOA (Voice of America) relay station. At least 94 percent of the whole Barangays in Lapaz, 80 percent of those in Bamban and 86 percent of those in Concepcion are actually energized.

For consumership, 73 percent of the whole households in Capas, 85 percent in Bamban and 69 percent in Concepcion have individual house connection. Of the total electrical power consumption, 67 percent is consumed for residential,14 percent for power and industrial,13 percent for small commercial, 2.4 percent for large commercial, 2.1 percent for public and institutional and 1.5 percent for street lighting purpose.

(3) Existing Constraints

One Barangay in Capas, three in Bamban and six in Concepcion still remain non-energized Barangay, 27 percent of the whole household in Capas, 15 percent of those in Bamban and 31 percent of those in Concepcion have no individual house connection.

3.6.4 Social Infrastructure

(1) Health Service

Health and medical services are mainly provided by district hospital, private clinic, rural health unit (RHU) and Barangay health station (BHS) (refer to Tables G-3-13 to G-3-16 in Appendix G).

There are only one public hospital (Concepcion District Hospital) with a total bed of 25 and 14 private medical clinics and 13 private dental clinic. As a rural health unit, seven main health centers are set up in the study area. Of the 72 Barangays, 28 Barangay health station are established to provide the inhabitants with medical and health service.

There are 33 doctors, six dentists, 14 nurses and 63 midwives at present. The per capita personnel is 1:5,300 in doctor, 1:29,000 in

dentist, 1:12,500 in nurse and 1:2,800 in midwife. Number of dentist and nurse is relatively lower than national standard.

The ratio of hospital bed to population is at lower level comparing to the national target. However, doctor or midwife to population ratio is at high level, while rural health unit and Barangay health station to population ratio are still at low level comparing to the national standard of 1:2,500.

The birth rate in 1988 was 29.57 per 1,000 person in Tarlac province, which is relatively higher than 21.05 in the past five years from 1983 to 1987. This rate is lower than the rate in the whole Philippines, 32.2 in 1985. Pneumonia and gastroenteritis are leading causes of mortality and morbidity in the past five years.

As compared with the national standard, the rate of dentist and nurse in personnel and the rate of Barangay health station in facilities are relatively lower. A lack of nurse or Barangay health station forces people to take medical check in the municipal proper area far away from Barangay.

(2) Education

The education system comprises six years of elementary school and four years of secondary school in the Philippines. Compulsory education is set for the first six years only at elementary school (refer to Table G-3-18 in Appendix G).

There are two school districts in Bamban, one in Capas and four in Concepcion. In those school districts there are 26 public elementary, four secondary schools and one private elementary in Capas, 14 public elementary and two secondary schools in Bamban and 53 public elementary, three secondary schools and one college in Concepcion.

Total enrollment for public elementary school is 4,363 and 5,330 in Capas east and Capas west,respectively, 5,749in Bamban and 4,678, 5,288, 3,370 and 4,661 in Concepcion east, north, south and west, respectively.

The average numbers of pupils for every teacher are higher than the national ratio of 35 pupils to a teacher in all levels of elementary, secondary and tertiary schools in the study area, while the average numbers of pupils for one classroom are higher than the national ratio of 40 pupils to one classroom in all levels of elementary,secondary and tertiary schools in the Study Area.

School buildings are not well-equipped since some have no toilet or library in the school yard or do not have enough classroom to educate all the pupils at their regular school hours. In such school, a shift education is adopted.

(3) Communication

Telecommunication and postal communication facilities contribute to saving of time and travel cost. The following are the existing services at present (refer to Table G-3-20 in Appendix G).

Telephone services are provided by both private and public telephone companies. The telephone companies presently operating are the Philippine Long Distance Telephone Company (PLDT) and the Bureau of Telecommunications (BUTEL). There are 17 telegraphic offices of BUTEL within the province. Of which one is located in Concepcion. The Radio Communication of the Philippines, Inc. (RCDI) which is the biggest private telegraphic company in the province has three branches while other private telegraphic firm is the PT & T.

There are 22 post offices in Tarlac province including three suboffices. Tarlac Post Office located at M.H.de Pilar street has two extension offices, that is, the San Miguel suboffice and the capital post office. There is one post office in each municipality; Capas, Bamban and Concepcion. Due to increasing volume of mails which has to be delivered, more systematic transport of mails requiring fast and efficient handling was introduced by the Bureau of Post all over the country.

No telephone equipment is facilitated in all Barangays, and Telephone service is only provided by the PLDT in the municipal proper area. Postal delivery service is available but the service is so time consuming that it takes one week to one month to get letters from Manila. Sending service is only available in the post office of the municipal proper area.

(4) Housing

Housing is fundamental and indispensable for family and society to lead productive and stable life (refer to Table G-3-24 in Appendix G).

There are 5,260 households with average household population of 5.9 in Capas, 4,985 with that of 6.5 in Bamban and 16,040 with that of 6.9 in Concepcion.

Of the total house-building of 8,256 in Capas, 95.8 percent households is single-story built and 0.3 percent is deluxe story built. Of the total house-buildings of 5,111 in Bamban, 77.5 percent is single-story built and 0.3 percent is deluxe story built. Of the total house-building of 18,120 in Concepcion, 49.8 percent is single-story built and 6.4 percent is deluxe story built.

In Capas, about 40 percent of house buildings have roof of light materials as nipa, veneer and bamboo against 60 percent with strong materials as galvanized iron, concrete or bricks. In Bamban, 25 percent have roof of light materials against 40 percent with strong materials, while in Concepcion, 43 percent have roof of light materials against 28 percent with strong materials.

According to the study conducted by NHA, about three percent of household is regarded as slum in Concepcion. The rate of slum is relatively low in the Study Area.

3.7 Farmers' Organization

3.7.1 Irrigator's Association

Among 19CISs in the Study Area, 15 Irrigator's Associations (IAs) were organized under the assistance of NIA. IA is the organization whose main purpose is to utilize irrigation water in optimum manner, thus it is resistered to Security and Exchange Commission (SEC) as "non-stock and non-profit" organization. By registering to SEC, the IA obtains water permit from the Government.

NIA assists IA in various fields such as organizing of members, registering to SEC, provision of suitable irrigation facilities and training of farmers and so on. The Irrigation Community Organizers (ICOs) and/or Irrigation Organization Workers (IOWs) are employed and fielded to the CIS eight to nine months before the IA establishment. The ICO and IOW are distinguished as the permanent and temporary employee of NIA in this order. They assist the IA in terms of identifying potential leaders, procedural and managerial set up for registering to SEC, planing and designing of adequate irrigation facilities and providing financial know-how for equity contribution and due payment. One ICO, two IOWs and one irrigation technician subject to act as ICO are fielded to 14 CISs in the area. Their activities are undertaken in line with NIA's participatory approach program manualized in detail on "Communal Irrigation Development Network".

The Provincial Irrigation Office (PIO) is in charge of about 50 communal irrigation systems in Tarlac province and out of these, 14 CISs are amortizing certain amount to NIA. The amortization of irrigation facilities and other incidental expenses are charged to the IA which has asked to NIA to construct or rehabilitate of the irrigation facilities borrowing some governmental fund. As the milestone of amortizing amount, the equivalent value of palay at 1.5 cavans/ha/year is defined with the maximum repayment period at 25 years. The most of amortizing CISs is repaying to NIA in cash ranging from 150 to 200 pesos per hectare per year with 3 to 10 years' repayment period.

In the implementation of the training programs for IA, NIA uses existing organizational units at the central, regional and provincial offices. Under each office, a core group is organized to attend to responsibilities related to training of IA. Roughly speeking, there are three types of training program; viz. i) system management training with 8 modules, ii) basic leaders development course with 7 modules, and iii) financial management training with 6 modules. These trainings are mainly undertaken in NIA's training center in Dutang-A-Matas with 35 to 50 trainee.

The IA is organized by seven to 11 Board of Directors (BODs) who are usually elected by vote every year. Since the main concept of participatory approach is to maximize farmers' participation in the planning, design, construction and operation and maintenance stage of the irrigation facilities, the majority of farmers are asked to participate to committees in the IA. In the Study Area, the IA equipped with i) agriculture and irrigation management committee, ii) membership, education

and training committee, iii) finance and management committee, iv) audit and inventory control committee is most common.

3.7.2 Agricultural Cooperatives

By the sign of the President on March 10, 1990, the Cooperative Code of the Philippines and the Cooperative Development Authority (CDA) was newly created under the name of Republic Act No. 6938 and Republic Act No. 6939, respectively. The Bureau of Agricultural Cooperatives and Development (BACOD), the former administrative office of the cooperatives was, then absorbed to the CDA. By the revamp of the organization, the CDA was newly assigned the task of cooperative development, the restoration of the cooperative loan fund and marketing program for the cooperative movement and the grant of exemptions from taxes for all cooperatives for a period of 10 years.

The cooperative movement in the Study Area has been emphasized since 1986 by the strong boost of DA and Land Bank, Concepcion. New cooperatives have been increasingly established since 1988 and 23 cooperatives are being registered in CDA.

There are 15 agricultural cooperatives being registered in the CISs covered area, of which four cooperatives are located within the Lucong CIS. The nine CISs do not include the cooperatives at all. The total membership of 15 cooperatives as of September, 1989 is recorded at 1,959 with a total of 1,686 thousand pesos of capital funds. This figures denote that about 40 percent of the IA members are also belonging to agricultural cooperative and the average capital investment is amounted to 860 pesos per member (refer to Appendix K).

Although the cooperatives in the area were established recently, they are not actively promoting the business. One measure of cooperative's effectiveness is its ability to borrow funds from financial institutions. Among 23 cooperative in the area, only 10 cooperatives are regarded as credit-worthy and actually they are borrowing some amount from the banks. However, the interviews to the member revealed that the usage of loan is not always for crop production but frequently for the repayment of debt to private lenders.

Inactiveness of the agricultural cooperatives greatly depending on : i) lack of good organizers and policy makers, ii) lack of policy and consciousness of the members, iii) insufficient technical know-how and proper training. The Study Area involves a notable cooperative named People's Livelihood Foundation (PLF), which was set up in August 1988 with 504 farmers in six barangays and 1,019 hectares of rice land. This has grown to cover 2,239 farmer-beneficiaries, 43 barangays, and 3,628 hectares of rice land as of July, 1989. Success of PLF was attributed to unity and organization, hard work and sacrifice, and just distribution of gains, i.e. the most fundamental requirements for the success of the cooperative activities.

3.7.3 Dues Collection

(1) Amortization Collection

Out of 19 CISs in the Study Area, 12 CISs are loaning a certain amount from NIA. These amount is regarded as chargeable cost and to be amortized to NIA. Generally however, the amortization starts only in case NIA would succeed to provide satisfiable facilities to the CIS. On the other word, unless the farmer-member of IA have intention to pay for the facilities, it is impossible for NIA to get back invested amount. Thus, the improvement of CIS through physical development is inevitably needed as well as community organizing through institutional development.

Chargeable cost is amortized by IA at a basis of equivalent value of 1.5 cavan/ha/year of paddy, with maximum 25 years of repayment period. Chargeable cost includes construction and rehabilitation costs of the irrigation facilities incurred during construction stage , but excludes institutional costs such as salaries and wages of officers in charge. Out of 12 CISs with repayment obligation, 9 CISs are amortizing dues or will start amortizing in the near future. The total IA loan of 9 CISs amounts to 3,877 thousand pesos out of which 171 thousand pesos of aggregate amount or 4.4 percent has been already amortized up to the year 1989.

Amortization plan of three CISs namely, Baluto CIS, Magao CIS and Caluluan CIS are not yet scheduled. Among three, Magos CIS and Caluluan CIS are now placed under NIA's Participatory Approach and an ICO is fielded, accordingly, amortization of the loan will sooner or later start. On the contrary, no possibility for cost recovery can be observed in Baluto CIS. PIO once deployed an ICO to the CIS during the period of 1986 to 1987 and tried to organize the farmers, but unfortunately it was finished in vain. As of now, a total of 262 thousand pesos of chargeable cost is still remaining unpaid. The total chargeable cost of three CISs are gradually accumulating year after year growing to 673 thousand pesos as of December, 1989.

As a whole, the amortization collection of Tarlac Province in 1989 marks the second highest rate at 57 percent among a total of six provinces in Region III. Lucong CIS, Marita CIS and Sto Rosario CIS remained rather high collection rate at more than 80 percent among a total of 14 amortizing CISs in the Province. Average collection rate of Region III and Tarlac Province in the year 1989 was at 23 percent and 57 percent, respectively (refer to Appendix K).

(2) IA Association Dues (ISF) Collection

Out of 19 CISs in the Study Area, 7 CISs are asking the members to pay association dues at the biggining of cropping season. Usually, the association dues are used for the operation and maintenance of the CIS. The implementors regard it as "irrigation fee" to distinguish it from "amortization payment" to NIA. The remaining 12 CISs collect irrigation fee when necessary, hence on a "case to case" basis. On the contrary, 7CISs which are collecting association dues, collect irrigation fee "in advance".

Amount of dues differs by CIS because the amount is determined by BOD meeting. One cavan per hectare per cropping is most common dues being adopted by four CISs, but the collection is not undertaken especially in drought year. Other CISs which collecting due on a case to case basis are asking members for occasional payment according to damaged or rehabilitated amount. In average, 10 to 30 pesos are collected by damage with frequency at 4 times a year.

Collection rate ranges from 10 to 100 percent by CIS. The maximum collection rate is reported at San Pedro CIS, while the minimum rate is marked at Bamban CIS. The CISs which are collecting dues on a case to case basis indicate the higher collection rate than these collecting it in advance basis as estimated at more or less 70 percent.

(3) Penalty of Due Collection

Almost all CISs levy no penalty on non-payers both in amortization and IA association due collections and this is considered as one of the major reasons of low collection rate. Sto Rosario CIS is only the one with strict penalty; that is, if a farmers could not pay, he can not obtain irrigation water during the next cropping season. This penalty is strictly followed and has actually applied ever to a few farmers. Accordingly, if he could not pay, he has to pledge the next payment by letter.

(4) Due Collectors

Dues collection is usually undertaken by assigned collector(s). One collector is assigned to cover less than 100 hectares generally, but some collectors take charge of more than 500 hectares with a huge number of farmer members. Comparing with amortization collectors, IA association due collectors tend to be given more privilege. Exemption from payment or 10 percent of collected amount is the most popular previlege for the due collectors. There are some CISs which the collectors are rendering their services in a voluntary manner, but generally, such CISs show low collecting rate compared with CISs with privileged collectors (refer to Appendix K).

3.8 Inquiry Survey on Inhabitants' Needs (Felt Needs Survey)

3.8.1 Methodology of the Survey

(1) Objective

The main purpose of the inquiry survey is to grasp the inhabitants' needs (felt needs) toward the future development. And also, the survey seeks to involve the beneficial farmers from the beginning stage of the planning that is considered to correspond with the principle of NIA stated in NIA's manual on "Participatory Approach in Communal Irrigation Project".

(2) Methodology

Target respondents were 45 Barangay Captains living in the Concepcion municiparity, who are considered as the representative opinion leaders of the inhabitants. Interviewers were selected among the ICOs who were fielded by NIA and were living in the villages of the Study Area to assist the farmers to organize themselves. It is expected that the employment of the ICOs enable the respondents to generate the participatory spirit.

Questionnaires were finally prepared after a testrunning so as to collect the necessary information as precisely and objectively as possible. In the presence of the respondents, the questions were explained in Pampangos (dialect of the area) by the interviewers in order to avoid the misunderstandings incurred from communication gap between English and local language.

3.8.2 Analysis and Observation on Each Item

(1) Methodology of Analysis

The analysis was made in the following manner. It is considered that the analysis by barangay basis is a theoretical one of little use, because the answers are greatly depending upon the character and personality of the respondents.

a) Degree of Satisfaction for the Present Situation

For the respondents, five answers were prepared. Those answers are classified by the degree of satisfaction for each item; viz.i) very satisfied, ii) satisfied, iii) no complaint, iv) unsatisfied, and v) very satisfied. In the analysis, answers i) to iii) are regarded as "No problem", while answers iv) to v) are taken as "With problem".

b) Expected Time to be Improved

Five answers were also set by the expected time to be improved and these answers follow the criteria as; i) deemed to be realized within five years, ii) deemed to be realized within ten years, iii) deemed to be realized after ten years, iv) deemed impossible to be realized and v) no idea. Since it is considered that the respondents tend to have the time

horizon of a short term, the answers iii) to v) is considered as "Hopeless", while the answers i) to ii) denote "Hopeful".

c) Degree of Necessity for Each Item

The answers are constituted as; i) urgently needed, ii) needed in the near future (within 5 years), iii) needed in the far future (within 10 years), iv) no need, and v) no idea.

d) Five most Needed Items that Requires Development

Among the items which were marked "i) urgently needed" above, the respondents prioritized top five needed items. Listed items were presented by each Barangay and top five priorities were made by summarizing all answers.

(2) Remarkable Results

Notable results obtained through tabulation are summarized as follows :

a) Degree of Satisfaction for the Present Situation (refer to Appendix M).

The Barangay captains revealed their unsatisfaction toward most fall the items asked except for the items mentioned below:

- The peace and order at present is satisfactory for the Barangay captains. About 85 percent of the respondents replied that there are no problems so far in terms of the peace and order in their Barangays.

- The present potable water supply in terms of both qualityand quantity was not listed up as a problem. The result corresponds with the findings obtained from the Farm Economy Survey conducted simultaneously.

- About 35 percent of Barangay captains stated their unsatisfaction with electricity, but these Barangays mostly represents the non-energized Barangays as of now. The result also corresponds with the findings from the Farm Economy Survey.

- Among the communication facilities inquired, like telephone, telegram, post office, radio and newspaper, the availability of radio was only indicated as a satisfactory item.

- In spite of no availability of colleges in the study area, 60 percent of the respondents indicated satisfactory answer. The nearest colleges and universities from Concepcion municipality are six, namely, Angeles University Foundation, Holy Angel University and Republic Central Colleges both in Angeles, Pampanga; Tarlac College of Technology, Osias Colleges and College of the Holy Spirit, all in Tarlac.

- The present situation of population control was one of the satisfactory items for the Barangay captains. It could suggest the idea that a 1.97 percent of the present population growth rate which is lower than the national average of 2.14 percent might be attained by the efforts of the inhabitants in the rural area of Concepcion municipality.

- The progress of Agrarian Reform Program is counted as a satisfactory item, because under the enactment of PD. 27, most of the farmer-beneficiaries have already been emancipated and some have already paid back all amortization needed to acquire their palay and/or corn land.

b) Expected Time to be Improved (Refer to Appendix M)

- As shown in the previous section, the satisfaction on peace and order, potable water supply, electricity, radio as communication facility and some others have mostly been recognized by a considerable number of Barangays as satisfactorily attained. The result on degree of expectancy shows that the same items mentioned above were categorized as "hopeless" but in this case, special consideration will still be needed; viz. "hopeless" means not negative reply but means already attained.

- Strong expectation especially to the improvement of road conditions and health services as well as upgrading of the quality on institutional services can be observed from the result. The lifestyle without depending upon sidelines are being expected by the inhabitants as an expectation in the far future.

- Establishment of post office at their convenient places are also being considered as a matter in the far future.

- About 55 percent of Barangay captains are thinking that a more active community participation by the people will be realized in the far future.

- As a whole, the Barangays have a bright expectations toward the future. The 9 Barangay captains replied that most of improvement will be realized within ten years, while 7 Barangay captains mentioned the bulk of improvements are hopeless to realize. But as mentioned above, the analysis by Barangay basis might have no significance, because those answers greatly depends upon the respondent's character and personality.

c) Degree of Necessity for each Item (refer to Appendix M)

- Most of the respondents replied that all items should be improved urgently with the exception of the items namely, the improvement of water supply, electricity, educational institution (colleges) and community participation of the residents.

- Generally, the higher priority is given to the physical improvement than the institutional improvement. It means that the physical

improvements which generate income immediately are being considered preferably by the Barangay captains as compared with the institutional improvement.

- The item for improvement of credit institution was one of the exception which was given the higher priority among the institutional improvement items. Other items for institutional improvement in terms of community participation of residents and educational institution (college) were not considered by all Barangay captains to be improved urgently.

(3) Analysis and Observation on Preference of Project

a) Results from Felt Needs Survey

Among the five most needed items, the improvement of farm to market road was placed as first priority, followed by irrigation and drainage, health care facilities, job opportunities for off-farm and educational facilities (refer to Appendix M).

The ranking of the top five prioritized items are summarized as follows :

Ranking	Mark */
1. Farm to Market Road	29
2. Irrigation and Drainage	27
3. Health Care Facilities	27
4. Job opportunities for Off-farm	14
5. Educational Facilities	14

*/ Number of Barangay captains marked. Total number of Barangay captains who attended in the Felt Needs Survey were 40, which corresponds to 89 percent of the total number of 45 Barangay captains in Concepcion municipality.

b) Results from Farm Economy Survey

The respondents of the Felt Needs Survey were the Barangay captains coming from the whole municipality of Concepcion; while the Farm Economy Survey was primarily focused on the CISs covered areas with 20 Barangays and a total of 100 respondents as reported in Progress Report (I). The five most needed items reported from 100 respondents through the Farm Economy Survey were tabulated as follows ;

Ranking	Mark */
1. Irrigation and Drainage	59
2. Drying Facilities for Agricultural Products	31
3. Farm to Market Roads	25
4. School (Primary, Intermediate & Secondary)	22
5. Milling Machinery	18

*/ Number of farmers marked.

c) Preference of Project

The above result entails that the inhabitants are primarily interested in terms of what would increase their income from palay production, and secondly, in terms of what would improve their standard of living. The result also suggests the difference of felt need items by the position of respondents. The Barangay captains who should have been a representative of a Barangay requested five items which would contribute to Barangay economy, while the farmers who should have been a representative of a household desired five improvements which would upgrade their household economy.

The improvement of irrigation and drainage is prioritized in both survey and it is observed that the priority is rather high in the CIS covered areas than in non-covered areas.

3.9 Development Problems and Constraints

3.9.1 Physical Problems and Constraints

The Study Area is located in the lower middle part of the central Luzon and composed of lowlands and moderately sloping areas. The area is bounded on the west by the Zambales mountains, on the east by Chico river and on the north and the south by the boundary with the neighboring municipalities with plain areas. The western of the Study Area from the hillfoot of the Zambales mountains toward the center of Concepcion municipality is fertile agricultural land with a moderate slope west to east ranging about 1:300 to 1:400, while the eastern half from the center of Concepcion municipality toward Chico river in the eastern edge of the Study Area is rather flat agricultural land with an average slope by about 1:700.

The climate of the Study Area is classified into the first type of the Corona's classification system. There exists clearly distinct two seasons; wet season from May to October and dry season from November to April and an annual rainfall is about 1,900 mm in the area.

The natural features of the area, especially in topography and climate have ruled to the present unfavourable situation on the socials and insufficient rural infrastructure as well as rather low agricultural productivity. The water resources of both the surface water of Bamban and Lucong rivers and groundwater in the area are abundant; however, they have not been fully utilized for agriculture and other purposes so far due to the physical constraints of the area.

The major physical problems and constraints lie in the area are considered as follows ;

(1) Silting of Brushdams for Irrigation on the Bamban

Bamban river is the major surface water as the source for irrigation in the area. The river is not controlled and remain wild. A great deal of sand and silt is effused from the denuded catchment area in the Zambales Mountains where there exist no dam and reservoir to store the eroded materials.

At the upstream reach of Bamban river, relatively high velocity of the flow is observed due to rather steep topography in giving damages to the brushdams and intake facilities by flood or much flow. On the contrary, at the middle and downstream reaches of the said river, the flow velocity is slowed down due to moderate gradient of the river-bed in resulting from silting of sand and silts lay in front of the river structures like brushdams.

(2) Climate

The Study Area is situated under the First Type of the Coronas' climate classification, having clearly distinct two seasons; dry and wet and 1,900 mm of annual rainfall. The precipitation is mostly concentrated

in a half year of the wet season, which is characterized agriculture, rural industries and even living conditions in the Study Area.

(3) Inundation in the Flat Area, Particularly in the Easter-Most Area along Chico River

Chico river is one of the largest tributaries of Pampanga river discharged into Manila bay. In wet season, the backwater of Pampanga river is caused to obstruct flow of Chico river due to insufficient flow capacity of Pampanga river. Sometimes, Chico river is being flowed adversely from the downstream to the upstream, which results the inundation of the areas along the river, and moreover, it affects also to flow capacity of Bamban and Lucong rivers because the two rivers are the tributaries of Chico river and finally join with Chico river in the Study Area.

(4) Existence of Creeks and Streams in the Study Area

Drainage system in the Study Area is quite complicated in system and structures by existence of many creeks and streams providing separated agricultural land groups in terms of irrigation and drainage purpose. It is one of reasons why there are a lot of small scale irrigation systems, so-called communal irrigation systems(CISs) in the area. Aside from the above-mentioned topographic features of the area, each CIS has been established and developed independently in the respective areas by the leadership of the pioneers. Therefore, each CIS has different faces in farming, living ways, and social and economic conditions as well as peculiar functions and activities of the associations like IAs or cooperatives in the area.

3.9.2 Socio-Economic problems and Constraints

(1) Rationale

A number of socio-economic problems continue to persist in the area. Inadequate production in several food items (beef, dairy, feed grains, etc.) are still a major problem. Loopholes in marketing and distribution of food commodities, particularly fruits, vegetables and fish, cause supply and demand imbalances. Also, the hike in palay and corn has caused problems related to warehousing and storage. In agrarian reform, although operation land transfer has broken the backbone of feudalism and has given better security of tenure and well-being of farmers, several constraints in its implementation have caused a delay in the complete coverage of all beneficiaries.

These constraints have hampered the institutional development of the farmers' organizations which could provide the necessary linkage between the governments' technologists and farmers to facilitate clientele identification and effect technology transfer that would enhance increased production and income.

(2) Problems on Agro-economy

The problems on agro-economy observed in the area can primarily find out from paddy production in which the majority of farmer-inhabitants are engaged, that is, i) problems on production technique, ii) problems on post-harvest and marketing, and iii) problems on crediting services. Nonpayment of amortization to NIA and arrears of IA association dues (O/M charge of the irrigation facilities) are recognized as the final result incurred from these problems.

i) Problems on Production Technique

Firstly, the lack of certified seeds is observed as the problem related to this item. Although the 48 farms in the area are aiming to produce 60,000 cavans of certified seeds per year, the aimed production covers only one third of potential demand. Also , since there exist the qualitative disadvantage for the seeds, the farmers are obliged to apply large volume of seed which exceeds appropriate volume by 30 percent.

Second problem to be picked up is crop management. Extension workers of DA, who is primarily take the responsibility for propagation of adequate crop management are not enough both in number and capability. There is no established production technique in the area, and thus, huge amount of economic loss can be investigated for example in fertilizer and agro-chemical applications. Further worse, inconstancy of time and volume on agro-chemical application prevents the area from protecting of crop disease and harmful insects, especially of tungro.

Due to the lack of fund, the farmers in the area regard agricultural machineries as luxurious commodity beyond their reach. The delay of introduction of modern art is thus, hampering the area from upgrading of production technique.

ii) Problems on Post-harvest and Marketing

As mentioned in the previous section, post-harvest loss of paddy is estimated at 22.5 percent in volume. This means that even though a farmer harvests 100 cavans from his farm, the returnable income will correspond with only 77 cavans' equivalence. The main reason of this loss is greatly attributable to inadequacy of the facilities for threshing, drying, forwarding, and milling.

Inadequacy of these facilities causes to lessen farm income for the producers, because quite a few persons who possess the facilities purchase such productions from them at low price and sell processed goods to market at high price. As the result, excessive margin will remain only for the facility owner. Further worse, inadequacy of the facilities brings about not only quantitative loss, but also qualitative loss of the production. According to the estimate by Quedan Board, qualitative loss qualified on white rice base is considered at 0.9 pesos/kg in the area.

iii) Problems on Crediting Services

An analysis of formal credit in the Study area reveals that there are adequate short-term (less than one year) funds available but borrowers, especially small farmers have difficulty in gaining access to funds. The main reasons of this problems are attributable to ; i) inconvenient accessibility to the banks, ii) requirement of strict eligibility and collateral, iii) complicated procedures required for loan application.

Information from bank officials indicated that the total deposit (August 1989) of P 233 million exceeded total loans of P 205 million for all financial institutions in the area. If taking it for granted that not so many farmers have a deposit in the banks, this huge amount of deposit is considered to be made by a bundle of non-farmers.

Another problem is the limitation of the medium-term and long-term credits, and as a result, the expansion of crop areas and cottage, small-scale and medium-scale industries as well as the investment to the future such as animal raising and perennial crop cultivation is constrained. Almost all banks offer medium-term credit facilities, but in fact few medium-term loans are made.

(3) Problems on Farmers' Organizations

Major farmers' organizations such as irrigators' associations and agricultural cooperatives have just established recently or re-formulated from the former organizations. Primary problems on these organizations are summarized into three ; viz, i) lack of good planner and organizer, ii) indiscriminate size of organizations and iii) insufficiency of Government's support.

i) Lack of Good Planner and Organizer

Since farmers' organizations have been just recently created, the officials are confronting difficulty in finding and planning their way to go. The shortage of good planners and organizers stagnate the activities of the organizations, for example ; within 23 agricultural cooperatives, the 12 reported that they have performed nothing since its establishment, but on the other hand, as mentioned in former sections, already 555 thousand pesos of net profit has been marked from January to September in 1989 by the People's Livelihood Foundation (PLF) headed by Mr. Bernabe Buscayno.

ii) Indiscriminate Size of Organizations

As far as all the farmers are depending upon God-given natural resources such as land and river water, the organizations ought to act aiming for their optimum utilization and in this sense, the size of the organization is to be suitable. With the exception of some successful organizations, most of them are Barangay-based organizations with no harmonious relationship with the other communities.

iii) Insufficiency of the Government's Support

The Government's support in terms of extension, training and marketing is quite limited. Agri-institutional personnel must cover the acreage ranging from 13 thousand hectares at the maximum to 800 hectares at the minimum. NIA Training Center located at Dutung-A-Matas, Conception and Sacobia Training Center in San Vicente, Bamban are only available to farmers if paid for by the sponsoring agencies. Crop loan assistance are limited only to specific crops such as palay, corn and sugarcorn with strict judgment of eligibility and loan limitation. The increase on the NFA's purchasing price of palay from 3.50 pesos/kg. to 4.50 pesos/kg., enacted from Oct. 1, 1989, was a good news for the farmers, but only one palay buying station is available in the area, wherein its accessibility is also one of the major problems being sought for by the farmer-beneficiaries.

(4) Social Problems

There is a high degree of emigration from the area due to lack of sufficient job and as a consequence, there is a shortage of skilled labor. Under the prevailing Rural Industrization Can Happen (RICH) program, rural industrization is strongly boosted by the Provincial Government, and bring-up of skilled labors and absorption of rural unemployment and under-employment are being highly expected.

Farmers do not have so much interest about any information occurring outside their territories. Most of these farmers do not customarily read newspapers. Direct interview with the farmers revealed that they did not even know about the successful activities by the PLF even though they are living in the adjacent Barangay. Conservative attitude toward such information is preventing them from abandoning old consciousness.

Many farmers are thinking that it is natural for them to obtain irrigation water throughout the year as far as they pay amortization to NIA. Consequently, the strong resistance toward the payment of O/M fee (usually collected as IA association dues) is sometimes bothering implementors. And also, frequent embezzlements of collected dues by collectors and treasurers are lessening farmers' intention for payment.

3.9.3 Problems and Constraints of Each CIS

Generally, there are three steps to be essentially pursued for the formal agricultural development , that is; i) consolidation of agro-infrastructure, ii) increasing of production, and iii) upgrading of production qualify and stabilizing of farm-gate price, in this order.

The problems on which 19 CISs are being confronted are examined in line with each step and simultaneously, institutional setbacks on each CIS are investigated (refer to Appendix K).

It is observed, as a whole, that the 19 CISs hold critical problems concerning especially on water shortage in the dry season, and

insufficient post harvest facilities in physical term, and financial insufficiency and administrative undoing in institutional term.

Correlation between agro-infrastructure and yield of palay can not be clearly verified numerically, while rather high coefficient of correlation can be analyzed between the following items.

Relationship (A-B)	Coefficient of Correlation
Method of Planting-Yield	0.56
Fertilizer Application-Yield	0.35
Availability Thresher-Farmgate Price	0.44
Availability of Dryer-Farmgate Price	0.48
Accessibility to Market-Farmgate Price	0.40
Availability of IA Fund-Gross Production per Hectare */	0.66
IA Fund Collection Rate-Gross Production per Hectare */	0.73

*/ IA fund means IA association dues (ISF) collected not on case to case

As can be seen from above results, the level of consolidation of agro-infrastructure among 19 CISs has no significant difference which affect to yield of paddy as a whole. It means that the level of consolidation is low on average, and benefits from the physical development will be no longer expected without the upliftment of this level.

As for the second process (increasing of production), the results revealed that there exist some CISs which have possibility to achieve the increase of yield through the improvement of method on planting and fertilizer and agro-chemical applications. Hence, the suggestions related to upgrading of production skills and establishing of adequate production technique is considered as effective ones to be proposed.

Upgrading of production quality and stabilizing of farm-gate price, being recognized as the third step of the development are to be prioritized as the most important component of the Project.

This is because, - from above mentioned coefficient of correlations -, the availability of thresher, dryer and the accessibility to market were proven to give significant influence to farm-gate price of paddy. The coefficient of correlations denotes that presently, the CISs in which post-harvest facilities are consolidated can sell the products at higher farm-gate price than those CISs without consolidation of the facilities. As the result, the farmers in the former CISs were proven to obtain numerically higher farm income than those who are belonging to the latter. Accordingly, upgrading of production quality and stabilizing of farm gate price brought about by the consolidation of post-harvest facilities is regarded as one of the most significant improvements proposed by physical development of the Study.

As far as the coefficient of correlation proves, the improvement of farmers' organization will surely be considered as one of the most important development components which directory reflect to the gross

return per hectare. Especially, as the coefficient of correlation indicates, the gross return per hectare is certainly affected by the availability of advance payment of IA association dues (the dues used for operation and maintenance of the irrigation facilities) and its collection rate. It is considered that the typical farmer, if once he has paid some amount, is tend to make best effort to get back the benefits accruable from his investment, and the coefficient is regarded as the proof which explains such farmer's attitude.

CHAPTER 4. DEVELOPMENT FRAMEWORK

4.1 Development Target, Strategy and Component

4.1.1 Development Target and Strategy

The master plan on improvement of communal irrigation systems through physical and institutional development and rural development in southern Tarlac province aims at uplifting the rural economy by solving the basic problems of the people such as persistence of poverty and income inequality, reducing high unemployment and underemployment by creating employment opportunity and rectifying urban/rural and regional disparities in line with the national development goals under the Medium-Term Philippine Development Plan (1987-92).

The master plan on the project is formulated based on the consideration of the facts observed during the field work. The physical and socio-economic constraints on the Study Area and also harmonized development with the socio-economic conditions of the region/province are analyzed and studied for the formulation of the master plan. Aside from the importance on the institutional development, particular attention is paid to the physical constraints on the availability of the irrigation water resources, topographic and geographic conditions along the rivers of Bamban and Lucong, and severity on watershed management and erosion control of the major source of rivers, Bamban and Lucong.

Target of the master plan is expected to attain the desirable annual income for low-income farmers and healthy and worthy living environment in the Study Area. The target will be realized through provision of the complete irrigation water distribution system, development/equipment of the agricultural productive, processing and marketing facilities and establishment/strengthening of the farmer's association and agricultural supporting services.

Improvement of communal irrigation systems are being handled by NIA under the administration and engineering support of the Regional/ Provincial Irrigation Offices with the active participation of beneficial farmers and farmers'/irrigators' association. The participatory irrigation development approach is recently considered as a significant role of NIA for successful implementation of the projects and efficient operation and maintenance of the irrigation facilities, as well as agricultural development facilities such as seed multiplication station, primary marketing station, several demonstration farms, etc.

The physical improvement and development of the project components formulated in the master plan shall be implemented through participation of farmers'/'irrigators' association by strengthening/revitalizing their associations diffusing cooperative sense, and educating/training pioneers and leaders among the association members. On the other hand, the project shall be supported by the institutional development activities for successful implementation and proper operation and maintenance of the completed facilities. As a result, the farmers/farmers' associations will be benefited by the above activities for increasing agricultural

production, improving agricultural products and uplifting living standards of the low-income farmers.

The physical development will be implemented relatively for a short term by timely appropriation of budget, however, the institutional development and its activities will be taken for a little long term, because its achievement will be made by mostly manpower. Therefore, the implementing schedule of the institutional development will be continued and followed up even after the completion of physical development.

The Project on the improvement of communal irrigation systems in southern Tarlac province is expected to serve as a model project for improvement and development of thousands of communal irrigation systems/projects in the Philippines by active participation of farmers and irrigators' associations in terms of methodology of planning and development, implementation of the project and operation and maintenance on the completed project facilities.

4.1.2 Development Component

Development component of the master plan is composed of physical development and institutional development. The physical development component involves irrigation facilities, farming facilities, post-harvest including processing facilities, marketing and so on, while the institutional development deals with establishment/strengthening of farmer's associations, seminar/training program, etc.

In the physical development component, irrigation facilities are composed of intake structures such as brushdam, intake, diversion dam, etc., distribution canals and canal structures, and on-farm facilities. Among those facilities, improvement of the intake structures depends mostly on the natural conditions surrounding the project area thus, the design of the structures with some alternatives are comparatively studied based on two schemes; namely Scheme-I includes rehabilitation or improvement of the existing brushdams to be replaced by semi-permanent structure, while in the Scheme-II, unified diversion dam is assumed to be placed at immediate upstream from the Bamban railway bridge where there is a limited site recommended from the engineering point of view and serves about 1,750 hectares of paddy land. Aside from the above-mentioned improvement of the intake structures, both Scheme-I and Scheme-II development include almost the same physical development component. Proposed site of the unified diversion dam is also not avoidable due to the influence from the sediment afflux and slow progress of the development and improvement of watershed by the watershed management and erosion control project. Construction cost for unified diversion dam was estimated at rather high and seemed beyond the economic feasibility level (refer to Tables B-3-1 and B-3-2 in Appendix B).

As a result of the comparative study, the Scheme-I development is recommended for the master plan due to technical soundness and economic viability, while the Scheme-II development is considered to be implemented in the future after implementation of the watershed management and erosion control project in the watershed of Bamban (Parua) and Lucong (Cutcut)

rivers. The proposed project components of the master plan are summarized as follows :

(1) Physical Development Component
    Agricultural Infrastructure Development
    Farm Road Development
    Agricultural Development

(2) Institutional Development
    Establishment/Strengthening of Farmers' Association
    Strengthening of Agricultural Supporting Services
    Assistance for Seminar and Training Program.

4.1.3 Projections on Population, Household and Labor Force

(1) Population

The population projection up to CY 2020 was made based on the actual population in 1988. The population growth rates (compound rates) adopted were quoted from Tarlac Socio-Economic Profile prepared in 1986. The projection of the population growth rates presents that average annual growth rate at 2.37 percent (1985-1990) in three municiparities, namely, Bamban, Capas, and Concepcion will be slowing down to 1.63 percent (1990-2020) and finally to 0.93 percent (2020 - 2030).

According to the calculations, the population projections up to the year 2020 are tabulated by municiparity as follows :

Population projection (persons)

Municiparity	1989	1995	2000	2010	2020
Bamban	33,185	36,605	39,606	43,808	46,713
Capas	31,716	35,360	38,635	43,900	48,184
Concepcion	113,205	123,273	137,010	154,094	167,055

The projections were carried out by Barangay, and the Barangays which are not included in the Study Area were eliminated from the projection. The number of these Barangays are at one in Bamban Municiparity and five in Capas Municiparity. The projection denotes that a total of 178 thousand of population in 1989 will increase to 262 thousand in 2020, or about 84 thousand of population increase will happen in the Study Area for the coming 30 years. As the result, the population density in three municiparities will increase as follows:

Population Density (person/sq.km)

Municiparity	1989	2000	2030
Bamban	580	690	840
Capas	350	420	530
Concepcion	460	560	680

The average population density in the Study Area will increase from 440 persons/sq.km in 1989 to 550 persons/sq.km in 2000, and finally to 660 persons/sq.km in 2030 (refer to Appendix M).

(2) Household

The projection on the number of households was undertaken in the same way as that of the population projection, viz., the same growth rates were assumed and the family size throughout the projection term was considered to be constant at 6.7 persons. As the result of calculations, the projection by municiparity is tabled as follows:

Projection of Number of Household (HHs)

Municiparity	1989	1995	2000	2010	2020
Bamban	5,081	5,601	6,056	6,689	7,122
Capas	5,361	5,984	6,544	7,451	8,193
Concepcion	16,363	17,797	19,752	22,153	23,950

The projection entails that the present household number in the Study Area at 26,800 will increase to 32,400 in 2000, and to 39,300 in 2020. However, in the analysis which shall be undertaken hereinafter, the loss of average land holding area brought about by the farm household will not be allowed for, because large amount of investment is or will continuously be expected to the Study Area and as the investment increases, absorption of labor force will be mushroomingly proceeded beyond expectation. Accordingly, there have much possibilities that the increased household, vis-a-vis population are to be absorbed in the secondary and tertiary sectors (refer to Appendix M).

(3) Labor Force

Labor force projection is undertaken based on the ratio and percentage obtained from prevailing data and statistics on provincial and regional basis, because in the municipality level, there is no available data which can favorably contribute to the projection.

According to the employment classification specified by NCSO in April 1989, about 33 percent of the working age population (age group between 15 and 65 years old) are engaged in agriculture; while the same survey in April 1980 presents a percentage at 46 percent. The fact denotes that a huge number of new employment has been created in secondary and tertiary sectors of industry during the period from 1980 to 1989 and a considerable number of farm workers have been moved to non-farm workers. It is a well-known fact that a huge amount of capitals are now being invested in Tarlac which leads Central Luzon provinces in investment-employment ratio as is accounted for the least capital invested to employ one person. It was recorded in the first semester of 1989 that for every 35 thousand pesos worth of capital investment, one employment is generated in Tarlac (refer to Appendix M).

Unemployment and underemployment marked at 46 percent of total working age population; viz. six percent of unemployment and 40 percent of under-employment are estimated. In the Study Area, accordingly, a total

of 114 thousand are estimated as working age population and out of these, 52 thousand persons are regarded as unemployed and underemployed.

Within the average family size of 6.7 persons, about 4 members belong to age groups between 15 to 65. The labor force in the area will increase to 138 thousand in 2000 and 155 thousand in 2010 wherein new entrants are accumulated at 11 thousand during the period from the year 1990 to 1995, 13 thousand from the year 1995-2000, and 16 thousand from the year 2000-2010, respectively. In order to absorb these new entrants completely in the labor force, additional investment of 380 million pesos, 450 million pesos and 600 million pesos are required during the period of 1990 to 1995, 1995 to 2000 and 2000 to 2010, respectively (refer to Appendix M).

4.2 Physical Development Plan

4.2.1 Alternative Development Plans

In the physical development plan of the master plan, alternative physical development schemes are sought to find the most favorable plan for the improvement of 19 CISs. Those alternatives are chosen by considering the physical constraints prevailing in the Study Area. One of significant constraints is an appearance of silting / sediment in the major rivers in the area ; Bamban (Parua) river and Lucong (Cut-cut) river, of which on catchment areas are denuded and no watershed management has been implemented so far. Under the circumstances for the main irrigation resources, the irrigation facilities, particularly intake structures located on those rivers will be improved by provision of semi-permanent structures due to river course shift and river bed fluctuation.

On the other hand, the source of the irrigation water is river discharge except for a part of Baluto CIS and be supplied to the area in the wet season. In the upper reaches of each river, can supply irrigation water can be supplied even during the dry season. In the middle and lower reaches of each river, water is hardly supplied by the river discharge and supplemented by the groundwater which is generally abundant with high groundwater table.

In the upper reach of Bamban river, brush dams shall be improved by comparatively studying two alternative development schemes : the scheme I development plan takes improvement and rehabilitation of the existing brush dams, while the scheme II development plan aims at construction of an unified diversion dam which serves the area of 1,750 hectares (Bamban CIS, San Pedro CIS, Malonzo CIS, Bangcu CIS and Telabanca CIS). The service area of the unified diversion dam is determined by the amount of water resources available during dry season. The location of the proposed site for the unified diversion dam is at immediate upstream of the railway bridge where is a recommendable site by engineering point of view.

In the middle and lower reaches of Bamban river, the existing brush dams shall be improved and rehabilitated : In addition, it is proposed development of the groundwater collecting conduit as a new water resources utilization for the irrigation since the amount of groundwater is generally abundant, and the groundwater table is high and the geological formation of sandy material is suitable. The proposed groundwater collecting conduit will be located at the upstream of the service area. The irrigation will be made by gravity method due to comparatively steep topographical slope.

4.2.2 Proposed Master Plan

(1) Irrigation Facilities

In the upper reaches of Bamban river for five CISs, the master plan includes improvement and rehabilitation of the existing brush dams and also existing canals and canal structures.

In the middle and lower parts of Bamban river of five CISs, it is proposed the improvement and rehabilitation of the existing brush dams, canals and canal structures and the development of the groundwater collecting conduit (GCC) as a new water resources for the irrigation.

In Lucong river and other river, the intake facilities shall be improved and rehabilitated.

The irrigation canals, canal structures and on-farm facilities shall be improved and rehabilitated for proper water management. The operation and maintenance roads shall be provided along the main and lateral canals.

The SMORIS is a national irrigation system served by O'Donnell river as its water resources for irrigation of parts of the Study Area. However, an amount of irrigation water is not sufficient to cover over 19 CISs. The BBMP canal is planned to run south from Tinang to San Bartolome Via Santa Nicolas. The plan includes supplemental water supply through each feeder canal to the 12 CISs located at the eastern part of the Study Area ; Sta Rita, Marita, San Martin, Baluto, Lilibangan, San Bartolome, San Isidro, Lucong, Magao, Tinang, Sto.Rosario and Sta. Monica CISs.

(2) Drainage Facilities

Chico river is one of the largest tributaries of Pampanga river and discharges into the Manila bay. In wet season, the backwater of Pampanga river has caused obstruct itself for flow of Chico river due to insufficient flow capacity of Pampanga river. Sometime, Chico river flows adversely from the downstream to the upstream resulting in inundation of the area along the river. Under the situation, the river improvement works as well as inundation protection works shall be carried out for the area to eliminate the standing water in the area. However, complete elimination of such inundation can not be solved out until the river training works of Pampanga river, which flows into Manila bay, because the Chico river is a tributary of Pmpanga river and considerable cost and time are required for its works.

The left bank of the upstream of Bamban river has been left intact after being washed away by flood between Barangay Bamban and San Pedro. In other respect, the embankment toes to the river side have been scoured and exposed to danger of destruction even by small floods due to the fact that Bamban river banks are constructed with sandy soils. The protection works shall be carried out at the banks where the water current collides, and furthermore, many springs have been found along the inside of the left banks from Barangay San Martin to Barangay Lilibangan. Those flood control works are progressing or planning by DPWH. Therefore, flood control works is not included in the development plan.

Drainage of the farm land in the Study Area is made mainly through creeks, and the canal density of the existing drainage canal system in 19 CISs which seem to be adequate from the viewpoint of on-farm drainage. Since the creeks have suffered from shortage in capacity to cause frequent inundation in their peripheral farm lands, these creeks shall be improved to widen for increase of capacity. The drainage ditches between paddy plots and creeks are required to improve, however, the master plan is not

included this program because this program will be developed in the future.

(3) Farm Road

The density ratio of farm road in the Study Area is higher than the national average, but rather low in the pavement ratio. Therefore, the emphasis of development target for the farm road is placed on the improvement of the existing road.

Improvement works on provincial and Barangay roads are being progressed or planned. Therefore, those road imprevement works is not included in the master plan.

At present, Barangay and farm-to-market roads are more or less made of earth or gravel, but the road condition is very poor in quaility, so that the farmers in the area hardly carry their agricultural products at the proper time. Therefore, those road improvement is proposed on the master plan.

(4) Agricultural Development Facilities

By introduction of modernized farming techniques, upgrading of the quality of products through the arrangement of farming facilities and provision of the post-harvest facilities to be required for reduction of large losses of crops and the agricultural development and improvement will be greatly beneficial to farmers. Farming technology demonstration farm program, seed multiplication station, post-harvest facilities and technology demonstration farm program are proposed in the master plan.

On the other hand, although improvement of the farmers living standard depends on the increase of the agricultural productivity, and also available agricultural land is limited for expansion of farming scale in the area, it is proposed in the master plan agro-related production plan for obtaining more off-farm income.

4.3 Institutional Development Plan

4.3.1 Institutional Development Approach

Institutional development shall be planned based on the results of reviewing of the past efforts exerted for more than two decades by NIA for the improvement and development of the irrigation systems/projects and also the results of analyses and findings on the information and data collected and observed during the field survey of the Study which were performed in harmonic cooperation with counterpart personnel of NIA. Past experiences of NIA below is cited from the report of NIA for Second International Seminar on Farmers' Participation in Irrigation Development conducted in Manila from November 5 to 13, 1989 with heartfelt thanks to the author.

(1) Past Experiences of NIA in Institutional Approach

Since NIA was established in 1964 as a government corporate agency under an act of Congress to accelerate irrigation development for improving agricultural productivity and solving annual rice shortage, NIA's activities was concentrated in planning and construction of new irrigation projects and operation and maintenance of irrigation systems. Notwithstanding NIA's activities were inserted with a great effort to expand the irrigation area in the Philippines to meet the requirement of increased rice production by early 1970's, irrigated area was increased far from the plans and collection rate of irrigation fee was very low to meet the requirement of NIA.

In the mid-1970's, NIA activities started the new approach to *operation and maintenance of irrigation systems in maximizing* participation of irrigation water users association by creating two pilot projects in Nueva Ecija. Maximizing participation of farmers in the two pilot projects meant developing participation at the grass roots level in the critical activities of i) decision making within the irrigation association, ii) planning improvement and expansion of irrigation systems, iii) securing water rights and rights of way for canals and other facilities, iv) construction of irrigation facilities, v) control of construction cost. NIA regarded the pilot projects as "learning laboratories" from which it could develop process for maximizing participation of farmers and learn about its problems and effects.

In early 1979, Communal Irrigation Committee (CIC) was officially formed by NIA. Additional members to the CIC were invited from the institutions associated with NIA; FSDC, UPLB, the Economic Development Foundation, and CLSU. The CIC was able to draw from its members expertise in engineering, agriculture, sociology, economics, anthropology, institutional management, and training. The CIC met at least once a month, to review progress, address problems and agree on activities.

In April 1979, to further improve the process, the CIC established another pair of pilot projects in the province of Camarines Sur where the general conditions and characteristics of the farmers were different from those of Nueva Ecija. The two pilot projects followed the strategy and method of organizing used in the pilot projects in Nueva Ecija but

improved and supplemented some in the approach to farmers participation. By the end of 1979, the processes developed were sufficiently satisfactory for expanding the program to the twelve regions of the Philippines.

In December 1979, NIA decided, with support of the Regional Directors and the CIC, to start a pilot project in each of the twelve regions with the understanding that each pilot project will be a "learning laboratory" in which regional staff capability for using the participatory approach would be developed. Some of the processes and methods used and developed in prior projects in Nueva Ecija and Camarines Sur was developed into a socio-technical profile writing process for communal irrigation projects and NIA personnel were trained in the data gathering and writing of socio-technical profiles for the projects. Workshops for engineers and community organizers were held by giving the guidance to their participants by members of the CIC and the engineers and community organizers who have experienced in Nueva Ecija and Camarines Sur pilot projects.

In 1981 a year after the start of the regional pilot projects, an additional province was added to the program in each region to bring 24 out of 68 NIA provincial offices into the learning process.

In 1982 the program was expanded to all 68 provincial offices through the recommendation of a IBRD Mission that they analyzed and assessed the effects of the participatory approach program and recommended its adoption in all communal irrigation projects of NIA and by 1983 had become the standard procedure.

Back to December 1980, NIA started to extend the farmers participatory approach experienced and developed in the communal irrigation projects with participation of the irrigator's association to the large scale national irrigation projects. Community organizers (COs) were fielded in the Buhi-Lalo Irrigation Project in Camarines Sur. The COs applied the participatory approach developed in the communal with some modifications. Several tries were employed in the project by the COs to prevail cooperative spirit on O/M of the system, improvement of common knowledge on the irrigation, improvement of collection rate on irrigation fee, etc. With the successful process of the Buhi-Lalo project, farmers participatory approach was programmed by NIA to expand to the national irrigation systems under rehabilitation and improve-ment. Additional COs were recruited and trained for the relevant activities.

To improve the productivity by applying proper water management and active participation of farmer's associations, it is needed for NIA to continue his efforts to be exerted in developing and strengthening irrigator's association. In return, experiences of NIA indicated the following benefits ;

In the communal irrigation project,

- Stronger and more responsible irrigation association.
- Increased counterpart contributions from farmers during construction.
- Ready acceptance by farmers of the completed physical facilities and their financial obligations.

- Better maintenance of canals.
- More amortization collections.

In the national irrigation project,
- Improved maintenance of canals and better water distribution.
- More irrigation fee collection.
- Reduction of NIA O/M expenses such that NIA's share in the irrigation fees collection exceeds NIA's expenses.
- No removal of farm ditches by farmers after construction.
- Ready acceptance by farmers of their share of responsibil-ities for O/M.

(2) Institutional Development Approach

For the institutional development on the Master Plan, it is proposed to take some steps according to the present situation of the systems and farmers organization. The first step of the institutional development is strengthening of the existing irrigator's association (IA) and in case of that there exist no such organization, IA shall be established in all communal irrigation systems (CISs). Primary purpose of the IA is to carry out proper operation and maintenance of the irrigation facilities and conduct an equitable water distribution to the service area for increasing the productivity. Secondary, IA members shall have more cooperative spirit implanted through public communication and training and seminar to be scheduled from time to time by the project. Through these programs, members of the IA will have a sense of positive participation to the activities of IA/CIS. The IA should register the Securities and Exchange Commission (SEC) in order to give the IA a legal personality to file the necessary application for water permit. The water permit is necessary for the acquisition by the IA of right to the use of water and authority to allocate and distribute the water among its members.

4.3.2 Model Federation of Irrigator's Association (MFIA)

Among 19 CISs, three to four CISs shall be selected and organize a Model Federation of Irrigator's Association (MFIA) as a leading body for expanding the activities of the IAs. The MFIA shall have a favorable size in service area and number of members and also possibly have an united irrigation facilities for servicing the area of the MFIA. The members of the MFIA are expected with more positive activities in providing by the project training and seminars on the irrigation system management, financial management, etc.

As mentioned in previous Section 3.3.7 "Farm Economy", the farmers engaging in palay cultivation in the area are still placed in insufficient income level, even though they could receive sufficient irrigation water and increase palay production, accordingly, the prevailing farm management on the contract with private dealers shall be improved.

In order to improve the present farm management, especially to improve the agro-service works carried out in the lead of private dealer now, it is necessary to establish the MFIA with the aggregate of 2 to 4 individual IAs. MFIA should deal with procurement of agricultural input

materials and sale of production so as to retrench the production costs and to increase the farm gate price of farm outputs, because individual farmer or IA has no purchasing and selling power by itself.

As for the scale of the MFIA, an ideal scale with the covering area of about 200 to 600 hectares, 10 farmers irrigators' groups and 200 farm household will be touchstone from viewpoint of the present covering area of IAs. The functions of the federation are as follows;

a) To request NIA with the cooperation for training on water management, repair and improvement of CISs, repair of agro-service equipment, marketing, etc.

b) To request the banks and other lending agencies the loan for procurement and operation of agro-service facilities.

c) To request extension service staffs of DA the improvement of farming practices and introduction of new farming technology.

d) To negotiate with dealers to procure agricultural inputs at easonable price as well as to keep the high selling price of palay products.

The organization of the MFIA should be composed of the presidents of IA, and the representatives of IAs committee.

Since the MFIA will be established only to seek for farmers' benefit, it should be operated on their own initiative without direct instruction and intention from the governmental agencies concerned. Those governmental agencies should provide smooth and effective supporting services for the MFIA.

NIA should be the core of the supporting agency to MFIA, because the PIO is the most active and important agency for farmers especially in irrigation aspects in the Study Area and has established, organized and guided the IAs in accordance with participatory approach not only for the purpose of irrigation water supply but also for the practical farming activity and farming community. In addition, the O/M section of PIO can easily support the following services for MFIA.

a) Repair of agro-service equipment facilitated in the MFIA could be undertaken at NIA, Concepcion training center in Dutang-A-Matas with low cost compared with commercial repairing cost.

b) On-farm facility improvement required by the MFIA could be made with the support of O/M equipment and staff.

The concept of the association is not so familiar in the Study Area, so that the MFIA should be carefully supported and the operation should be proceeded in the following manner.

a) Prior to establishment of the MFIA, the consolidated IA equipped with a lot of members and firm organic structure should be organized. There are however, a few consolidated IA at present in the area, because most of IAs have been just established recently. In this

sense, the MFIA should be established after selecting the consolidated IA(s).

b) The operation of MFIA would bear some operational results which is utilized for improvement of the model. Then, the MFIA will expand its wing involving other IAs and the agricultural cooperatives. The MFIA will be operated and monitored under the full support of governmental agencies, especially from NIA.

In case MFIA is rather difficult to be established due to lack of the consolidated IA groups in the area, the MFIA will be formed with some IAs at first and then gradually expand its wing to cover the proposed acreage.

4.3.3 Federation and Confederation of Irrigator's Association

Referring the organization and activities of the MFIA, several Federation of Irrigator's Associations (FIAs) shall be organized in the adjacent MFIA area to keep the favorable size of the organization effective for every activities of the FIAs. The FIAs are expected to function not only for the operation and maintenance of the irrigation facilities but also functional body in operating and managing Farming Technology Demonstration Program (FTDP), Seed Multiplication Station (SMS), Pilot Primary Marketing Station (PPMS), and Post-Harvest Technology Demonstration Farm (PTDF).

The above-mentioned process in the institutional development beginning from the strengthening of IAs, through the step of the MFIA, up to the step of FIAs, is expected to perform within the period of the implementation of the Phase-I and Phase-II in corporation with and/or supporting each other with the physical development. The FIAs are expected to expand their basic func-tion in O/M of the irrigation facilities to the activities on agricultural production including post-harvest processing, purchase of input materials, marketing of production, and so on.

In the near future, the FIAs should be developed in terms of land productivity and qualification of members and then shifted to Confederation of Irrigator's Association (CIA) by unifying themselves. Strengthening and expanding of the associations should be attained by continuous effort of governmental agencies and leaders and members of IAs and cooperatives. Public communications and proper training for members and association leaders are essential factors to realize the institutional development.

CHAPTER 5. SECTORAL DEVELOPMENT PLAN

5.1 Proposed Land Use and Soil Conservation

5.1.1 Land Use Plan

Taking a general view of the present land use in the study area, as whole, the area has relatively ample irrigation water, except to some flooded areas, so that most of all arable lands are planted in wet season, and even in dry season considerable rice planting is observed at the irrigated area.

Accordingly it is possible to do double cropping of paddy rice or dual cropping in most of the Study Area if only irrigation water could be provided. Therefore the basic strategy for future agricultural land use in the Study Area should be focussed mainly on the double cropping of paddy rice, taking into consideration to contribute to the improvement of self-supporting ratio of rice, as one of the great granary of the Philippines. However, in case that it is difficult to gain sufficient water double cropping of paddy rice by the improvement of irrigation facilities or water management, diversified crops should be introduced in dry season, taking into account the required labor, supply-demand relation on the crop market, etc.

Recently, the planting area of sugarcane is increasing a little, so that, the benefit of its farming is comparatively high. But sugarcane is rather suitable for large scale farming, and it isn't better for small scale farming like most of this area planting other crops, from a viewpoint of long term economics. So it will be better to keep share of the present sugarcane planting area for a while.

Under the above mentioned basic concept, the proposed land use in the command areas of CISs concerned are planed as follows ;

1) In the command area of CISs where double cropping of paddy rice is planted all over the area, the increasing of productivity should be aimed to achieve more completed double cropping through the cultivating technique.

2) In the area including the fields being capable of double cropping of paddy rice by the improvement of water shortage in dry season, expanding double cropping area should be promoted as much as possible.

3) In the area being unable to use sufficient water for double cropping paddy rice if some improvement would be conducted, other crops which have less water requirement should be introduced for the most extended water use.

4) In the area where some crops besides paddy rice are grown in dry season,though they are generally introduced as a measure to cope with water shortage, provided that these crops can be changed to dry paddy by improvement of water supply, the changing should be accelerated as far as possible.

5) In the area with few crops planted due to insufficient conditions can be improved by relatively small scale construction, firstly double cropping of paddy rice should be introduced, followed wet paddy connected with diversified crops in dry season.

6) The area grown with sugarcane should be kept for a while as it stands because of its indefinite future. However it will be necessary to examine the probability changing it to paddy rice taking into account for long term economics.

Finally the land use plan is proposed in Table 5-1-1 and some comments on each CIS in the table are mentioned below ;

(1) Bamban CIS

Through the improvement of irrigation facilities, a double cropping of paddy rice with 532 hectares is proposed in the Bamban CIS area expect a 219 hectares of the elevated paddy fields, out of 751 hectares of the total paddy fields. The existing sugarcane fields of 300 hectares is kept as it is.

(2) San Pedro CIS

Land use is maintained as it is.

(3) Malonzo CIS

Wet season paddy is planted all over the area owing to some improvement on the irrigation facilities, that is double cropping of paddy rice is proposed in the whole area.

(4) Bangcu CIS

Through the improvement of the irrigation facilities, double cropping of paddy rice in a 500 hectares of the area is proposed except a 200 hectares of the elevated paddy fields out of 700 hectares of the total paddy fields.

(5) Susuba Cutcut CIS

Present land use is inevitably continued due to availability of irrigation water resources in dry season.

(6) Telebanca CIS

Present land use is inevitably continued due to availability of irrigation water resources in dry season.

(7) Sta. Rita CIS

By means of some improvement of irrigation facilities and development of new water resources through groundwater collecting conduit, dry paddy rice replaces dry crops and is introduced in the fallow land.

(8) Marita CIS

As same manner of planning with Sta.Rita CIS by means of improvement of irrigation facilities and development of new water resources, double cropping of paddy rice is proposed all over the area.

(9) San Martin CIS

Also as same manner of planning with the above Sta.Rita and Marita CISs in the areas cultivated dry crops and fallowed in dry season, dry paddy rice are introduced resulting in double cropping in all of the area.

(10) Baluto CIS

This CIS is also developed by the same way with the previous three CISs double cropping is proposed by replacing dry crops to dry paddy and introducing dry paddy to the idle lands.

(11) Lilibangan CIS

This CIS is also developed by the same way of the above-mentioned, double cropping of paddy rice is proposed in all of the area.

(12) San Bartolome CIS

Wet season paddy rice is expanded to the idle land with a little improvement on the existing irrigation facilities and others.

(13) San Isidro CIS

Because of the difficulty in increasing the irrigation water resources, the present land use is inevitably continued.

(14) Lucong CIS

As same with San Isidro CIS, because of the difficulty in increasing the irrigation water resources, the present land use is inevitably continued.

(15) Magao CIS

Because of difficulty in improvement of the present conditions of irrigation and drainage, especially inundation in wet season by flood of Chico river, the present land use is hardly changed in cropping crops.

(16) Tinang CIS

The land use on the paddy field is kept as it is, because new irrigation water resources is hardly developed in the area and sugarcane field has to keep it in status quo.

(17) Sto. Rosario CIS

The land use of the existing paddy field is not changed as double cropping of paddy rice is actually being practiced and then additionally wet season paddy is introduced in idle land through the improvement of the irrigation facilities.

(18) Sta. Monica CIS

Because of difficulty of improving flooded area along the Chico river, the present land use is continued.

(19) Caluluan CIS

The land use is maintained as it is due to the back of the irrigation water.

5.1.2 Soil Conservation

Most of the study area is very flat paddy field, and as a whole present soil conservation over the area seems to be fairly good. However the land consolidation in most of the paddy fields has been conducted so insufficiently that the drainage of the momentary precipitation in wet season is not imperfect, therefore it is sometimes observed that surface soils in paddy fields are run off with the over flows from the ridges broken by rainfall. And in the frequently flooded areas, a great quantity of the earth and soil flows into the cultivated land so as to make its fertility worse.

Table 5-1-1 Proposed Land Use

Unit : Hectare

Name of CIS	Total Area	Arable Lands: Rice Wet	Rice Dry	Dry Crops	Sugarcane	Idles etc.	Total	Rivers Roads Others
1. Bamban	1,490	751	532	-	300	-	1,051	439
2. San Pedro	238	120	120	-	-	-	120	118
3. Malonzo	315	240	240	-	-	-	240	75
4. Bangcu	728	700	500	-	-	-	700	28
5. Susuba Cutcut	57	40	8	-	-	-	40	17
6. *Telebanca*	600	389	364	25	-	-	389	211
7. Sta. Rita	150	135	135	-	-	-	135	15
8. Marita	132	100	100	-	-	-	100	32
9. San Martin	317	280	280	-	-	-	280	37
10. Baluto	780	740	740	-	-	-	740	40
11. Lilibangan	281	240	240	-	-	-	240	41
12. San Bartolome	447	375	260	90	-	-	375	72
13. San Isidro	667	450	330	120	-	185	635	32
14. Lucong	2,832	2,000	1,390	400	-	250	2,250	582
15. Magao	730	468	620	-	-	-	620	110
16. Tinang	905	250	100	-	600	-	850	55
17. Sta. Rosario	323	200	150	-	-	-	200	123
18. Sta. Monica	889	300	740	-	-	-	740	149
19. Caluluan	123	80	45	35	-	-	80	43
Subtotal Gross		7,858	6,894	670				
Net	12,004	8,450			900	435	9,785	2,219
Others	27,396	10,769		1,088	3,090	2,256	16,115	11,281
Total	39,400	19,219		1,758	3,990	2,691	25,900	13,500
Irrigated		13,423						
Rainfed		5,521						

5.2 Water Resources Development Plan

5.2.1 Hydrological Probability and Design Year

The probability analysis on rainfall and discharge had been made by applying rainfall data available at Hacienda Luisita and calculated discharge at Parua for the period of 21 years.

Through this study, design year for water utilization scheme has been determined as follows :

Design year ; Drought year, 1982
Equivalent to Probability (W)=1/5
Medium year ; 1971,(W)=1/2
Wet year ; 1972,(W)=1/1
Abnormal drought year ; 1983

5.2.2 Water Resources and Utilization Plan

(1) Surface water

Water balance study on the Study Area should be computed to analyze the conditions of water resource utilization in 1982(design year).

Basic formula that stands for water balance in the area is as follows :

Fout = Fin + R + RF - WR
where Fout ; outflow from area
Fin ; inflow into area
R ; precipitation
RF ; return flow from neighboring area
WR ; water requirement

And this computation was executed by ten days.

The available water based on this water balance study is estimated at about 250 MCM in wet season and about 81 MCM in dry season, respectively.

The water resources of each river basin are estimated as follows :

- Bamban river	(wet season)	62.8	MCM
	(dry season)	39.3	MCM
- Lucong River	(wet season)	139.2	MCM
	(dry season)	37.1	MCM
- Balen Creek	(wet season)	16.1	MCM
	(dry season)	1.6	MCM
- Tinang River	(wet season)	31.7	MCM
	(dry season)	3.2	MCM

Through this study, it is realized that the surface water is not surplus under present condition (land use and cropping pattern).

(2) Ground water

Abundant groundwater resources for the development of the Study Area is considered to be available to supply irrigation water, even during dry season.

On the assumption of available drawdown, the exploitable groundwater is estimated at approximately 24~35 MCM/year in the area. Well yield may range from 5ℓ/sec to 100ℓ/sec.

5.2.3 Water Resources and Utilization Plan by Zone and CIS

Based on the water balance study in 1982, the 19 CISs area are classified in terms of availability of water resources into four types as follows :

Type I Water for irrigation is enough in dry season.
CISs involved in this type are Bamban, San Pedro, Malonzo, Bangcu and Telabanca CISs, and these are located on the upper and middle reach of Bamban river.

Type II Irrigation water is almost available, however, supplement by pump is required. CISs included in this type are Lucong, Magao, San Bartlome and Tinang CISs.

Type III Surface-water on the river in dry season is little.
The returnflow from neighboring CISs and supplement by pump are mainly used. This group of CISs are Sta Rita, Marita, San Martin, Lilibangan, Sto Rosario and Sta Mornica CISs.

Type IV No surface water is expected in dry season and no irrigation can be made. CISs under this type are Baluto, Susuba Cutcut, San Isidro and Caluluan CISs.

Generally speaking, it is difficult to get surplus surface water for irrigation from river in dry season, except Type I.

On the other hand, the groundwater is abundant in the Study Area. Especially, along the lower reach of Bamban river, the groundwater level is less than 0.5 meters below the ground surface, which is good condition for planning utilization of groundwater resources by development of groundwater collecting conduit.