

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF TRADE AND INDUSTRY

THE MASTER PLAN STUDY
ON
THE PROJECT CALABARZON

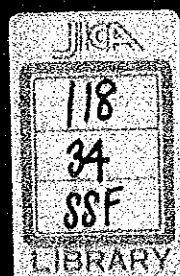
FINAL REPORT



Appendix A : Agriculture

October, 1991

JAPAN INTERNATIONAL COOPERATION AGENCY



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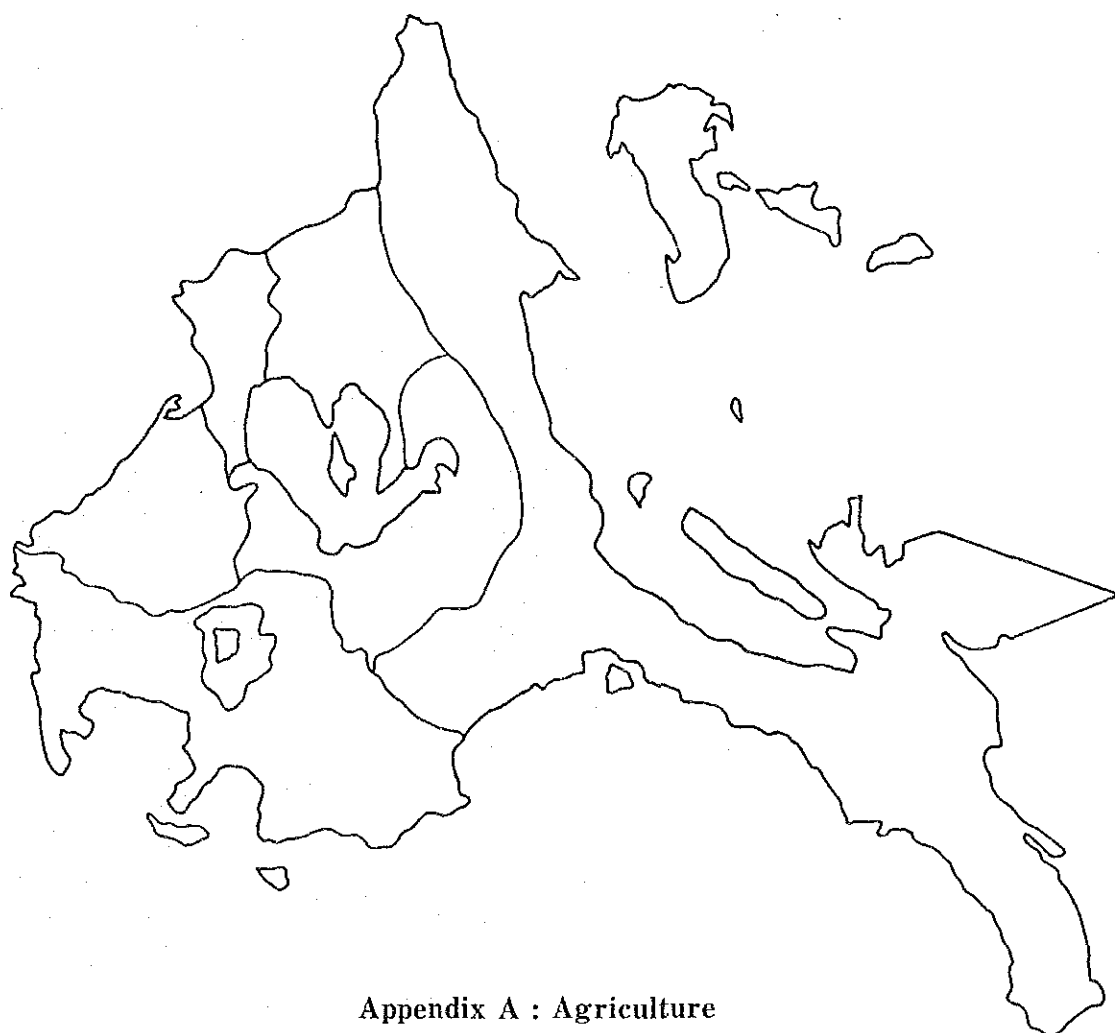
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Appendix A : Agriculture

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JAPAN INTERNATIONAL COOPERATION AGENCY

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Appendix A: AGRICULTURE

A.1 Present Conditions of Agriculture

A.1.1 Overview of the CALABARZON region

Climate

The dominant climate of the Region is of Type-I, which has two distinct seasons: wet and dry seasons. The whole Cavite and Batangas provinces, the western part of Rizal and Laguna provinces and the westernmost strip of Quezon are of this type. The wet season lasts for seven months from May to November and the dry season for the rest of the year. Excessive and intense rainfalls in the wet season cause soil erosion in upland areas with thin vegetation cover, making fertilizer application less effective. Scarce water in the dry season is one of the limiting factors in this area in relation to crop production.

The eastern portion of Quezon including the group of islands is of Type-II climate, which has no dry season with a very pronounced rainfall from November to January.

Eastern and southern parts of Laguna have the Type-III climate which does not have a long dry season. Annual rainfall exceeds 3,000 mm in some areas. This makes Laguna province water-rich in the Region. High crop productivity in this province is due in part to this abundant water resources. The mountainous area of Rizal and the southern side of the westernmost strip of Quezon also have this type of climate. However, Rizal province's water potential is low as substantial areas have been denuded as well as due to the topographic condition. Quezon has the annual rainfall of less than 2,000 mm.

The southernmost (Bondoc Peninsula), northwestern and central portions of Quezon province have the Type-IV climate, which is characterized by an relatively even distribution of rainfall throughout the year. Annual precipitation in the southernmost and central part is less than 2,000 mm while at the northwestern part it is 4,000 mm. The rainfall data in and around the CALABARZON region is shown in Table A.1.

The habitual strikes of typhoons cause various damage to the crop production. This phenomenon often makes crop production unstable in the Region.

Annual average temperature in the Region is generally about 27°C ranging from 26°C in January to 30°C in May. Higher lands usually enjoy lower temperature, allowing perishable vegetables to grow.

Topography and soil

The CALABARZON region enjoys its unique topography. The production of various crops and other agricultural activity including inland fishery are possible thanks to this varied topography. Lowlands extends along the Laguna de Bay, in northern part of Cavite, eastern part and western part of Batangas and the westernmost part of Quezon. Upland areas cover central and southern parts of Cavite, the foot-slope of Mt. Banahaw, Laguna, most parts of Batangas and central to eastern parts of Quezon. The Sierra Madre mountain range runs along the borders of Rizal and Laguna with Quezon. Several volcanos are seen: Mt. Makilin, Mt. Banahaw and Mt. Malepunyo in the southern part of Laguna; Mt. Cariliao and Mt. Palay-Palay on the border of Cavite and Batangas. Islands covered by Quezon are mostly low-lying with undulating to rolling relief.

The soil types are generally of volcanic origin. They have good physical structure; sufficient effective soil depth without gravel or stone and light texture with good drainage, but have unfavorable chemical characteristics: less nutrients and acidic. Those soil types are generally suitable for crop production if proper input is applied. Alluvial soil in lowland is suitable for various kinds of crop including paddy, vegetable as well as root crops and the soil in upland is suitable for many kinds of crops such as corn, vegetables, fruit trees, etc.

The colluvial soil types extend over the Marikina watershed area. They have characterized by its high gravel contents, thin effective soil depth, lack of phosphorus, etc. These types of soil allow tree crops like coconut, mango, citrus, etc. to grow.

The slope area under soil of volcanic ash origin commonly seen in Batangas and Cavite, and steep mountain hill side are susceptible to soil erosion hazards.

Agricultural land use

Agricultural lands share about 863,000 ha or about 53% of the total CALABARZON region as shown in Table A.2. Grassland/shrubland accounts for 268,000 ha or 17% of the total area. Forest and woodland accounts for 280,000 ha or 17% of the total area. Some parts of lowland area, mainly paddy field, has been converted into built-up area especially in Rizal, Cavite and Laguna provinces.

Agricultural land use in the Region seems reasonable in general, being in accordance with the topographic and soil characteristics.

Major irrigated paddy field extends along the lakeshore of the Laguna de Bay, northern part of Cavite province, and western part of Batangas province, under national irrigation systems with a total area of 28,000 ha. Communal irrigation systems cover another 11,000 ha, being dispersed in the lowland.

Coconut based multi-story cropping is becoming common practice. Crops being inter-cropped are: coffee, banana, pineapple, papaya, blackpepper, etc. in Cavite; lanzones, coffee, pineapple, citrus, etc. in Laguna; coffee, blackpepper, lanzones, citrus, etc. in Batangas and lanzones and banana in Quezon.

Cavite province has the biggest banana (12,000 ha) and coffee (10,000 ha) planted areas among the five provinces. Blackpepper cultivation has been started recently. Generally agricultural land use is well-diversified according to the altitude: coconut-based multi-story cropping in higher upland, annual crops and tree crops in lower upland and paddy-based cropping in lowland. Ornamental flower business has started in higher land of Tagaytay. Perishable vegetable production is also being practiced in higher upland of Silang and Tagaytay. Commercial based livestock activity is seen in Dasmarinas and Tagaytay.

Laguna province has the biggest share of coconut area in the province (69,000 ha or 39% of the total provincial area). Sugarcane, another important commercial crop, has decreased its harvested area these five years, due to the decline in the international market price. Irrigation development has been advanced in lowlands. Piggery farming, duck raising and dairy production has been increasing recently.

Batangas province is characterized by commercial crops: coconut and sugarcane. These crops accounted for 150,000 ha or 48% of the total provincial land. Reflecting the decline in the international price of coconut oil and sugar, however, the area has also been decreased considerably in these years. Grassland/ shrubland shares 77,000 ha, the biggest area among the five provinces. Upland rice and corn are planted extensively. Corn area has increased recently due to its increasing demand for feedgrains for animal production. Irrigated paddy field area is still small. Livestock production has been practiced in Rosario, San Juan and Laurel, while poultry production center has been Lipa city. Nursery of fruit trees has been produced in Talisay.

Rizal province has the smallest agricultural area (19,000 ha or 14% of the total land area) among the five provinces. The biggest share of grassland/shrubland (70,000 ha or 53% of the total) is found mainly in watershed area. Urbanization/industrialization of Metro Manila

has decreased the agricultural land, especially paddy area. Some livestock activities are seen in Baras, San Mateo, Montalban and Antipolo.

Quezon province, the largest among the five provinces with a total area of 870,680 hectares, is covered considerably with forests. Forest and woodland areas account for 32.2% of the total area or 280,000 hectares. Agricultural land covers about 52% of the total area or 452,000 hectares, 86% of which or 388,000 hectares are planted to coconut. Patches of paddy fields are found in the lowland. This accounts for 8.5% of agricultural land or 38,640 hectares, 57% of which are irrigated. Other seasonal crops share a small area and is only 3% of the agricultural land. This consists mainly of corn.

A.1.2 Land tenure and holding size

The data on the land tenure and holding size are available from the Census of Agriculture conducted in 1980. The results of the Census revealed that there were 251,000 farms in CALABARZON with an area of 654,000 ha. Average land holding size is 2.6 ha. It should be noted that Quezon has the biggest average land holding size of 3.8 ha while Batangas has the smallest with 1.6 ha. There are also some differences in holding size among crops; smaller in cereal crops and larger in sugarcane and coconut in general.

Of the total, 60% or 149,000 farms are of owners holding about 341,000 ha. Average land holding size of owner farmers in CALABARZON is 2.3 ha. Cavite shows the largest owner farmer percentage with 62% while Quezon is the lowest with 41%.

Other farms are, in most case, leased or rented. There are 125,000 farms with 304,000 ha. More than 50% of farmers in Quezon are share-holders with an area of 3.4 ha. These area are supposed to be the objective areas for the Agrarian Reform.

In terms of land size, 32,500 farms are more than 5.0 ha with total holding area of 291,000 ha, being subject to the Agrarian Reform. Quezon shares 198,000 ha or 68% of the total area, followed by Laguna with 40,500 ha, Batangas with 30,000 ha, Rizal with 14,400 ha and Cavite with 7,800 ha.

Land tenure and holding size condition in CALABARZON is summarized in Tables A.3 and A.4.

A.1.3 Socio-economy of the farm families in CALABARZON

In order to grasp the present situation of the farm families in CALABARZON, a questionnaire survey was conducted in cooperation with DA for 1,500 sample farm families throughout the Region. Although the number of sample may not be sufficient, some differences in living condition of rural people by provinces can be identified. The results of the survey, which may represent the voice of farmers, are presented in detail as an appendix, and summarized in Table A.5. The present socio-economic situation from farmers' point of view is described based on the survey results.

Demographic profile

The average size of household is 5.5, showing little difference from national average family size of 5.3. Quezon province shows the smallest average family size of 4.6 while Batangas has the largest average family size of 6.0.

The education attainment of the head of the households, who is practicing farming, is generally of elementary school level. Other household members are receiving in general higher education; high school and University. About 36% of the other members are engaged in economic activities or getting jobs, while 26% are unemployed. Main jobs of other members are farming/fishing followed by temporary works.

Economic profile

Poverty incidence in the Region on the basis of the annual income of the head of household is about 38%, which is rather low compared with the value of 70% for the whole Philippine rural area. The incidence is higher in Batangas and lower in Rizal. In general, the bigger the household size, the higher the poverty incidence. There is a tendency that farmers with higher education get higher income.

Other working members of the households generally gets lower annual income with below ₱10,000. In Quezon and Batangas, especially, 98% and 74% of the working members, respectively, are in this income class while shares are lower in Cavite, Laguna and Rizal (39%, 28% and 22%, respectively). In order to supplement the income of the head of households, more than two members are working in Quezon. Main works are: salary-men for Laguna, temporary workers for Cavite, and Farming/fishing and temporary workers for Quezon province.

Other income sources include remittance from other members of the family outside CALABARZON. About 18% of families receive remittance with an annual value of less

than ₱20,000 in most cases. Rental of work animals/machineries is practiced in Laguna more often. Cottage industries are seen mainly in Laguna and Quezon. In Rizal and Quezon provinces, working as farm labors is a rather important income source. In most cases those incomes are below ₱10,000 level.

Living conditions

Almost all the households have their own houses. Those houses are normally single detached ones while nipa huts are rather common in Quezon.

The most common appliance in the Region is TV set, followed by range, refrigerator and stereo. Cavite and Laguna are more highly equipped with TV set (more than 70%) than Quezon with the rate of 32%. Quezon is less equipped with appliance, due probably to lower rate of electricity supply. In places, Quezon has remarkably higher rate of gas range.

Fuel source for cooking is mainly firewood in all provinces except Quezon although the use of biogas is also common in Batangas and Rizal. It is noteworthy that the use of LPG is very common in Quezon. Charcoal and electricity are not much significant in the rural area.

People in the CALABARZON region generally depend on rivers for their domestic water uses. Laguna people, instead, get their domestic water from underground in the form of well and springs because of its abundance. Potable water supply rate is only 21% in the whole Region.

Only 8% of the sample families own car, generally jeep or jeepney. Some 25% of the samples utilize public transportation once a week or less while 17% utilize it everyday. Significant portion of people commute more than 20 to 30 minutes in order to get daily commodities at sari-sari stores.

Only 20% of the samples are satisfied with the present living conditions in the whole CALABARZON region. Cavite and Laguna show relatively higher satisfaction level while Batangas shows the lowest satisfaction level. The most common factor of dissatisfaction on living is low income (70%). Among the five provinces, Batangas has the highest degree of dissatisfaction of low income (85% of the respondents) while Laguna has the lowest of 60%.

Second dissatisfaction factor is road, followed by hospital/health care, irrigation, water supply, post-harvest facilities, etc. Dissatisfaction in terms of environment is raised mainly from more developed provinces or areas.

As considerable measures for improving present living conditions, most people expect the government's subsidy on farm inputs and credit, followed by cooperative development. Infrastructural development such as roads and irrigation facilities is demanded in Quezon while many people in Batangas believe that employment opportunities in factories can improve their living conditions. Not many people expect the current Agrarian Reform as a way of solving dissatisfaction.

Agricultural activity

(a) Landholding

Among the total respondents, only 39% own a piece of land. Quezon has the most landowners among the five provinces. Most landholdings of owners in CALABARZON are smaller than 3 hectares (67% of landowners).

(b) Land tenure

Of the land owners in CALABARZON, 21% lease (or tenant) additional land for cultivation and 6% rent out to others. The most common size of cultivated land is 1 to 3 hectares (59%).

(c) Lease or sharing

In most cases, the lessees pay a rental of 5,000 pesos or less for use of land, while in harvest sharing, the most common agreement is 20 to 30% payment to land-owner (37% of the total who are in harvest-sharing agreement). A considerable percentage of respondents, especially in Quezon, still holds to a 50-50 harvest-sharing agreement.

(d) Crops cultivated

More than half of respondents cultivate paddy. More than 50% of paddy farms are irrigated, especially in Cavite, Laguna and Quezon. Batangas farmers commonly cultivate upland paddy, which usually shows poor performance. Rizal has considerable areas of rainfed paddy.

Batangas is a production center of corn in the Region. Almost half of the farmers cultivate corn for their domestic consumption, marketing or animal feeds. The yield of corn, however, is rather low.

Vegetables are cultivated throughout the provinces. Common vegetables cultivated in the Region are: ampalaya (Cavite), eggplant (Laguna, Batangas, Rizal and Quezon), sitao (Cavite, Batangas, Rizal), squash (Laguna, Batangas) and tomato (Laguna).

Fruits are also grown throughout the Region. Reflecting different natural conditions, specific fruits seem to grow in certain area; coconuts are widely cultivated in Laguna and Quezon, mangos are common in Cavite and Batangas, lanzones in Laguna, pineapple in Cavite, Laguna and Rizal and coffee and blackpepper in Cavite and Batangas; etc.

(e) Credit

Of the total respondents, 39% avail credit. Batangas has the smallest number of credit users. The usual amount availed is 1,000 to 5,000 pesos at an interest rate between 11 to 20%. Credits are in most cases availed from the rural banks, private lenders and other forms of credit facilities. In Quezon, however, farmers more often use cooperatives to borrow money.

Credit availed is at differing rates per province: Cavite, Laguna and Quezon have more cases of availments on 16 to 20% interest rates while Rizal's common case is 11 to 15%. Batangas shows a distinct case where interest rate polarize to high and low, less than 5% and more than 20%. It is noteworthy that credit is mostly availed from private lenders and other forms of credit facilities.

Respondents are in general not satisfied with credit availed except for those in Quezon. The reasons for dissatisfaction are mainly high interest rates and complicated procedures.

(f) Farm input

Seed for planting usually come from previous harvest, and in smaller cases from dealers. The access to this farm input is rather difficult, especially in Batangas.

Fertilizers commonly come from dealers, and in less usual cases subsidy from the government. Significant portion of land owners provide fertilizers with lessees. Some farmers do not use fertilizers because mainly of high prices. Fertilizers are not difficult to acquire in general.

Agro-chemicals usually come from government subsidy, and in fewer cases from landowners. Spraying agro-chemicals is not a common practice in Quezon.

(g) Harvest

About one-fourth of respondents are satisfied with the amount of harvest. It is the highest in Laguna and the lowest in Batangas. Among the reasons of dissatisfaction, natural disasters and damages caused by diseases and insects are major ones. A significant percentage feel that dissatisfaction is caused by low level of application and poor supply of farm input.

(h) Crop budget

Based on the crop budget analysis conducted as a part of socio-economic survey, there are wide range of variation in profitability among crops. They are shown in Tables A.6 to A.9. It should be noted that the profitability of upland crops is rather low, which may result in making Batangas people feel poorer.

(i) Marketing

Paddy produce is sold largely to wholesalers. Batangas and Quezon paddy farmers produce mainly for their domestic consumption. Other agricultural products including vegetables and fruits are in most cases sold to public markets and wholesalers/middlemen.

Livestock and poultry

Among the total respondents, 34% raise cattle, 30% raise carabao and 39% raise hogs. Most common cattle farm size is 1-2 heads. Batangas has the largest number of raisers in CALABARZON.

Common farm size of carabao is 1-2 heads accounting for 81% of the total carabao raisers in CALABARZON. Hog raisers have mostly one to five hogs corresponding to 80% of the total hog raisers in CALABARZON.

Goat raising is relatively small in CALABARZON. Poultry raisers are relatively few. Common poultry farm size is one to 20 heads for both chicken and ducks.

Those livestock and poultry production is mainly for domestic consumption.

A.1.4 Agricultural production and farming practices

(1) Agricultural production

Crop production

Important crops in terms of the production value in the Region are paddy, corn, tomatoes, pineapple, bananas, mangoes, coffee, coconut and sugarcane. Harvested area, unit yield and production of crops are shown in Tables A.10 to A.12. Gross value of crop production based on the 1988 farm gate prices are shown in Table A.13.

Paddy production in CALABARZON is 412,000 tons in 1988, accounting for only less than 5% of the national total production. Total production value (gross value) in the Region in 1988 was 1,444 million pesos. Quezon shares about 43% of the regional production due to its largest area harvested. Laguna has the highest productivity. Batangas produced less than half of Laguna production although its harvested area was the same as Laguna's due to the extensive upland paddy farming with low yield. Based on the results of the socio-economic survey, the yields of paddy by type of cultivation are found to be 4.5 tons per hectare under irrigated condition, 3.3 tons per hectare under non-irrigated condition and 1.8 tons per hectare under upland condition. The varieties used are: IR series under irrigated and non-irrigated conditions while traditional ones like Kinanda, Benernal, Sinampaga, Daggue, etc. on upland.

The total corn production in the Region is 186,000 tons in 1988, accounting for only 4% of the national production. Almost 70% of which are harvested in Batangas. The production in the Region has not increased in recent four years because neither harvested area nor yield had increased during the period. The productivity in Batangas is still low, probably due to unstable weather condition and low input use. Yield ranges from three tons per hectare in hybrid corn to less than one ton per hectare in white or yellow corn. Farmers tend to cultivate sweet corn because of its higher profitability. Hybrid variety has not been yet common in the Region.

Tomato production in the Region in 1988 recorded 18,000 tons which shares 11% in the national total production, with the gross value of 146 million pesos. Laguna produces the biggest volume with the highest productivity of more than 10 tons per hectare while Cavite has the least production with the lowest productivity of as low as two tons per hectare.

Banana production centers in the Region are Quezon, Cavite and Batangas, although the yield is lower than national average. Total production in the Region in 1988 was 105,000 tons with gross production value of 292 million pesos.

Mango is produced mainly in Batangas, Quezon and Cavite among the Region. Of the total production of 23,000 tons in the Region in 1988, 21,000 tons were produced in these three provinces. The Region's production shares 6% of the national production. Unit yield in any province in the Region except Quezon is lower than national average. The gross production value in 1988 was 204 million pesos.

Pineapple is produced dominantly in Cavite, sharing more than 80% of production in the Region. Due to the increase in yield, the production has been increasing year by year in these five years, recorded 43,000 tons in 1988 with the gross production value of 216 million pesos. The highest productivity is attained in Quezon.

The bulk of coconut production in the Southern Tagalog Region is given by Quezon. About 80% of the total production in the Region or 1.5 million tons is shared by Quezon. The productivity in the province is higher than the Region's average. Although coconut produces by far the highest gross value of 10 billion pesos in 1988, productivity in coconut has been continuously decreasing for the past 10 years, due to the increasing number of senile trees and the higher incidence of coconut tree diseases. Due to the decline in the international market of coconut products, farmgate prices of coconut had been very low which eventually made coconut farmers very poor. In effect, this led the coconut farmers to shift to other crops and consequently decrease in coconut areas.

Sugarcane production has decreased in these five years mainly due to the decrease in harvested area. Only two provinces, Laguna and Batangas produce sugarcane. The production in these two provinces accounts for more than 10% of the national production. In 1988, the sugar was produced in 28,000 ha in the Region with the production of 1.9 million tons.

Cavite is famous for its producing high quality coffee in the Philippines through very careful harvest and drying. The productivity is also higher than other provinces. The Region produced 16,000 tons of coffee in 1988, 80% of which are produced in Cavite, accounting for 10% of the national total production. The gross production value was 608 million pesos.

Other important crops in the Region are: fruit trees such as lanzones, papaya, jackfruits, rambutan, calamansi, blackpepper, santol, and some root crops like cassava, ube, etc. Vegetables are also produced in the Region: among others sitao, eggplant, squash, ampalaya are commonly cultivated.

Livestock and poultry

Cattle meat is produced mainly in Batangas with the production of 7,400 tons in 1989 , followed by Quezon (3,200 tons), as shown on Table A.14. Although the production has increased, the total number of cattle in the Region has decreased by 22% from 183,000 in 1985 to 142,000 in 1988 (Table A.15). Batangas has the largest number of cattle among the five provinces, accounting for 49% of the Region's population.

Hog production has increased year by year over these five years. Total production in the Region in 1989 was 85,300 tons. In recent five years, the total production is the largest in Quezon, but Laguna shares the biggest production in 1989 with 25,000 tons, followed by Quezon (21,000 tons). The total number of hogs in the Region in 1988 was 784,000, accounting for 74% of the number of the Region IV, and for 10% of the national. Laguna has the largest number of hogs with 215,000 heads, followed by Quezon (195,000 heads).

Batangas is a production center of chicken meat with the production volume of 38,500 tons in 1989 , accounting for 73 % of the total production in the Region. Batangas has the largest number of chicken with 3,941,000 heads in 1988, which account for almost half in the Region, followed by Laguna (2,121,000 heads), Quezon (978,000 heads), Rizal (809,000 heads) and Cavite (541,000 heads).

Carabao production has also increased over these five years. Total production in the Region was 5,100 tons in 1989 . Quezon produced 3,700 tons in 1989, which shares 72% of the total production in the Region. The number of carabao in the Region has been rather steady during the last five years with 145,000 to 150,000 heads, accounting for about 5% of the national total.

Although no statistical data are available, duck production is predominant in Laguna province. The number of ducks in the Region was 874,000 heads in 1989 , of which Laguna shares 551,000 heads or 63% of the Region total.

Dairy production

As of 1990, there are 790 heads of milching cows in CALABARZON region, producing 450,000 litres of milk (Table A.16). Batangas and Laguna are production centers of milk, accounting for about 87% of total production in the Region.

Fishery production

Marine fishery activities are seen in Cavite, Batangas and Quezon provinces, while inland fishery production is in Laguna, Batangas and Rizal provinces. Past production data are shown in Table A.17.

Quezon produced 74,000 tons sharing about 73% of total production in the Region. Marine fishery production has increased although recent red tide seriously affected aquaculture of oyster and mussel. Marine fishery production in the Region was 66,000 tons in 1984 and 77,000 tons in 1988.

Inland fishery production in Laguna de Bay has fluctuated year by year and tends to decrease. Fish species caught also have been changed and decreased. Inland municipal fishery production in Laguna de Bay total was 230,000 tons in 1984 and 175,000 tons in 1988.

Timber production

Data are available only for Quezon. From 1985 to 1990, timber production has been increasing. Timber production consists mainly of Tanguile, Red and White Lawan, Mayapis and Apitong. The total production in 1990 is 21,000 m³.

Other agricultural activities

Although no data are available about production, there are some important agricultural activities in the Region. They are:

- 1) Cut flower/ornamental flower business throughout the Region: the upland of Cavite, especially Silang and Tagaytay and Los Banos and Calamba in Laguna.
 - 2) Nursery of tree crops in Batangas: Talisay is the production center of nursery of tree crops
- (2) Farming practices

Crops

Under irrigated conditions, farmers plant paddy in May to August in general for wet season crop, and October to January for dry season crop. Plowing and paddling are done by machine or using animal power before transplanting. Average farm size is 2.2 ha. Fertilizers, especially nitrogenous fertilizers of urea and ammonium sulfate are commonly

applied with an average amount of 72 kgN/ha (Table A.6). Complete fertilizer (known as 14-14-14) is also commonly applied with the dosage of 63 kg/ha. Other forms of fertilizer are not so common. Organic manure is seldom applied. Only several farmers apply phosphatic fertilizer. Application of agro-chemicals including pesticide, fungicide and herbicide is also common, but the applied amount seems to be limited. Weeding is done by hand or simple equipment. Harvesting is done by using man-power. Threshers are becoming common through the government support.

Under rainfed conditions, most farmers plant paddy in May to August. Although the average farm size is smaller (1.8 ha) than that under irrigated conditions, farming practice is basically the same as that under irrigation conditions. Fertilizer dosage is a little less than the case under irrigation conditions. Average amount of applied nitrogen is about 50 kgN/ha. Application of agro-chemicals is almost the same as that for irrigated conditions.

In upland area, farmers plant paddy mainly for their domestic consumption. Average farm size is as small as 1.2 ha or smaller. Plowing is in most cases done by use of animal power. Application of fertilizer is common practice with an average amount of 63 kgN/ha. Urea, ammonium sulfate and complete fertilizers are popular ones. Agro-chemicals are not applied much. Labor force almost entirely depends on family members.

In spite of its high demand, feedgrain corn is not common due to its low market prices. Although some farmers try to plant hybrid cultivars, yield level is still low, and the production value is not so attractive. Instead, sweet corn (or green corn) at present is popular cultivar because of its relatively high profit considering less work involved (earlier harvest time). In general, fertilizer and labor are major component of production cost.

Vegetables are planted as main or second crops depending on the area. Cultivated area per one family is generally small with less than 1 ha. Fertilizer and agro-chemicals are commonly used although mechanization is still less popular. Applied amount of fertilizer varies crop by crop and farmer to farmer. Ampalaya, eggplant, mustard, and string beans are applied with more than 100kgN/ha equivalent fertilizer, while cowpea, peanut and radish are applied with only 20kgN/ha equivalent fertilizer as shown in Table A.8. Urea and complete fertilizer are common. Agro-chemicals used are mainly insecticides, followed by fungicides.

Through the analysis of crop budget as a part of socio-economic survey, it is found that some pineapple growing farmers and mango growing farmers seem to use excessive amount of fertilizer or agro-chemicals. The amount of fertilizer used for growing pineapple

is reported at 500kgN/ha in some cases in Cavite province while the used rate of agro-chemicals applied for mango in Rizal province is reported at more than ₱10,000/ha equivalent.

Sugarcane farmers usually follow instructions given by land owners. They plant canes in the onset of rainy season. Fertilizer is applied with the amount of more than 100 kgN/ha. Sugarcane grows all the year round and first cut will be made during the next dry season. Farmers burn the plants to remove unnecessary leaves, and then cut the canes. Ratoons appear soon after cutting. After two or three cuttings, new canes are replanted.

As for coconut, small scale farmers do very little, just waiting for shells ripen. Without taking any care, no fertilizer application, and no planting, shell yields remain very low. After harvesting, some are sold to wholesalers for direct consumption in Metro Manila while others are cut, dried to prepare copra, and then sold to brokers or shippers for bringing them to processing factories.

Inter-cropping is becoming common practice. Utilizing the rather wide space between tree crops, other small tree crops and upland crops are cultivated. Some farmers cultivate three different kinds of crops at once placing them spatially for suitable land use.

Animal husbandry

Backyard raising is a common practice for domestic consumption. More than 80% of total cattle is raised in backyard. Backyard cattle is raised in paddy fields after harvest or furrow land, eating grass. Crop residues and molasses are fed when the materials are available. As feed efficiency is generally low in cattle raising, at more than 8, cattle needs a lot of feed to fatten. Being insufficient in feeds, fattening takes time, and is not successful in backyard. Commercial cattle raising has been practiced extensively in extensive grass lands. A modern feedlot has been established in Cavite.

For hog, chicken and duck, commercial production is rather popular due to the increasing demand in Metro Manila. Artificial insemination is not yet common for re-production. Big piggery farms keep their feed with feedmills. Sometimes such piggery farms produce pollutants and throw them out to rivers without any treatment, causing sanitation and pollution problems as pig wastes show very high BOD. It is noteworthy that one big piggery farm in Angono, Rizal, raising more than 60,000 hogs has biogas systems which generates self-sufficient energy from hog wastes by methane fermentation, successfully controlling a pollutant.

Fishery

Marine fishery activity in the CALABARZON region is characterized by small scale, off-shore fishery. Fishermen have small banka or boat usually with diesel engine. Marine culture of oyster and mussels is also famous, especially along coastal area of Cavite. Since fishing methods are traditional, the production in one fishing is generally small. The fishermen sometimes use dynamites or some chemicals like cyanides to get more production, which cause serious problem destroying natural reef along the coasts.

Inland fishery is also practiced in Laguna Lake and Taal Lake using fish pens and open capture fishing. Fish pens are usually made with bamboo and net. Fingerlings are obtained by trapping them in "fish coral" or fish trap. In case of Laguna Lake fishery, fishermen live along the lake coast and have small banka with diesel engine. They go to the Lake for fishing almost every day. Fish in fish pens are grown by being fed low cost feed like rice bran. It used to take four months to grow tilapia to commercial size. At present, however, it takes more than one year to grow them to commercial size due, according to fishermen, to deterioration of lake water quality.

A.1.5 Marketing system

Marketing of agricultural products is handled mostly by the private sector. Only cereal crops of paddy and corn are dealt with by the Government (NFA). Being near the huge consumption area, Metro Manila, marketing system seems already established in the Region. Producers bring their products to public market nearby and sell them to consumers, or they sell those products to wholesalers and/or brokers who bring the products to retailers and/or other wholesalers, or to Metro Manila or other consumption centers to sell them. Due to lack of information, the amount of crops cultivated has not been monitored, often causing over-supply. Some tree crops farmers have contract with food processing companies to produce juice or preserves.

Since many sugar companies have direct contracts with farmers for cultivating sugarcane, farmers bring their harvest to sugar mills owned by the sugar companies contracted. Sugar Regulatory Authority (SRA) operates and decides the cane price on sugar content basis.

Coconut farmers process shells into copra through peeling, cutting and drying processes and sell them to brokers or shippers who bring them to processing factories.

Cattle are sold mainly through auction markets held periodically in several cities. Big food companies have their own ranches or feedlots. Some farmers have direct contracts with big food processing companies for fattening.

Considerable number of hog, chicken and ducks are raised on commercial basis. Many of commercial raisers have contracts with big meat processing companies, fastfood restaurants or wholesalers and the products are brought alive mainly to Metro Manila. Animals raised at farm backyard are mainly for domestic consumption, and sometimes are sold to neighborhood.

Marketing of fish is rather difficult for small scale fishermen because mainly of their unstable and small production as well as lack of storage facilities. Since fishermen have to sell daily harvests within a day before fish become rotten, their market is limited to public markets nearby or neighboring houses. Restaurants or supermarkets have direct contracts with fishermen or wholesalers who assure steady amount of fish.

A.1.6 Agricultural support services

(1) Infrastructure

The infrastructure support services of the Government provided to the agriculture sector consist mainly of roads and irrigation facilities.

Roads

The CALABARZON provinces have a total road length of 11,300 kilometers as seen in Table A.18. These roads are a hierarchy of roads from national to provincial to municipal to barangay roads or farm-to-market roads. National roads comprise 19% of the total road length while barangay roads comprise 56%. The national roads are almost paved and in fair conditions (almost 60%) and more than 50% of both city and municipal roads are in good conditions. Provincial roads in good conditions, on the other hand, account for more than 35%. Among the five provinces, Cavite has a considerable network of good roads with a road density of 1.3 km/km² while Quezon has very poor road network with a road density of as low as 0.2 km/km².

For all the five provinces, only 15% of the total barangay road length is in fair conditions. None of these roads are paved. Road density per farm area is the highest in Rizal (3.0 km/km²) and the lowest in Laguna (1.06 km/km²). Batangas and Cavite have about the same road density, 1.8 and 1.7 km/km², respectively. This makes marketing of agricultural products rather difficult.

Irrigation

Due to the prevailing topography of CALABARZON, only 5% of its land area has potential for irrigation (Table A.19). Cavite, Laguna and Quezon have the largest potential area for irrigation with about 20,000 ha each, followed by Batangas (13,600 ha) and Rizal (5,900 ha). Irrigation development in these areas is quite satisfactory with 78% of the total potential area or 62,200 ha already irrigated. The province of Laguna endowed with abundant water resources has the highest percentage of irrigation development with 92% while Batangas has achieved only 54% of the total potential area.

There is a total of 16 national irrigation systems with a total area of 32,500 ha operated by the National Irrigation Administration (NIA), ten of which are in Laguna, four in Quezon and one each in Batangas and Cavite. Cavite has the single largest irrigation development area with the service area of 14,700 ha. Under the ADB finance, this area will increase cropping intensity by expanding dry season cropping area with 6,500 ha through use of Laguna Lake water. One national irrigation project named the Quipot irrigation project is proposed along the border between Batangas and Quezon provinces. This project will cover about 3,000 ha of irrigation area with gravity.

The total number of communal irrigation systems is 331 with a total area of some 17,000 ha, operated by farmers-irrigators' associations and private entities. Also, some 2,800 pump systems with a total irrigated area of 12,700 ha are being operated by farmers.

The present irrigation development program of NIA in the CALABARZON region includes rehabilitation and upgrading of poorly operated national irrigation systems through the Irrigation Operation Support Project (IOSP), development and rehabilitation of communal irrigation systems through the Communal Irrigation Development and Improvement Project (CIDIP) and the Irrigation Component of Comprehensive Agrarian Reform Program (CARP-IC).

Through those programmes as of 1989, cropped area is expected to increase by 3,000 ha for two national irrigation system and by 15,400 ha for 186 communal and pump irrigation systems in 10 years.

(2) Agricultural research and extension

Organizational set-up at national level

Research activities in agriculture are being conducted at the different staff bureaus, such as the Bureau of Plant Industries and Bureau of Animal Industry, of the Department of Agriculture (DA) and at the 12 regional offices. Also, attached agencies like the Philippine Coconut Authority (PCA) of the department, other agencies such as the Philippine Council for Agriculture and Resources Research and Development (PCARRD) of the Department of Science and Technology and state colleges and universities (SCU's) conduct researches related to agriculture. Equally important input to research progress in agriculture are the international research institutions like the International Rice Research Institute (IRRI).

In order to plan and coordinate various research efforts of the different agricultural research institutions, the Bureau of Agricultural Research (BAR) was created in DA by virtue of Executive Order 116. It is mandated to coordinate, integrate, plan, monitor, and evaluate the research programs of DA and its attached agencies, ensuring that there is no duplications and that they are within the department's thrusts and priorities. It is also mandated to source and allocate funds for DA's research programs. In totality, the bureau has the following functions:

- 1) Research coordination and monitoring.
- 2) Program planning and development.
- 3) Technical support on research programs, research designs, training programs, monitoring and evaluation.
- 4) Institutional development in coordination with DA-Agricultural Training Institute.
- 5) Information systems development and research utilization.

While BAR does not have direct authority to monitor and guide the researches of the different SCU's, it has developed an access to these institutions through the 13 region-based research and development consortia through which it links with various research institutions. Three of these institutions were created under the initiatives of BAR; the Farm Systems Research and Development Network (FSRDN), the Agricultural Training Institute (ATI), and the Farming Systems and Soil Resources Institute (FSSRI). These institutions serve as the main conduit for the exchange of information and experiences on farming

systems activities. The bureau has also established linkage with international research institutions, particularly the International Rice Research Institute.

In order to guide practitioners on location-specific priorities of research and extension identified by the farmers and fishermen, BAR has produced the National Agriculture Research and Extension Agenda (NAREA) for 1988 - 1992. This book outlined ten thrusts of research and development at the national level. BAR with its production of NAREA hopes to address problems of research management, specifically duplication and effective programming of researches.

To promote linkage between research and extension, BAR has organized the Research and Utilization Program (RUP). This program has come up with a regular publication of the "Technotrends" and the "Farming Updates". These magazines featured the most recent innovations and inventions in the field of agriculture. The RUP also enhanced linkages with various media. It contributed articles to dailies and other publications. It also facilitated press conferences with DA researchers. BAR intends to enhance and improve more its linkage mechanisms, particularly the publication of Technotrends and Farming Updates.

Research and extension in CALABARZON

CALABARZON being under the administrative jurisdiction of the DA-Regional Office IV is covered by agriculture research programs of the region. For this reason, the description of the research in the area is largely that of Region IV as a whole.

For the conduct of technology generation researches, the region has four regional research stations each located in Mindoro Oriental, Palawan, Lipa City and Los Banos. Technology adaptation and verification are conducted at the eleven provincial research stations (one each for the provinces of the region). The regional research staff is composed of 32 personnel, of which 28 are technical core staff giving the direction through planning and programming, coordinating, monitoring and evaluation, responsible also for requesting and allocation of funds for research. On-farm researches of the region mostly cover technologies on cropping/farming, integration of crops and livestock, varietal improvement and fertilizer management. For 1990, there are a total of 36 studies programmed.

Extension services in the region as in the rest of the Country is carried out through the extension workers called the Agriculture Production Technicians (APT's). Dispersion of these APTs are based on any number of farm families in any barangay. Ideally, one APT should cover 75 farm families plus a radiation area with 75 more farm families. The

distribution of APT's with the corresponding farm families per province in CALABARZON are as follows:

Province	No.of APT's	No.of Farm	No.of Farm/APT
Cavite	136	86,349	635
Laguna	213	34,672	163
Batangas	179	84,356	471
Rizal	110	74,182	674
Quezon	182	37,310	205
Total	820	316,869	386

With the proportion of APT's and farm families shown above, it is not surprising that quite a number of farmers are not contacted by the APT's in a year's time. Moreover, each APT has to deal with any agricultural field including crop production, pest management, animal husbandry, fishery, etc., after the re-organization of the DA.

In Cavite, there is one agricultural college in Indang, Don Severino Agricultural College, doing many activities on research and extension as well as education in cooperation with other agencies concerned. They are studying the possibility of agro-based industry with regards to community development to help small farmers increase income under the assistance of LEAD programme.

Rizal college of agriculture located in Tanay has been studying the possibility of sericulture, making use of the advantageous cool climate in highland, cultivating 2 ha of mulberry. Also cut flower such as orchid and vegetable production has been studied.

(3) Agricultural credit and guarantee

Agricultural credit is being granted by both the private and government banks. From 1984 to 1988, the total amount of credit granted to agriculture was 142 billion pesos, 94% of which were lent from private banks while the remaining 6% is granted by the Government. Government credit facilities was however, expanded to 5.8 billion pesos in 1989 from 3.5 billion pesos in 1988, sharing 19% of the total amount of loans. Among the three lending institutions, LBP has largely been catering to small and medium scale agricultural producers although it shares the smallest percentage of the total amount of loans given to the agriculture sector. In 1988, it shared only 11% while PNB shared 75% of the total loans. Generally, agriculture credit has not really been attractive for the lending institutions because of high risks related to it.

Since loan defaults by small farmers were numerous in the previous years, many rural banks which had been engaged in credit retailing to small farmers, went bankrupt. In its

desire to reverse the situation, the government through the Central Bank, launched a program to revitalize distressed rural banks through debt restructuring and conversion of arrears into government equity. As of December 1989, the participation of 484 rural banks has been approved by the Central Bank under this program.

To make credit attractive, the Government launched in 1988 the guarantee program called the Comprehensive Agriculture Loan Fund (CALF) which covered all consolidated funding programs. Under the CALF, four guarantee institutions were tasked to implement the program; the Quedan Guarantee Fund Board (QGFB), the Guarantee Fund for Small and Medium Scale-Enterprises, the Philippine Crop Insurance Corporation (PCIC), and the Bagong Pagkain ng Bayan under the Local Government Units. In 1989, some 446 million pesos was infused to these four guarantee institutions to encourage lending to the agriculture sector. Under this program, a total amount of 1.2 billion pesos in credit was granted to some 35,987 farmers as of June, 1990. Among the four guarantee institutions, QGFB shares the sizable amount of credit guaranteed (59%). However, PCIC served the most number of clients.

Despite the abundant lending institutions, avail of credit is considerably low in the CALABARZON because of the lack of access to credit facilities. How the prospective clientele could be reached or informed is still impending constraint to delivery of service. With this ascertained problem, the government lending institutions are launching programs on training and educating farmers on credit awareness, loans acquisition, skills and loan repayment ability to provide access and also, to increase farmer's credit worthiness and bankability.

Credit is scarcely available to farmers for three reasons; (1) total credit need is huge and only 6% of the requirement is satisfied by the Government, (2) small farmers are not bankable because most of them do not possess acceptable collateral and agricultural projects are very risky, as there is an inadequate support for cost and risk reducing intervening schemes, and lastly, (3) the cost of lending to agricultural projects is high because of high administration, lending and transaction costs. In the two national surveys, the proportion of farmers who avail loan is only 30% and 48%, respectively. Consistently, in a survey conducted among 1,500 farming households in CALABARZON, only about 36% are credit users.

(4) Crop insurance

A survey conducted to 1,500 farm families within the CALABARZON provinces revealed that 51% of the farmers' dissatisfaction in farming activity is caused by damages brought

about by natural calamities and 27% by pests and diseases. The survey finding is consistent with the location of CALABARZON. Production losses in both rice and corn are largely due to typhoons and floods. In 1989, this accounted to 69.6% and 57.5% of the total losses in rice and corn, respectively. Realizing this constraint to agriculture production, the Government launched a program on crop insurance through the creation of the Philippine Crop Insurance Corporation (PCIC) in 1981. It is a government controlled corporation under the umbrella organization of the Department of Finance which operates all over the Country. It is primarily tasked to provide the farmers with crop insurance services.

Initially, crop insurance was provided for rice and corn only. For these crops, crop insurance is virtually a free insurance given by the Government to the farmers. In March 1988, PCIC expanded its coverage to livestock insurance.

From 1984 to 1988, the number of farmers that avail of insurance services through PCIC was constantly declining. During these years, an average drop of 63% per annum in the number of corn farmer-insurers occurred. The number of rice farmer-insurers, however, dropped less significantly. Rice crop insurance was dwindling from 1984 to 1985 but began to pick-up in 1986. The year 1989 was a fruitful year for crop insurance endeavor which was brought about by tremendous calamity that hit Luzon in late 1988. Crop insurance for the year was all time high in paddy, corn and even livestock which was launched only in 1988.

Crop insurance was also created to make credit attractive to the agriculture sector. Consequently, crop insurance was coupled to agriculture credit to lessen the risk of lending. For this purpose, the present scheme was so conceived as application for agricultural loan is at the same time application for insurance of the intended crop.

The 1989 record of performance of PCIC is high compared to its past performances as shown in Table A.20. However, this does not mean a commendable accomplishment on the part of PCIC. PCIC fields one insurance representative per province. To supplement the inadequacy of personnel, the Municipal Agricultural Officers of DA were deputized as insurance underwriters.

The future prospects of PCIC includes supporting the Government's move toward cooperativism via the implementation of Group Crop Insurance Scheme (GCIS) which shall cater to accredited Farmers' Organizations (FO) under a single Group Certificate of Insurance Cover (GCIC). The FO's shall be self help groups composed of farmers and are

engaged in lending and re-lending to its members who are rice and corn farmers. To increase the awareness of the target clientele of its programs, PCIC utilizes the radio and film-television media for information dissemination on regular programs.

(5) Marketing

The role of the Government in marketing of agricultural products is primarily balancing the market situation for both the producers and the consumers. The Government has institutionalized the market assistance for paddy and corn through the establishment of the National Food Authority (NFA, formerly National Grains Authority). Market assistance for the farmers comes in two forms, stabilization and marketing development.

The NFA operations on stabilization involves the procurement of paddy and corn from farmers in order to build-up sufficient buffer stock and the distribution of these stocks during exigencies. The procurement of grains is also directed towards price stabilization objective of the Government. In 1989, NFA has set the supportive market prices for paddy and corn which were stabilized at 5.00 pesos and 4.50 pesos, respectively. However, although NFA has targeted buying 10% participation with the private sector, only 6% participation has been attained.

The essence of marketing development is based on the objective of the government program on agriculture which is "to make farming pay for the farmers". On rice and corn, marketing has been stabilized as it receives a high level of support. There are a total of 302 NFA buying stations all over the Country of which 37 are in Region IV.

In Region IV, inadequacy of drying facilities is another impending problem. Under CARP support services program for 1990, about 45% of the total number of driers targeted for the whole Country is allocated to this region in order to address this limiting factor to production.

As for marketing of coconut products, the controversial issue on aflatoxin content of copra produced in the Philippines is largely traceable to inefficient drying methods and practices. Researches of PCA proved that the level of aflatoxin in copra which are sun-dried is high. Through continuous effort, PCA has developed a more efficient drying facility for copra called Kukum (Hot-Air) Dryer. The technology has been released for dissemination to coconut farmers.

NFA is embarking on a study to come up with an economically viable systems that would help farmers toward self-reliance through post harvest processing and trading of their

produce. Specifically, the study aims to integrate post harvest processing and trading system where a cooperative-oriented approach operation will be employed.

For non-grains, the government's program does not include participation, rather improvement of market efficiency are directed towards developmental activities like shaping the linkage between producers and market (c.g. corn producers and poultry raisers), providing adequate post harvest facilities and strengthening of the market price information system.

As a marketing support to the agriculture sector, the Quedan Guarantee Fund Board (QGFB) enables the farmers to obtain better prices for their produce. In this concept, farmers are encouraged to store their produce in a QGFB warehouse where a Quedan certificate which can be used as a collateral for loan in accredited banks of QGFB.

Despite its sound objectives, QGFB is tagged as operating on the benefit of "big-time" producers and millers. Statistics show that bigger percentage of credit guaranteed are those of the big producers and millers. Difficulty in convincing banking institutions to lend to the small producers (farmers) still remains a constraint to the realization of QGFB goals.

Also along the line of market development strategy, the Bureau of Agricultural Statistics launched a sub-project of the Accelerated Agricultural Production Project entitled "The Marketing Information System". Its main objective is to establish an integrated and comprehensive marketing information system that is responsive to the farmer's needs which will guide them in planning their production and marketing activities. Implementation strategies include price collection system and determination of commodity flow, packaging market-related information and disseminate to the farmers through local media, establishing a provincial level commodity data bank and undertaking researches on market information delivery system.

QGFB is presently undertaking a study on the marketing of grains which would be more profitable for the producers. The study involves a marketing scheme which would eliminate the middlemen in order to enhance market benefits for the farmers and the consumers.

(6) Agrarian reform

The agrarian reform in the Philippines is an integrated program which contains a set of measures to effect land tenure improvement to provide production and support services. The implementation of the program envisions an empowered and socially conscious rural

population. Hence, the agrarian reform was so conceptualized as an integrated program of development.

This concept of agrarian reform was first implemented through Presidential Decree No.27 which was signed into law on October 21, 1972. This law provided for the transfer of ownership of parcels of land to the tenants-tillers.

The Comprehensive Agrarian Reform Program (CARP), having started in June, 1988, is an expanded version of the Agrarian Reform Program under PD 27. It was formulated under the same framework and concept. As an expanded version of the said presidential decree, the CARP shall cover all public and private lands which are suitable for agriculture regardless of tenurial arrangement and commodity produced. The coverage is specifically defined as those that are:

- a) alienable and disposable lands of the public domain devoted to or suitable for agriculture
- b) other lands owned by the government devoted to or suitable for agriculture, and
- c) private lands devoted to or suitable for agriculture regardless of the agricultural products raised or that can be raised thereon.

Under the CARP, land owners are allowed to retain five-hectare portion of their land and three-hectares each for their children who is at least 15 years of age and actually tilling the land. A program beneficiary shall be awarded three hectares of land.

The highest implementing authority of CARP is the Presidential Agrarian Reform Council (PARC) chaired by the President of the Philippines. The membership of the council consists of the top officials of, Department of Agrarian Reform (the Vice-Chairman), DA, DTI, Department of Budget and Management (DBM), Department of Finance (DF), DPWH, DENR, NEDA, Department of Local Government (DLG), Department of Labor and Employment (DOLE), LBP, and NIA. Incidentally, the represented agencies in the PARC membership are cooperating agencies in CARP implementation. It is the policy-making body as well as the sole authority to allocate funds for the implementation of the program.

The Department of Agrarian Reform (DAR) which has the primary mandate is the lead agency in the implementation of CARP. It is primarily in charged of land acquisition and

distribution. As the lead agency, it also performs the function of coordinating and monitoring the support services for CARP beneficiaries. The following are the agencies involved in acquisition and distribution of lands: (a) DENR, (b) Assessor's Office, (c) Land Registration Authority, (d) Municipal Treasurer's Office, (e) LBP and (f) DA. The major agencies that provide support services are: (a) LBP, (b) DPWH, (c) NIA and (d) DA.

The implementation of the program is a collaborative effort of different government agencies spearheaded by DAR.

Land transfer

There are three phases in the scheme of CARP implementation which actually covers the order of priority of land distribution.

Phase I

- a) rice and corn lands which were described under PD 27,
- b) all idle and abandoned lands,
- c) private lands voluntarily offered for sale,
- d) lands foreclosed by government financial institutions,
- e) all lands acquired by the PCGG, and
- f) all lands owned by the government which are suited for agriculture.

Phase II

- a) all which are alienable and disposable public agricultural lands under agro-forest and pasture,
- b) public agricultural lands to be opened for new development, and
- c) resettlement and private agricultural lands in excess of 50 hectares.

Implementation schedule for Phase I and II is from 1988 until 1992.

Phase III

- a) landholding above 24 hectares up to 50 hectares to be implemented in 1992-1994, and
- b) landholding 5-24 hectares to be implemented 1994-1998.

Support services

Support services given to the agrarian reform beneficiaries are being phased according to the program and accomplishment of land transfer. Efforts have been directed towards

involving the agrarian reform beneficiaries in determining the type of support services that should be delivered in specific CARP areas to properly address their needs via programs and projects of implementing agencies. Along this end, the active participation of concerned government agencies, NGO's and other support groups are encouraged.

CARP funds

The CARP being the one of the priority programs of the present administration, has an automatically appropriated funds. These funds are being sourced from the proceeds of the assets privatization, sale of government properties abroad, sale of assets sequestered by PCGG and the Government's annual budget through General Appropriations Act. PARC has sole authority to control the CARP Fund. For the years 1987-1989, PARC approved a total of 17.5 billion pesos. Of this amount, 6.3 billion pesos was released but disbursements stood at 4.3 billion pesos only. The total disbursement covered some 430,730 hectares of land distributed which is 67% of the total target. Per provision of the law, 25% of the CARP fund shall be allotted for support services to the beneficiaries.

Implementation of CARP in CALABARZON

In the CALABARZON region, the implementation of CARP is taking a commendable pace. Based on its annual targets, accomplishments on land acquisition and distribution are rather high. As of December 1989, accomplishment stands at 226% in land acquisition and 81% in land distribution against the total target (Tables A.21 and A.22). The total target area of CARP for the next five years (1990-1994) is 87,238 ha, broken-down as follows: 8,352 ha in Cavite, 11,578 ha in Laguna, 14,513 ha in Batangas, and 10,437 ha in Rizal, and 42,356 ha in Quezon.

Infrastructure component of the CARP is being phased according to the identified CARP areas. In the CALABARZON region, there are at least 65 projects identified for the construction and rehabilitation of roads and bridges. Thirty-six of these identified projects are confirmed for implementation. These projects are being implemented by DPWH.

Irrigation projects identified number 18. These projects are mostly communal-size irrigation projects (less than 1,000 ha) which are either for rehabilitation or generation of new areas. Five projects are now on-going construction. These projects are being implemented by NIA under the CARP-IC Project.

Agricultural extension is dispensed by DA to the agrarian reform beneficiaries. It is a package of assistance given to the beneficiaries which include farming technology and livelihood in both financial and technical assistance. Farming technology includes those

implemented under the DA regular program at an intensified implementation scheme. As of June, 1990, a total of 15,224 beneficiaries are being serviced by DA through its Agriculture Production Technicians.

(7) Rural institutions

Government agencies' strategy towards effective and facile distribution of goods and services includes organizing rural institutions composed of the clientele themselves.

The present administration recognizes the importance of agricultural cooperatives as one of the means to uplift the living standards of the people in the rural areas specifically the farmers. The establishment of cooperatives is sanctioned by the 1986 constitution which recognizes it as an instrument to achieve social justice and economic development.

In line with the Government's support for the enhancement of the cooperatives, the Cooperative Development Authority (CDA) was created under the Office of the President with the passage of Republic Act No.6939 in July 1989. Under the republic act, CDA was charged with the powers to regulate, monitor and support the cooperatives. It is also responsible for the formulation and implementation of comprehensive plans and programs on cooperative development.

CDA is governed by a board of administrators consisting of six members. Under the board of administrators, is the executive director who is responsible for the discharge of the authority's functions. CDA operates nationwide and its functions are extended through the seven extension offices located in Manila, Dagupan, Naga, Cebu, Iloilo, Cagayan de Oro and Davao. The creation of CDA replaced the Bureau of Agricultural Cooperative Development (BACOD) in order to provide a stronger government machinery in support for the development of cooperatives. It was established in the middle of 1990.

The present cooperative development program stands on three basic premises:

- 1) Cooperatives are a means of effecting income and wealth redistribution and as such they should be accorded special privileges by the Government.
- 2) Cooperatives should be built from the bottom. This requires effecting attitudinal changes demanding a learning process which may be completed only after a sufficient span of time.

- 3) Cooperatives shall be developed into a system by integration into a single national development scheme.

As of December 31, 1989, there are 6,481 primary cooperatives all over the Country. They consist of six types of cooperatives, namely credit, consumers, producers, marketing, service and multi-purpose. Of the total cooperatives existing, 36% are credit, 29% are multi-purpose and 17% are consumers cooperatives. Among the thirteen regions, Region IV accounts for the largest number of cooperatives. In the CALABARZON region, total cooperatives is 433, of which 223 are pre-dominantly credit cooperatives as shown in Table A.23.

At present, government programs concerning the delivery of services to the farmers are channeled through the cooperatives. Among these are credit programs, credit guarantee programs, livelihood enhancement programs, agriculture production programs, and other assistance programs.

Irrigators' associations

In the early 1980's, NIA realized the importance of organizing group of irrigation beneficiaries into Irrigators Associations to facilitate water distribution. Associations did not only solve water conflicts but also helped the agency in collecting irrigation service fees and in maintaining irrigation facilities. In case of communal irrigation projects, the irrigators' association provided a ready source of labor during construction period. At present, there are 62 irrigators' associations under the national irrigation systems and 254 under the communal irrigation systems (Table A.19). In the case of the associations under the communal irrigation systems, the agency still supports the associations in the management of the systems in order to maintain the viability of these associations, and in turn to enable them to pay the cost of construction of the system.

A.2 Constraints to CALABARZON Agricultural Development

Based on the analysis of the present agriculture conditions, several issues related to future agricultural development in CALABARZON have been identified. Those constraints are classified into following categories by the nature of constraints:

- 1) Natural condition,
- 2) Farming practice,
- 3) Poverty of farmers,
- 4) Support services by the Governments, and
- 5) Competitiveness with other sectors.

(1) Natural condition

Water resources

As described above, unreliable and scarce rainfall in the dry season makes crop productivity lower in the dry season in the Cavite, Batangas and Rizal provinces. Large scale development is not expected in Cavite since watersheds are small. Small Water Impounding Projects may solve this issues. Taal Lake development and irrigation development in lowland will be expected in Batangas, while implementation of reforestation or agro-forestry development programme in the Marikina watershed should be taken in Rizal for water conservation. Very small scale rain water harvesting will be another option at each farm level.

Soil erosion

Steep mountain side and volcanic ash soil area should carefully be developed to avoid acceleration of soil erosion. The foot of the Tagaytay ridges in both Cavite and Batangas, the Marikina watershed, steep mountain range in Laguna, Bondoc peninsula in Quezon, Infanta and Polillo islands are such areas. It is necessary to take some measures like terracing, contour tillage, permanent crop cover, etc. to avoid further erosion.

Low fertility of upland soils

The types of soil on upland are of low fertility and strongly acidic in spite of their favorable physical characteristics. Those soil types require much input to attain better yield. However, fertilizer seems not effective under present farming condition due probably to leaching by intense rainfall during wet season. Some measures should be taken to make fertilizer effective. Inter-cropping may be one solution to this issue to avoid fertilizer leaching preventing soil surface from direct reaching of rain.

(2) Farming practice, production and marketing

Low crop production of upland farmers

Farming systems of upland crops including corn, vegetables and fruit trees do not seem to have been established yet at farm level. The yields of upland crops are sometimes very low, or the level of farm input is sometimes extremely high to get high yield. There are some publications regarding the farming practices of such crops but the technologies have not been extended to farmers. There may be several reasons for explaining this: (a) existing recommended farming practices are not proper ones for various reasons so that they are not extended to farmers, (b) extension services do not function well even in the case that recommended technologies are appropriate, and (c) farmers are not capable of understanding the technology. Proper farming systems should be adopted by improving present constraints so that farmers can apply them.

Decreasing number of animals

The imbalance between the supply and demand of animal meat has caused the decline of the number of animals being raised not only in CALABARZON but also in the Philippines as a whole. It is reported there are technical, economical, policy and institutional constraints. The ADB-assisted livestock sector program is expected to solve the present issues.

Unstable fish production

Fishery production in Laguna de Bay has decreased drastically. There are several arguments to explain this phenomenon: (1) pollution of Laguna de Bay, (2) over fishing in the past, and (3) siltation of Laguna de Bay. Another problem is that it now takes more than 12 months for fish to become commercial size, which is much longer than before (it took about 4 months). The determination of countermeasures should be made after the identification of the causes.

Marine aquaculture of oysters and mussels was seriously affected by recent red tide. Such fishery activity should also be diversified through introduction of fish processing technology like making smoked fish and/or dried fish, or introduction of other fish species such as seaweeds, lobster, pearl, tilapia sea culture and lapu-lapu culture.

Illegal fishing in coastal areas

Some fishermen catch fish using dynamites and poisonous chemicals which are not allowed to use. This activity will cause not only depletion of fish resources by killing small

fingerlings but also destruction of natural coral reef where fish live. A patrolling system should be introduced to manage coastal zones and "eradication campaign on illegal fishing" should be made in order that fishermen realize the importance of preservation of environment.

Unstable international market price of tradable commodities

Being internationally traded crops, the prices of coconut, sugarcane, coffee and blackpepper are determined by international supply-demand conditions. Those prices are unstable in general, and the income of the growers also depend on those prices. Monoculture of those crops will be risky business. Such producers should diversify the production through introduction of multi-cropping and/or backyard livestock production.

(3) Poverty

Most farmers in CALABARZON feel that their income is not enough to support their families. Many farmers are small and sometimes they are tenant farmers who have to give considerable portion of harvest for land owners. Due to low productivity of soil, unreliable rainfall, improper farm management, low level of infrastructure development, etc., crop production have remained at low level. Aside from the low level of crop productivity, prices of products fluctuate much depending on the balance between supply and demand amounts except for rice and corn of which the Government tries to control market prices. In order to solve a series of these constraints, several countermeasures should have to be taken. They are:

- completion of the present Agrarian Reform to give incentives especially to small scale and tenant farmers,
- establishment of upland farming system in combination with livestock farming,
- diversification of crops, and
- enforcement of market information system.

(4) Support services by the Government

Poor infrastructure development

Road networks in remote areas are identified as constraints to future development. Farm-to-market roads or barangay roads have not been paved at all in many parts of rural areas. This sometimes makes farmers feel isolated. To ease accessibility to market, such road networks should be improved.

Irrigation facilities are generally well-established in the CALABARZON region. However, some areas especially in Batangas and CARP beneficiary areas are to be developed for irrigation.

Post-harvest facilities like dryers, warehouses, rice-mills, etc. are also not sufficient in capacity. Wet season paddy is often lost by lack of dryers after harvest. Mechanical dryers with drying spaces should be established in proper places.

Poor research and extension activities

Shortage of fund for conducting research works, lack of training for researchers and technicians, and insufficient equipment and instruments for research are the major constraints.

The number of Agricultural Production Technologist (APT) seems insufficient for the number of farmers. Moreover, APT has to cover all fields of agriculture after the re-organization of DA, which makes extension or information exchange difficult.

Agricultural production will be enhanced by strengthening linkages between research and extension activities as well as training of research and extension workers.

Credit, insurance and guarantee

The flow of credit to the agriculture sector is really unsatisfactory and government intervention to this is very minimal. Barely 6% of the huge amount of credit needs is provided by the Government. More often than not, the credit users of private lending institutions are the large producers because these institutions would not cater to small farmers as they are not bankable. Access to such credits are rather difficult due to small number of branch offices and to complicated procedures to avail loans. Hence, the farmers are left to the mercy of informal lending systems which impose high interest rates.

The Comprehensive Agricultural Loan Fund (CALF) will play an important role to encourage lending to the agricultural sector with an effort to strengthen the farmers' institution like cooperative development.

Cooperative development

Cooperative development will be a prospective measure to give farmers strong basis for improving their living conditions. Under the support by the newly established Cooperative

Development Authority, cooperative development should be enforced through man-power training, integration, funding, etc.

(5) Others

Land conversion

Due to the expansion of Metro Manila, urbanization and/or industrialization continue at the sacrifice of agricultural land, especially lowland paddy area in Cavite, Laguna and Rizal. Although the provincial governments have their own land use plans, it is feared that agricultural land will ultimately be converted into other purposes unless any effective law on land use plan is established, as land productivity is much higher in industry than in agriculture.

Import liberalization policy

Present import liberalization policy strongly recommended by IMF and the World Bank may hinder the development of livestock sector since the imported prices of red meat, milk and corn are lower than those of domestic products. If the Government has a strong intention to re-develop livestock sector, this sector should have to be protected from the said policy.

A.3 Objectives and Strategy for Agricultural Development

A.3.1 Existing development policies and objectives

(1) National development policies and objectives

In the process of pursuing the national development goals and objectives, the agricultural sector is expected to play an essential role by providing a firm foundation for an equitable efficiency and sustained growth. As agriculture is basically private sector business, however, the role of the Government is to create the policy and institutional framework and to provide the necessary incentives and investments in such areas as infrastructures, research and technology.

The Medium Term Philippine Development Plan, 1987 - 92 set the following objectives for agricultural/rural sector:

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

The prime thrusts of the Government's agricultural policies, as clarified for PAP (MAI) in line with the Mid-Term Plan, are (1) to increase the real incomes of farmers and fishermen to an above-the-poverty-line level by 1992, and (2) to provide adequate food for the Country's growing population.

Expanded support services shall be extended to farmers, fishermen and agri-business in general, and to particular groups which have been disadvantaged due to the inequitable distribution of resources or market failure. These groups include agrarian reform beneficiaries, upland farmer families, subsistence fishermen, cultural communities and cooperatives.

Completion of agrarian reform is expected to be the centerpiece of the effort towards centerpiece distributive justice to ensure that the gains from agricultural growth are fully transmitted to small farmers. The objectives of the Agrarian Reform program are:

- 1) To resolve the issue on land titling, registration, land disputes and ownership;
- 2) To complete the process of transferring land ownership to farmers and farm workers, including landless rural workers;
- 3) To expand the scope of agrarian reform to other arable lands regardless of crops planted;
- 4) To improve the productivity and nutritional status of farmer-beneficiaries through improved access to land/water resources, appropriate family-sized farm technology and land development projects;
- 5) To attend the development of agrarian reform beneficiaries' human resources, encourage all forms of farm cooperation, and promote the improvement of conditions among rural families through their independent organizations;
- 6) To protect the rights of landless rural workers, as well as of tribal/cultural communities;
- 7) To provide a data base for agrarian reform; and
- 8) To provide a workable compensation scheme for expropriated properties.

(2) Regional development policies and objectives

The Medium-Term Southern Tagalog Development Plan, 1987 - 92 has adopted a two-pronged strategy consisting of agro-modernization and growth corridor development. The agro-modernization strategy derives from two prime factors: (a) accelerating urbanization/industrialization that applies pressure on prime agricultural lands, and (b) increasing

demand for food and more diversified products from the Region. The other factor is that the agricultural sector in Region IV as a whole attained only a modest growth in the recent past, although Region IV played a leading role in the production of some primary products such as cattle, poultry, hog, vegetables, fish, coffee, coconut and sugar. The agro-modernization will be realized through capital- and labor-intensive technology.

Crops and livestock

Under the basic strategy of agro-modernization, a range of programs are being implemented covering crop production, livestock, fishery and forestry. For crop production and livestock production, the emphasis is on productivity to attain regional self-sufficiency in basic foodstuffs. Specific aims are:

- a) intensified rice production,
- b) intensified corn and feedgrain production,
- c) livestock and poultry production and development of dairy industry,
- d) intensified vegetable production, and
- e) commercial and export crop and fruit tree production.

Various support facilities and services will be expanded to attain these aims. Infrastructure supports include irrigation and drainage facilities, post-harvest and marketing facilities. Other supports include development of intermediate and labor-intensive technologies and associated extension services, efficient system of pricing, financing and other incentives, land reform and related surveys, and development of community and human settlement systems conducive to agro-modernization and self-reliant rural socio-economy.

Fishery

Three elements of the fishery development strategy are (a) expansion of fish production, (b) efficient fish and fishery product utilization, and (c) fishery law enforcement and conservation.

The first component relies on expansion of fingerling production and dispersal, research and extension services, improvement for existing fishing crafts and motorization of fishing boats for aquaculture and municipal fisheries. For commercial fisheries, the government assistance includes extension on boat design, identification of new fishing grounds, and credit support.

The marketing component emphasizes proper handling, storage and processing. The law enforcement tries to prevent illegal fishing methods such as use of dynamite and cyanide

chemical fishing. Actual fishery conservation projects will include the construction of artificial reefs and the implementation of "close season" in critical areas.

Forestry

Despite the abundant forest potential, reforestation and afforestation, parks and wildlife conservation and management will be main concern of the Region IV, considering the possibility of overlogging. The government programs concentrate on maintenance of field nurseries, reforestation, industrial tree plantation, agro-forestry and tree farm lease agreements.

A.3.2 Development potentials and targets in CALABARZON

(1) Development potentials

Crop yields

The crop yields in the Region are strongly influenced by climate, soil and farming technology including fertilizer application. The present yields of cultivated crops are not high as compared with national average yields, as shown in Table A.12. It means the Region still has big potential to increase productivity if measures are properly taken.

Since no target crop yield for the Region has been available from the Government, target yields of major crops have been set for the Study by 1995, 2000 and 2010 taking infrastructure development situation and level of farming technology into consideration. Those are shown in Table A.24 and summarized as below.

Crop	<u>Target Yields</u>			
	1988	1995	2000	(tons/ha) 2010
Palay	2.4	2.8	3.1	3.6
Corn	0.9	1.4	1.8	2.4
Tomatoes	8.8	9.3	10.3	12.5
Mango	4.2	5.2	6.4	8.7
Sugarcane	69.0	72.0	76.4	82.1
Coconut	4.7	4.9	5.2	5.8
Coffee	1.0	1.2	1.3	1.7

Source: JICA Study Team

Estimated harvest area by crop

There exist 830,000 ha of agricultural land and 280,000 ha of grassland/shrubland in the Region. Grassland/shrubland have been formed mostly as a result of logging or "kaingin" activity. Those lands are not much expected to be future agricultural land but may partly be

utilized as forage land for livestock production. A part of present agricultural land in Cavite, Laguna and Rizal provinces near Metro Manila may be converted into other land use purposes such as residential and industrial area as a result of spill-over from Metro Manila.

Considering that future physical agricultural area is estimated at 820,000 ha at 2010 by decreasing proportionally from present condition. Future agricultural land use is estimated and presented in Table A.25 and summarized as below.

<u>Future Harvested Area by Crop, CALABARZON</u>				
	(ha)			
Crop	1988	1995	2000	2010
Paddy	169,800	185,600	194,600	194,600
Corn	219,000	221,000	230,000	240,000
Tomatoes	2,100	2,700	3,100	3,600
Field crops/Vegetables	5,000	6,000	7,000	8,000
Mango	5,600	6,100	6,600	7,500
Coconut	391,200	390,800	390,800	390,800
Sugarcane	28,100	25,000	21,500	21,000
Other Perennials	37,000	38,000	39,000	40,000
Total	826,000	822,000	818,000	816,000

Estimated crop production

The amount of crop production is estimated on the basis of target yield and harvested area set above. Estimated production of major crops is presented in Table A.28 and summarized as below.

<u>Estimated Crop Production in CALABARZON</u>				
	('000 tons)			
Crop	1988	1995	2000	2010
Paddy	409	516	596	698
Corn	198	304	408	565
Tomatoes	19	25	32	45
Mango	23	32	43	66
Coconut	1,823	1,926	2,028	2,262
Sugarcane	1,939	1,801	1,643	1,725

Livestock and poultry production

Future livestock and poultry production will increase to meet the increasing demand for meat in Metro Manila. Future production by the years of 1995, 2000 and 2010 in the Region is estimated by province as shown in Table A.27, considering the interaction of this sub-sector with other sectors as a result of future development. Overall estimated production is summarized as below.

Estimated Livestock and Poultry Production in CALABARZON

Animals	1988	1995	2000	2010
Cattle	10,500	10,700	11,200	12,600
Carabao (carabeef)	4,500	4,000	4,000	4,000
Hog	78,700	89,500	97,000	105,000
Chicken	53,500	73,000	83,000	106,000

(tons)

Milk production

In order to increase the self-sufficiency level, milk production will increase by encouraging small farmers. Future estimated production by province by target year is presented in Table A.27. A summary table is shown below.

	1990	1995	2000	2010
Estimated Milk Production	450	950	1,550	2,900

(kl)

Fishery production

Considering various constraints to future fishery development such as the pollution problem of Laguna Lake, illegal fishing along coastal area, lack of storage facilities, etc., rapid increase of fishery production will not be expected. Estimation of future fishery production by province and by target years is made and shown in Table A.28.

Estimated Fishery Production in CALABARZON

	1988	1995	2000	2010
Marine Fishery	97,000	106,000	117,000	137,000
Aquaculture	47,000	47,000	47,000	47,000
Inland Fishery	193,000	193,000	193,000	193,000
Total	337,000	346,000	357,000	377,000

(tons)

(2) Development targets

Based on the development potential set in the previous section, development targets are set at various years by province. They are shown in Tables A.29 and A.30, and summarized as below.

Value added

	1988	1995	2000	2010
Crops	13,497	16,017	18,252	23,268
Animals and Milk	3,933	4,736	5,221	6,129
Fish	6,000	6,175	6,395	6,795
Total	23,429	26,929	29,868	36,193

(million pesos)

Labour requirement

	('000 man-day)			
	1988	1995	2000	2010
Total Labour Requirement	50,023	50,773	51,225	51,581

A.3.3 Objectives and basic strategy for CALABARZON agriculture

(1) Objectives

Considering the factors affecting living conditions expressed by farmers through the agro-socio-economic survey, and in line with the national and regional development objectives, the objectives and basic strategy of the future agricultural development in the CALABARZON region are set as follows:

- 1) to increase farm income,
- 2) to stabilize farm income, and
- 3) to create employment opportunities.

(2) Basic strategy

To attain the above objectives, basic strategy is set as follows:

- 1) to increase crop production, livestock production and fishery production for the objectives 1 and 3;
- 2) to stabilize marine fishery production, and recover the inland fishery production for the objective 2 and 3;
- 3) to diversify agricultural activity by integration of crop, livestock and fishery production activities, taking marketing and price into consideration, for the objectives 2 and 3; and
- 4) to pursue sustainable agriculture in harmony with the natural environment for the objective 2.

A.3.4 Specific strategy for CALABARZON agricultural development

(1) Specific development strategy

Under the basic strategy, the following more specific strategies should be taken.

For increasing crop production

- Irrigation development
- Saving post-harvest losses
- Better farming practice
- Increase farm input
- Enhancement of farmers' incentives

For increasing livestock production

- High quality breed supply
- Recover the number of breed
- Increase forage crop production
- Artificial insemination
- Veterinary service
- Food processing development

For increasing and stabilizing fishery production

- Enforcement of law
- Education
- Artificial reef development
- New culture method development
- Institutional arrangement
- Environment improvement

For diversifying agricultural activity

- New/improved cropping system
- Introduction of new crops
- Linkage between crop production and livestock/fishery production
- Integrated farming
- Improvement of marketing and pricing

For pursuing sustainable agriculture

- Agro-forestry development
- Erosion control
- New farming practice

(2) Strategic crops

In order to focus the development efforts on selected and more promising crops, strategic crops have been selected for agricultural development in the Region. Agro-ecological condition in the Region was considered for the selection so that the crops can be reasonably distributed. They are the following.

- a) Lowland Crops:
paddy, corn, sugarcane and vegetables
- b) Upland Crops:
corn, sugarcane, coconut, fruit trees, root crops and vegetables
- c) Highland Crops:
coffee, blackpepper and, vegetables

(3) Definition of the sub-regions and strategy by sub-region

Based on the agro-climatic and present socio-economic conditions, 25 sub-regions are identified for the future agricultural development. They are shown in Figure A.1 and their features are briefly explained in the following.

Lowland agricultural areas

(a) Cavite coastal agricultural area (Area No.1)

Area: 21,000 ha.

Agro-climate: Annual rainfall of less than 2,000 mm with distinct dry season; annual average temperature of 26 to 27°C.

Present land use: Double cropping of paddy under irrigation, aquaculture for oysters and mussels along the coast.

Proposed cropping pattern: Paddy-paddy; Paddy-vegetables; Vegetables-vegetables.

Socio-economic condition: Since this area is adjacent to Metro Manila, urbanization and/or industrialization is being proceeded in a surrounding area, which affects agricultural activity in terms of land use and employment.

Strategy: Productivity of paddy should be increased by further extension of irrigation as well as by proper extension of farming technology. Crop diversification should be promoted under on-going programs mainly for vegetables. Post-harvest facilities and market information system need

to be upgraded to reduce post-harvest loss and avoid over-supply. Early clarification of issues related to CARP implementation is needed.

Farm mechanization should be advanced for the anticipated labor shortage due to substantial absorption of labour in industry and related services.

Aquaculture along the coast should be preserved/enhanced as it has established markets.

(b) Laguna lakeshore agricultural area

1) Laguna west agricultural area (Area No.2)

Area: 4,000 ha.

Agro-climate: Annual rainfall of less than 2,000 mm with distinct dry season; annual average temperature of 26 to 27°C.

Present land use: Double cropping of rice under irrigation

Proposed cropping pattern: Paddy-paddy; Paddy-vegetables.

Socio-economic condition: Being adjacent to Metro Manila, urbanization and/or industrialization is being proceeded in a surrounding area, which is affecting the agriculture in terms of land use and employment.

Strategy: Further urbanization/industrialization from Metro Manila is inevitable, and agriculture should take this as a premise. Productivity of paddy should be further increased by utilizing higher level of input and agro-chemicals. As more people will engage in industry and services, farm mechanization should be promoted to reduce labour requirement.

2) Laguna south agricultural area (Area No.3)

Area: 17,000 ha.

Agro-climate: Annual rainfall of between 2,000 and 3,000 mm with distinct dry season; annual average temperature of 26 to 27°C.

Present land use: Double cropping of rice under irrigation with livestock/poultry, fisheries.

Proposed cropping pattern: Paddy-paddy; paddy-diversified crops; integrated agriculture (crop-livestock, crop-fishery)

Socio-economic condition: Still agriculture is the dominant economic sector. Thanks to its abundant water resources and advantageous location for getting advanced technology, crop productivity in this area is high.

Strategy: Existing paddy fields should in principle be preserved, and its productivity increased by utilizing high level of input. Provision of post-harvest facilities needs to be improved, including rice dryers, rice mills and warehouses. Crop diversification will be realized with the provision of marketing information and outlets.

Rural economy in the area should be diversified by further promoting poultry and piggeries, and much enhancing livestock with dairy production as well. Primary processing, administration and related services would further add to diversified economy.

An important strategy for individual farmers is to combine crop cultivation with livestock for an integrated farming system. Recycling of waste may be used for biogas digester to generate energy and organic fertilizer as residuals. Crop residues and weeds may be used as animal feed. These practices not only reduce organic wastes discharged to the lake but contribute also to reducing production costs. Research and extension should be effected through cooperatives for wide application of these practices.

3) Sta. Maria lowland agricultural area (Area No.4)

Area: 5,000 ha.

Agro-climate: Annual rainfall of between 2,000 and 3,000 mm with distinct dry season; annual average temperature of 26 to 27°C.

Present land use: Double cropping of rice with poultry

Proposed cropping pattern: Paddy-paddy, Paddy-diversified crops, integrated agriculture (crop-livestock)

Socio-economic condition: Agriculture is the dominant economic sector. Dry season crop is restricted due to lack of irrigation water.

Strategy: The same strategy will apply to this area as that for the Laguna south agricultural area for increasing paddy productivity and diversifying crops. Integrated farming should also be promoted as described above.

(c) Batangas eastern lowland agricultural area (Area No.5)

- Area: 25,000 ha.
- Agro-climate: Annual rainfall of less than 2,000 mm with distinct dry season; annual average temperature of 26 to 27°C.
- Present land use: Upland rice, sugarcane, corn, etc.
- Proposed cropping pattern: Paddy-paddy; paddy-corn; feed grain production; livestock production
- Socio-economic condition: Economic activity is not so active and development is left behind. People cultivate crops mainly for domestic consumption. Lack of basic infrastructures such as road, irrigation and drainage are constraints to future development.
- Strategy: Paddy-based agriculture should be established with the provision of irrigation facilities and improved access. In addition to corn, soybean may be introduced to increase the feed production to support the livestock development in this and adjacent areas. Limited areas where irrigation is difficult should be devoted to coconut-based multi-story cropping. Increased post-harvest facilities should be provided for paddy and corn.

(d) Batangas western lowland agricultural area (Area No.6)

- Area: 8,000 ha.
- Agro-climate: Annual rainfall of between 2,000 and 3,000 mm with distinct dry season; annual average temperature of 26 to 27°C.
- Present land use: Double cropping of rice under irrigation; sugarcane.
- Proposed cropping pattern: Paddy-paddy; paddy-diversified crops; sugarcane; integrated agriculture (crop-livestock)
- Socio-economic condition: Sugar industry has sustained the life of local people. Double cropping of paddy is also seen. The implementation of CARP may change the present condition.
- Strategy: Paddy productivity should be increased with higher input utilization. Sugarcane production will continue to support the existing sugar refinery, but its area will be reduced after the CARP implementation. Instead, diverse crops will be introduced to increase and stabilize farm income. CARP beneficiaries should be supported by the provision of

basic infrastructure and agricultural credit. Livestock activities, especially of cattle, should be promoted with the use of baccas.

(e) Quezon lowland agricultural area

1) Quezon west lowland agricultural area (Area No.7)

Area: 15,000 ha.

Agro-climate: Annual rainfall of less than 2,000 mm with distinct dry season; annual average temperature of 26 to 27°C.

Present land use: Paddy-paddy; Coconut

Proposed cropping pattern: Paddy-paddy; integrated agriculture (coconut-livestock/crop)

Socio-economic condition: Thanks to abundant water resources and flat fertile soil condition, irrigated paddy and coconut are produced with rather high yield. With infrastructure development, paddy yield will more be enhanced.

Strategy: Paddy production will further be increased by modernization of irrigation facilities and higher level of farm inputs. Livestock production will also be promoted so as to establish integrated farming, as in the Laguna southern lowland agricultural area.

2) Infanta delta agricultural area (No.8)

Area: 6,000 ha.

Agro-climate: Annual rainfall of more than 3,000 mm with no distinct dry season; highly humid, annual average temperature of 26 to 27°C.

Present land use: Paddy-paddy; coconut, forest

Proposed cropping pattern: Paddy-paddy; Carabao production; Coconut

Socio-economic condition: Agriculture is the dominant sector in economy. Thanks to abundant rainfall, double cropping of paddy is possible. Coconut is also cultivated in rather wider area. This area is also famous for its carabao production. The biggest constraints to further development is non-established road network. West of Infanta is prone to soil erosion as a result of overlogging of forest trees.

Strategy: Agricultural productivity will further be increased by improvement of irrigation facilities and by use of high level of input. Coconut production will also be increased through replanting or rehabilitation. Carabao production will be increased to prevent the decrease in the

number of working animals. All these activities will be vitalized by the upgrade of road which accesses to Metro Manila area. Reforestation or agro-forestry programme should be made in the west of Infanta.

3) Lopez-Calauag coastal agricultural area (Area No.9)

Area: 5,000 ha.
Agro-climate: Annual rainfall of 2,000 to 2,500 mm evenly distributed throughout the year; annual average temperature of 26 to 27°C.
Present land use: Paddy; Coconut
Proposed agricultural activity: Brackish water aquaculture, paddy
Socio-economic condition: Coconut is the main crop in the area. Patches of paddy are also seen along the coast. Off-shore fishing activities help people to take protein sources.
Strategy: Brackish water aquaculture will be developed in coastal area making most of natural mangrove forestry. Paddy production will be increased by facilitating irrigation system.

4) Tayabas bay coastal agricultural area (Area No.10)

Area: 20,000 ha.
Agro-climate: Annual rainfall of 2,000 to 2,500 mm with no dry season; annual average temperature of 26 to 27°C.
Present land use: Paddy; Coconut
Proposed cropping pattern: Paddy-paddy; integrated agriculture (coconut-livestock/crop)
Socio-economic condition: Coconut is the main crop in the area. Patches of paddy are also seen along the coast. Fishing activities help people to take protein sources.
Strategy: The same strategy will be applied to this area as that for the Lopez-Calauag lowland agricultural area. Establishment of access to this area will be pre-requisite to improve socio-economic condition.

Upland agricultural areas

(a) Cavite upland agricultural area

1) Cavite lower upland agricultural area (Area No.11)

Area: 31,000 ha.

Agro-climate: Annual rainfall of less than 2,000 mm with distinct dry season; annual average temperature of 24 to 26°C.

Present land use: Tree crops (mango, guava), pasture, corn, sugarcane.

Proposed cropping pattern: Integrated farming with tree crops and livestock

Socio-economic condition: Due to critical water availability, agricultural activity is restricted to wet season except orchard area. Cavite province appointed a part of this area along the Carmona to Ternate road as industrial development area in its land use plan.

Strategy: Land development for agriculture in the area should pay utmost attention to the prevention of soil erosion. More tree crops should be planted, multi-story cropping encouraged, and vegetables, root crops and feed grains cultivated by applying contour tillage or terracing. These crops fit well with agro-ecological conditions and marketing advantages of the area. Agro-based industry for primary processing of fruits may be established along the main roads in the mid- to the long term.

Livestock production, especially of cattle, can also be increased substantially. For this, pasture should be improved and well managed in slope land.

2) Cavite higher upland agricultural area (Area No.12)

Area: 17,000 ha.

Agro-climate: Annual rainfall of less than 2,000 mm with distinct dry season; annual average temperature of 20 to 24°C.

Present land use: Coconut based multi-story cropping (papaya, pineapple, coffee, banana, blackpepper, jackfruit, etc.); Vegetables; Ornamental flower.

Proposed cropping pattern: Tree crop based integrated farming.

Socio-economic condition: Land is used intensively along Silang to Tagaytay road. High value crops are cultivated taking advantage of cooler climate condition.

Strategy: Coconut based multi-cropping should be further promoted, as it suits to friable soil texture, slope and extended dry seasons observed in the area. Perishable vegetables will be encouraged to take advantage of the cool climate. Backyard livestock should be further encouraged to form integrated farming. Coffee production will further be increased by improving farming and harvesting technologies. Blackpepper will also be promising.

Backyard livestock should further be encourage to form integrated farming.

(b) Laguna upland agricultural area

1) Laguna highland horticultural area (Area No.13)

Area: 1,500 ha

Agro-climate: Annual rainfall of around and more than 3,000 mm with short unclear dry season; annual average temperature of around 22°C.

Present land use: Vegetable (tomato); coconut based multi-story cropping

Proposed cropping pattern: Vegetable

Socio-economic condition: Infrastructure development is being left behind: People still use horses as means of transportation; Neither electrification nor water supply system has been established; Tomato is cultivated in off-season taking advantage of its cool climate. Farmers has recently organized a federation for further agricultural development in cooperation with UP Los Banos, Department of Agriculture, municipality, and some NGO.

Strategy: With cool climate, production of perishable vegetables is highly promising, such as cabbage, lettuce, tomato, chinese cabbage and radish. To support this basic infrastructure such as roads and irrigation should be facilitated. Applied research on the said crops at existing institutes should be coordinated, results be transmitted to farmers through the existing extension system, and extension services be

provided also is farming practice and water management. Soil conservation measures are important part of extension.

2) San Pablo - Alaminos upland agricultural area (Area No.14)

Area: 13,000 ha

Agro-climate: Annual rainfall of 2,000 to 2,500 mm with distinct dry season; annual average temperature of 26 to 27°C.

Present land use: Coconut based multi-story cultivation

Proposed cropping pattern: Integrated farming (coconut based multi-story cultivation and dairy/livestock farming)

Socio-economic condition: As being the processing center of coconut, San Pablo City will play a leading role on coconut production enhancement. A milk processing plant is being operated and managed by farmers cooperatives under the technical assistance by the UP Los Banos and Bureau of Animal Industry.

Strategy: Coconut-based multi-cropping should be further promoted. More promising crops to be inter-cropped are citrus trees, lanzones, corn and vegetables. Full potential of coconut industry should be exploited with San Pablo as the center, including coconut fiber, coconut juice, activated carbon, vinegar, charcoal briquets, brooms and creosole by-products.

Dairy farming may be promoted. Small farmers should be organized for manufacturing dairy products on a cooperative basis. Extension should be channeled through the cooperative.

3) Middle Santa Cruz river upland agricultural area (Area No.15)

Area: 3,000 ha

Agro-climate: Annual rainfall of 2,000 to 2,500 mm with distinct dry season; annual average temperature of 26 to 27°C.

Present land use: Coconut based multi-story cultivation; Paddy-paddy

Proposed cropping pattern: Integrated farming (coconut based multi-story cultivation and livestock/poultry production)

Socio-economic condition: Main industry is by far the agriculture. Aside from coconut based agriculture, paddy fields are seen along the Santa Cruz river that supplies water to paddy. Due to

seasonal variation of water discharge of the river, double cropping of paddy is limited, which makes rural people get lower income.

Strategy: Coconut-based multi-cropping should be further promoted with vegetables, lanzones, citrus and other crops. Two cropping a year is possible thanks to abundant water resources. Irrigation facilities should be extended to increase paddy production. Livestock and poultry farming should also be encouraged for farmers to enter into integrated farming systems.

4) Upper Santa Cruz river upland agricultural area (Area No.16)

Area: 5,000 ha

Agro-climate: Annual rainfall of over 3,000 mm with unclear and short dry season; annual average temperature of 24 to 26°C.

Present land use: Tomato, Coconut based multi-story cultivation

Proposed cropping pattern: Vegetables, Integrated farming (coconut based multi-story cultivation), Cacao, Mushroom.

Socio-economic condition: Typical upland rural area. Although the agriculture is a main sector, leather industry and tourism are important income source in the area. Resort areas for local people are seen in some areas.

Strategy: Coconut-based multi-cropping should be continued with lanzones, citrus and other tree crops. Cacao will grow under the hot and humid climate. Mushroom production will also be possible. For these latter crops, research and extension will be necessary as well as clarification of market opportunities.

5) Canlubang upland agricultural area (Area No.17)

Area: 8,000 ha

Agro-climate: Annual rainfall of less than 2,000 mm with distinct dry season; annual average temperature of 26 to 27°C.

Present land use: sugarcane

Proposed cropping pattern: Sugarcane based mixed farming.

Socio-economic condition: Presently sugarcane monoculture with one big land owner. The implementation of CARP will change the

land use to some extent. Overall land use will also change by the urbanization and industrialization process.

Strategy: This area will undergo two kinds of land conversion. One is due to further urbanization and industrial location to proceed from the low land. The other is land subdivision and crop conversion as a result of CARP implementation. In order to prevent unordered land conversion to urban/industrial use, the land productivity for agriculture should be increased as CARP implementation proceeds. For this purpose, groundwater should be exploited to allow the year-round cultivation of various crops, and support services provided including research and extension, credit and market facilities. Livestock should also be encouraged for individual farmers to enter into integrated farming.

(c) Batangas upland agricultural area

1) Lipa-Tanauan upland agricultural area (Area No.18)

Area: 20,000 ha

Agro-climate: Annual rainfall of less than 2,000 mm with distinct dry season; annual average temperature of 22 to 26°C.

Present land use: Diversified crops (vegetable, corn, sugarcane, coconut based multi-cropping such as coffee, blackpepper)

Proposed cropping pattern: Diversified crops, coconut based multi-story cropping, integrated farming with livestock, poultry.

Socio-economic condition: Being accessible, commercial crops are commonly cultivated. However, water supply is a limiting factor on crop production.

Strategy: Further crop diversification should be encouraged with emphasis on tomato, eggplant, ampalaya, cassava, and ube. Coconut-based multi-cropping should be promoted particularly with citrus, coffee and blackpepper.

Livestock and poultry production may be further expanded. Corn production should be increased to supply raw materials for feed mills to support livestock and poultry activities.

2) Batangas sub-urban agricultural area (Area No.19)

- Area: 16,000 ha
- Agro-climate: Annual rainfall of less than 2,000 mm with distinct dry season; annual average temperature of 26 to 27°C.
- Present land use: Sugarcane, coconut based multi-story cropping, integrated farming
- Proposed cropping pattern: sugarcane, coconut based multi-story cropping.
- Socio-economic condition: There is no major industry in the area. Being located along Batangas - Manila highway, accessibility is good. However, water supply in dry season is critical and limit agriculture activity.
- Strategy: Production of corn and other feed grains should be much increased to expand the feed base for livestock and poultry in this and the Lipa-Tanauan upland agricultural areas.

An important prerequisite to this is careful land management such as contour tillage to minimize soil erosion, considering the geologic and topographic conditions and intense rainfall patterns in the wet season.

Other feed grains such as sorghum and millet can be established through research and extension. Production of vegetables can be increased to supply the growing urban markets in Batangas City and other towns.

3) Tuy - Balayan upland agricultural area (Area No.20)

- Area: 19,000 ha
- Agro-climate: Annual rainfall of less than 2,000 mm with distinct dry season; annual average temperature of 26 to 27°C.
- Present land use: Sugarcane
- Proposed cropping pattern: mixed agriculture (sugarcane, diversified crop and livestock)
- Socio-economic condition: Presently dominantly sugarcane area with minor part of corn. Local people largely depend on the sugar-related industry. With the implementation of CARP, such social structure may change.
- Strategy: Sugarcane mixed farming should be promoted, after CARP implementation, first to increase and stabilize income of CARP

beneficiaries, and second to maintain the existing sugarmill. Crop diversification can be realized with emphasis on vegetables, feed grains and pasture. More tree crops should be planted such as mango and citrus.

(d) Quezon upland agricultural area

1) Lucban-Sampaloc agricultural area (Area No.21)

Area: 2,000 ha.

Agro-climate: Annual rainfall of more than 3,000 mm with no distinct dry season; high humidity; annual average temperature of 22 to 23°C.

Present land use: Coconut; vegetables; paddy;

Proposed cropping pattern: High-value horticulture crops

Socio-economic condition: Due to favorable climate condition, vegetable grow well. San Isidro festival for good harvest held in May attracts many people. Cottage industry is also active in this area.

Strategy: Thanks to the cool climate, high-value horticultural crop production is practiced, and it should be further increased with improvement of market access and extension for establishing new crops and varieties with proper farming practices. An integrated rural development project may be formulated, combining physical measures such as communal irrigation facilities and rural roads, and non-physical support measures including applied research and extension, agricultural credit and marketing.

2) Tagkawayan upland agricultural area (Area No.22)

Area: 19,000 ha

Agro-climate: Annual rainfall of 2,000 to 2,500 mm evenly distributed throughout the year; annual average temperature of 26 to 27°C.

Present land use: Grassland, coconut and forest

Proposed cropping pattern: Forage-dairy/livestock

Socio-economic condition: Small population and difficulty in accessibility have left this area less developed. Vast grassland extends over the hill area, maybe due to kaingin activities.

Strategy: Making most of the vast grassland in the hilly area, dairy/livestock activities will be encouraged through introduction of new feed crops such as corn, sorghum and millet as well as forage grasses, with high

productivity. Access roads should be improved for marketing of products and distribution of farm inputs.

3) Bondoc Peninsula agricultural area (Area No.23)

Area: 17,000 ha

Agro-climate: Annual rainfall of less than 2,000 mm evenly distributed throughout the year; annual average temperature of 25 to 26°C.

Present land use: Grassland, corn and forest

Proposed cropping pattern: Forage-dairy/livestock

Socio-economic condition: Small population and difficulty in accessibility have left this area less developed. Vast grassland extends over the hill area, maybe due to kaingin activities.

Strategy: The same strategy will be applied to this area as that for Tagkawayan upland agricultural area.

Agro-forestry areas

(a) Marikina watershed agro-forestry area (Area No.24)

Area: 21,000 ha

Agro-climate: Annual rainfall of between 2,000 and 3,000 mm with distinct dry season; annual average temperature of 24 to 26°C.

Present land use: Unutilized land or pasture land; almost denuded area. Upland crops are planted in some areas.

Proposed cropping pattern: Forest; fruit trees and livestock.

Socio-economic condition: Basic infrastructure such as road and electricity have not been established yet. Population in the area is scarce. Only four-wheel drive vehicle can access in most areas. Land is rolling and dissected. Soils are infertile and erodible by strong rain.

Strategy: First and foremost, reforestation should be done extensively to enhance water retaining capacity and reduce soil erosion. This is a necessary condition for watershed management but not a sufficient one. The sufficient condition is to provide means of livelihood for people already living in the area and its vicinity in order to prevent illicit logging and shifting cultivation.

A study should be urgently conducted to clarify land suitability for cultivation, agro-forestry and reforestation. On-going Integrated Social Forestry (ISF) program by DENR and Sloping Agricultural Land Technology (SALT) by DA should be extended to the areas identified for respective uses. In addition to extensive reforestation, on-farm tree planting should be encouraged in cultivation areas by providing seedlings/saplings as well as extension for proper crop selection and farming practices. Fruit trees and some vegetables or root crops would be preferable. Livestock activities can be expanded in limited areas.

(b) Batangas south-east agro-forestry area (Area No.25)

Area: 20,000 ha

Agro-climate: Annual rainfall of less than 2,000 mm with distinct dry season; annual average temperature of 20 to 24°C.

Present land use: Unutilized land or pasture land; almost denuded area. Upland crops are planted in some areas.

Socio-economic Condition: This land at present is either unutilized or utilized as pasture, mostly denuded. Upland crops are planted in limited areas. Access is a problem in most parts.

Strategy: A topographic and soil survey should be conducted first to identify areas suitable for reforestation and various agricultural activities. The ISF program and the SALT should be applied to suitable areas. Access roads should be improved associated with these programs. Agricultural activities to be promoted are agro-forestry with fruit trees, and livestock with vegetables or root crops in limited areas.

A.4 Measures for CALABARZON Agricultural Development

Under the strategy presented above, a set of measures should be taken to attain the development targets set in subsection A.3.2. Such measures take the form either of development projects or of institutional measures related to the agricultural support system.

A.4.1 General measures

For the strategy considered above, principal measures to be applied to CALABARZON would be as follows.

Crop production

- Irrigation projects
- Farm-market road improvement projects
- Post-harvest facilities improvement projects
- Research and extension on farming practice and introduction of new crops
- Farmers' credit, insurance and guarantee
- Cooperative development

Livestock production

- Cattle auction market project
- Research and extension on forage production and feed
- Enforcement of extension services on artificial insemination and veterinary
- Research on small scale food processing
- Cooperative development
- Farmers' credit, insurance and guarantee

Fish production

- Enforcement of law on illegal fishing
- Education on environment conservation concept to small scale fishermen
- Artificial reef development projects
- Research and extension on improved/new fish culture methods
- Cooperative development
- Fishermen's credit
- Post harvest and marketing development

Diversification

- Research and extension on integrated farming method
- Research and extension on introduction of new crop species
- Market information development projects
- Farmers' credit

Sustainable agriculture

- Extension on erosion control measures in slope area
- Agro-forestry development projects
- Forestation projects
- Research on sustainable farming practice in mountainous area

Table A.31 presents principle measures to be applied to each of sub-region. Development projects/programmes may be identified, making the general measures listed above more specific. They are described in the next section. General directions for strengthening the support system are described in the next subsection.

A.4.2 Support systems

A comprehensive package of supporting services will be required to achieve the production targets envisaged in the Study, consisting of infrastructural services, agricultural research, extension, farmers' credit, insurance, guarantee, marketing, cooperative development and others. These services and measures should be organized in the following way.

(1) Infrastructure

According to the statistics, only 15% of farm-to-market roads in CALABARZON is in good condition, which makes difficult not only in marketing of harvest but in supply of agricultural input and other commodities, and results in increasing post-harvest losses thereby decreasing farm income. Poor access to city centers also makes rural people feel isolated, which tends to cause migration to big cities. To avoid further migration from rural areas to large cities, poor road conditions should be improved. Priority should be given to the farm-to market roads which are not passable by jeepney or other four-wheel drive vehicle.

Although the level of irrigation development is higher in CALABARZON, still more than 18,000 ha of paddy fields are expected to be irrigated under both national and communal irrigation development programs within 10 years.

More post-harvest facilities like dryers, rice-mills, ware-houses, etc. should be established to avoid post-harvest losses. Identification of the shortage areas is needed. Development efforts should be made with cooperative development.

(2) Agricultural research and extension programme

Research activities for future agriculture include crop variety trials, fertilizer trial for rainfed upland crops, basic farming practice on feedgrain crops, backyard livestock raising, fodder crops cultivation, small scale agro-machinery for upland, agro-processing, marine fishery culture, livestock-crops integrated farming, agro-forestry method, etc. There should be several steps in research works from that on theoretical level to that on practical level. Considering the present budget amount, priority should be accorded to the practical themes.

Present problems on extension workers after the re-organization should be solved by enhancing training program on APT's. The number of APT's should be adjusted so as not to cause imbalance between APT's and farmers. One APT should cover 200 to 300 farmers.

Linkages between extension services and research works should be strengthened. To conduct research works at practical level, much information on on-farm level is needed. Extension workers should play an important role in this regard.

In CARP beneficial areas, some change on land use will likely occur. As a part of extension services, beneficiaries should be advised by APT's what to cultivate in respective beneficial areas taking soil, marketing, climate and other conditions, into consideration.

(3) Credit and guarantee

The present "Comprehensive Agricultural Loan Fund (CALF)" should be enforced by increasing government budget allocation for credit, to meet the vast demand for credit by small farmers. Low bankability of farmers will be solved through the development of farmers' cooperatives and extension of technical assistance for earning more income. Guarantee funds should be increased to encourage private lending institutions to lend loans to small farmers. More branch insurance offices should be opened to increase visibility and accessibility to farmers.

(4) Marketing

Except paddy and corn whose prices are supported by the Government and except sugarcane whose market has been well-established, the prices of crops fluctuate in general according to supply and demand balance. To avoid over-supply problem, marketing information should be extended to producers so that they make decisions where to market their harvests. Market prices of crops in different places should be informed every day. Presently on-going marketing information services executed by the Bureau of Statistics should be maintained and even be expanded. Hopefully this price information would be linked with production data of respective crops so as to inform farmers with critical production level of crops in future.

(5) Cooperatives

In line with the national agricultural development goals, cooperative development should be further promoted. Cooperatives will enhance community development through its collective efforts. They make the procurement of credit easier for farmers, since it makes good credit conduits with its grassroots network and its built-in mechanism for capital formation. It will also enable the government's institutions to deliver services to the clients more effectively. To improve and promote further cooperative development, following measures should be undertaken by the Government:

- to extend manpower training especially for leaders,
- to extend credit, insurance and guarantee to support financial base, and
- to advise the integration of cooperatives.

A.4.3 Development projects

Development projects have been formulated by substantiating general measures listed above. The core projects are the following.

- 1) Batangas east agricultural development project
- 2) Research and extension program on integrated farming for upland farmers
- 3) Laguna highland vegetable development project
- 4) Quezon highland integrated rural development project
- 5) Cooperative-based post-harvest development project
- 6) Cattle auction market development project
- 7) Feed crops expansion project

The project (1) is formulated mainly aiming at income increase of poorer farmers through integrated approach, considering the national and regional development objective of poverty alleviation.

The project (2) focuses on upland agricultural areas where income levels of farmers are among the lowest. Integrated farming approach will be pursued to increase and stabilize income. Environmentally sound development making most of local materials and recycling concept will be the aim.

The project (3) aims at establishing a vegetable bowl in mountainous highland in the Laguna province to supply perishable vegetables mainly to Metro Manila, in the light of recent destructive earthquake occurred in Baguio. The project will be composed of irrigation, access roads, credit, extension, etc. A pilot project will be implemented soon, and at the same time a study of adjacent areas with similar topographic conditions on vegetable production potential will be made. Land conservation measures will be one of the important components of the project.

The project (4) aims at enhancing living standard of rural people through taking such measures as communal irrigation facilities, rural road, applied research and extension, agricultural credit and marketing.

The project (5) has demonstration characteristics for helping cooperative development, aiming at establishing marketing business by farmers. Dryers, rice-mills and warehouses will be operated and maintained by farmers cooperative. The project consists of training of cooperative leaders, provision of credit and guarantee, and marketing program.

The project (6) may be implemented urgently, considering the decreasing number of breed cattle, although it must rely on the Government's policy if this sub-sector be protected from import liberalization.

The project (7) relates with the project (6). To reduce production cost and to make livestock industry competitive in international market, increase of feed crops production is a must. Feed grains such as corn, sorghum and millet as well as protein crops like soybean will be further produced. The project will consist of research on farming technology of respective crops and on farm mechanization for large scale development, and demonstration of production.

The profile of each project is presented in Appendix K.

Tables

Table A.1 Rainfall Data in and around the CALABARZON Region

Location	Province	Coordinates		MSL (m)	Record Period												
		Latitude	Longitude		Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Mabolo	Cavite	14 27'N	120 56'E		6.7	1.8	7.6	16.0	190.6	183.1	299.2	541.7	361.1	170.4	134.5	58.5	1971.2
Amadeo	Cavite	14 08'N	120 57'E		18.6	6.6	8.7	19.0	78.0	107.2	267.7	305.9	232.9	219.9	99.3	80.0	1443.8
Bacoar	Cavite	14 25'N	120 59'E		17.6	1.3	11.9	16.4	129.9	242.3	365.9	437.8	308.3	211.0	165.2	74.4	1982.0
Sangle Point	Cavite	14 30'N	120 55'E	3.0	25.3	2.1	7.4	13.6	102.2	259.3	259.3	460.5	243.8	185.6	91.7	32.8	1683.6
Liliw	Laguna	14 08'N	121 26'E		94.4	71.6	30.1	79.7	358.2	291.4	327.7	232.3	340.7	408.0	394.3	228.7	2857.1
Cavinti	Laguna	14 15'N	121 30'E		233.7	119.1	91.3	108.7	163.6	242.0	200.4	206.4	329.6	400.1	503.1	426.9	3024.9
Sta. Cruz	Laguna	14 17'N	121 25'E		48.1	20.1	30.2	45.0	144.1	229.7	246.1	279.3	277.2	252.9	248.2	168.2	1989.1
Sta. Maria	Laguna	14 20'N	121 25'E		29.5	9.2	57.2	91.4	383.5	167.0	222.3	331.5	257.1	304.5	229.6	119.0	2201.8
San Pedro	Laguna	14 22'N	121 03'E		4.9	1.0	10.5	13.0	151.0	193.3	318.1	339.8	198.7	186.2	136.6	85.4	1638.5
UPLB	Laguna	14 10'N	121 15'E		45	21.8	29.1	35.9	174.7	243.2	235.8	251.8	262.8	243.5	242.9	154.6	1941.1
IRRI	Laguna				39.5	18.3	28.9	33	185.8	238.9	266.5	259.6	268.5	232	266.3	165.7	2003.0
Tanauan	Batangas	14 05'N	121 04'E		26.9	22.7	16.8	30.6	158.5	219.6	261.4	337.8	253.2	219.8	165.4	126.7	1839.4
Mabini	Batangas	13 45'N	120 57'E		24.5	5.5	15.8	18.4	84.3	158.1	287.0	290.5	219.4	199.8	143.8	100.7	1547.8
Nasgubu	Batangas	14 04'N	120 38'E		3.6	0.9	10.3	11.1	181.4	251.4	461.3	619.7	352.0	260.7	106.4	40.3	2299.1
Lobo	Batangas	13 39'N	121 15'E		18.9	5.6	14.3	21.7	67.0	175.8	198.5	176.3	198.6	226.0	121.3	96.8	1320.8
Laurel	Batangas	13 45'N	121 04'E		8.1	1.9	14.2	17.0	59.2	127.4	216.1	367.8	245.6	260.4	167.4	58.5	1543.6
Navotas	Rizal	14 30'N	120 57'E		16.1	5.9	28.1	15.6	126.4	288.6	592.3	594.8	355.3	265.0	142.0	17.9	2448.0
Antipolo	Rizal	14 35'N	121 12'E		38.4	3.3	11.9	15.7	138.3	146.7	401.8	449.7	354.2	206.7	113.6	54.8	1935.1
Lucena	Quezon	13 56'N	121 37'E	0.0	89.3	60.3	42.5	54.6	90.0	160.3	184.6	198.9	225.5	336.2	305.3	235.2	1982.7
Tayabas	Quezon	14 03'N	121 35'E	157.7	155.1	72.3	72.3	103.2	227.5	257.9	260.6	172.6	316.1	512.7	519.9	413.7	3083.9
Infanta	Quezon	14 45'N	121 39'E	7.0	353.8	220.1	187.3	179.7	225.2	249.4	258.7	196.4	325.2	607.8	597.4	597.2	3998.2
Science Garden	M.Manila	14 38'N	121 08'E	45.4	17.2	9.7	22.1	28.3	172.7	339.6	448.1	504.8	381.8	234.0	144.0	53.8	2356.1
Port Area	M.Manila	14 35'N	120 58'E	15.0	13.5	7.3	21.4	18.7	138.6	283.8	364.1	476.3	334.1	200.5	111.4	56.0	2025.7
MIA	M.Manila	14 31'N	121 00'E	32.8	12.3	3.6	13.4	15.9	109.4	258.6	332.6	417.0	308.7	180.5	116.7	54.1	1822.8
Alabat	Quezon	14 06'N	122 01 E		250.8	133.5	99.3	81.5	109.5	200.2	226.4	174.9	253.4	510.1	530.9	571.4	3221.9

Source: PAGASA

Source: PAGASA

Table A.2 Present General Land Use

Land Use	Cavite		Laguna		Batangas		Rizal		Quezon		Total	
	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
Total Provincial	128755	100.0	175973	100.0	316581	100.0	130892	100.0	870660	100.0	1622861	100.0
Agricultural Crops:	83149	64.6	98494	56.0	201538	63.7	19037	14.5	452235	51.9	854453	52.7
Paddy; Irrigation	6578	5.1	22300	12.7	2300	0.7	3331	2.7	21922	2.5	56631	3.5
Paddy; Non-Irrig.	22095	17.2	1036	0.6	37556	11.9	4015	3.1	16718	1.9	81420	5.0
Other Seasonals	4938	3.8	1980	1.1	3989	1.3	44	0.0	13626	1.6	24577	1.5
Fruit Trees	-	-	-	-	-	-	-	-	-	-	-	-
Banana	12267	9.5	1491	0.8	990	0.3	1215	0.9	0	0.0	15963	1.0
Coconut	20904	16.2	55871	31.7	51949	16.4	2119	1.6	47236	5.4	178079	11.0
Coconut/coffee	-	-	-	-	166	0.1	-	-	-	-	-	-
Coconut/lanzones	-	-	-	-	300	0.1	-	-	1852	0.2	2152	0.1
Coconut/banana	-	-	-	-	6238	2.0	-	-	29451	3.4	35689	2.2
Coconut/shrubs	-	-	-	-	26450	8.4	-	-	309246	35.5	335696	20.7
Sugarcane	10397	8.1	11824	6.7	70304	22.2	-	-	-	-	92525	5.7
Other Perennials	5970	4.6	3672	2.1	606	-	8021	-	588	-	18857	1.2
Forest and Woodland	14129	11.0	25048	14.2	18817	5.9	16648	12.7	280364	32.2	355006	21.9
Bamboo	873	0.7	-	-	10149	3.2	5742	4.4	-	-	16764	1.0
Pasture	-	-	320	0.2	690	-	92	-	11596	1.3	12698	0.8
Grassland and Shrubland	20565	16.0	38855	22.1	74856	23.6	71968	55.0	75977	8.7	282221	17.4
Wetland & Special Use Area	1788	1.4	304	0.2	2437	0.8	-	-	27590	3.2	32119	2.0
Built-up Area	8251	6.4	10592	6.0	7040	2.2	15231	11.6	2424	0.3	43538	2.7
Mining and Quarrying	-	-	64	0.0	276	0.1	1520	1.2	16	0.0	1876	0.1
Riverwash	-	-	346	0.2	-	-	-	-	356	0.0	702	0.0
Beach sand	-	-	-	-	406	0.1	-	-	293	0.0	699	0.0
Rivers and Lakes	-	-	322	0.2	1062	0.3	442	0.3	1306	0.2	3132	0.2
Reservoir	-	-	1174	0.7	-	-	-	-	-	-	1174	0.1
Kaingin	-	-	774	0.4	-	-	304	0.2	30099	3.5	31177	1.9

Source: Bureau of Soils, Department of Agriculture

Table A.3 Number and Area of Farms by Type and by Tenure in Each Province : 1980

Province		Total	Tenure of Farm					Others
			Owned		Rented or Leased		Other Forms	
			Fully-Owned	Owner Like Possession	for Share	or Fixed Amount of Money / Produce	Rent Free	
Cavite	Number	29228	18875	1171	8967	1977	589	
	Area (ha)	51809	29423	1414	16558	3627	704	82
	Ave. Area	1.8	1.6	1.2	1.8	1.8	1.2	
Laguna	Number	32556	19291	3656	11407	2641	711	683
	Area (ha)	85809	44729	6929	28427	5131	461	131
	Ave. Area	2.6	2.3	1.9	2.5	1.9	0.6	0.2
Batangas	Number	85357	48639	4892	39943	1349	808	594
	Area (ha)	140369	70683	5942	60215	2895	435	199
	Ave. Area	1.6	1.5	1.2	1.5	2.1	0.5	0.3
Rizal	Number	12628	5517	2987	3848	470	2009	352
	Area (ha)	29800	8954	7611	6735	1622	4379	498
	Ave. Area	2.4	1.6	2.5	1.8	3.5	2.2	1.4
Quezon	Number	91002	37481	6758	50783	3377	1849	246
	Area (ha)	346430	141759	23153	173775	5287	2028	428
	Ave. Area	3.8	3.8	3.4	3.4	1.6	1.1	1.7
CALABAR-ZON	Number	250771	129803	19464	114948	9814	5966	1875
	Area (ha)	654217	295548	45049	285710	18562	8007	1338
	Ave. Area	2.6	2.3	2.3	2.5	1.9	1.3	0.7

Source: 1980 Census of Agriculture; Cavite, Laguna, Batangas, Rizal and Quezon, NCSO

Table A.4 Number and Area of Farms by Size in CALABARZON : 1980

Province		Size of Farm				
		All Farms	Under 1.00 ha	1.00 to 2.99 ha	3.00 to 4.99 ha	5.00 ha & Over
Cavite	Number	29228	8053	15582	4747	846
	Area (ha)	51809	3523	24470	16010	7807
	Ave. Area	1.8	0.4	1.6	3.4	9.2
Laguna	Number	32556	8883	14957	5063	3653
	Area (ha)	85809	3396	23857	18097	40459
	Ave. Area	2.6	0.4	1.6	3.6	11.1
Batangas	Number	85357	30302	41999	9399	3657
	Area (ha)	140372	13374	64089	32833	30076
	Ave. Area	1.6	0.4	1.5	3.5	8.2
Rizal	Number	12628	4273	5745	1351	1259
	Area (ha)	29799	1530	9112	4755	14402
	Ave. Area	2.4	0.4	1.6	3.5	11.4
Quezon	Number	91002	9876	33876	24155	23095
	Area (ha)	346432	4801	56434	86729	198468
	Ave. Area	3.8	0.5	1.7	3.6	8.6
CALABAR-ZON	Number	250771	61387	112159	44715	32510
	Area (ha)	654221	26624	177962	158424	291212
	Ave. Area	2.6	0.4	1.6	3.5	9.0

Source: 1980 Census of Agriculture; Cavite, Laguna, Batangas, Rizal and Quezon, NCSO

Table A.5 The Summary of the Results of Agro-socio-economy Survey in CALABARZON

Item	CALABARZON					
	Cavite	Laguna	Batangas	Rizal	Quezon	Average
1 Average Family Size	5.7	5.5	6.0	5.8	4.6	5.5
2 Educational Attainment of the Head of Household (%)						
- No education	9%	4%	3%	4%	1%	4%
- Elementary School	62%	59%	68%	59%	54%	60%
3 Employment of Other Household						
- % of working member	35%	42%	36%	40%	29%	36%
- First	Farming	Farming	Farming	Farming	Farming	Farming
- Second	Temporary	Public	Temporary	Temporary	Temporary	Temporary
- Third	Salarymen	Temporary	Salarymen	Public	Public	Public
- % of unemployment	28%	23%	32%	24%	20%	26%
4 Annual Income of the Head of Household (below P20,000, %)	43%	39%	54%	45%	57%	48%
5 Other Income Source (%)	34%	47%	26%	25%	45%	35%
6 House Owner (%)	94%	91%	96%	96%	94%	94%
7 House Type						
- First	S.Detached	S.Detached	S.Detached	S.Detached	S.Detached	S.Detached
- Second	Other Type	Other Type	Duplex	Other Type	Nipa Hut	Other Type
8 Appliance						
- First	T.V.set	T.V.set	T.V.set	T.V.set	Range	T.V.set
- Second	Stereo	Refri.	Stereo	Stereo	T.V.set	Range
- Third	Refri.	Radio	Refri.	Range	Refri.	Refri.
9 Cooking Energy						
- First	Wood	Wood	Biogas	Wood	Biogas	Wood
- Second	Biogas	LPG	Wood	Biogas	LPG	Biogas
10 Main Water Sources						
- First	River	Spring	River	River	River	River
- Second	Spring	Potable	Potable	Potable	Potable	Potable
- Third	Potable	Groundwater	Spring	Spring	Spring	Potable
11 Car Owner Rate	11%	9%	10%	7%	3%	8%
12 Satisfaction on Living (%)	26%	24%	11%	19%	20%	20%
13 Reason for Dissatisfaction of Living						
- First	Low income	Low income	Low income	Low income	n.a.	n.a.
- Second	Water supply	Water supply	Water supply	Water supply	n.a.	n.a.
- Third	Poor infra	Public service	Poor infra	Public service	n.a.	n.a.
14 Idea on Improvement of Living Condition						
- First	Gov.Subsidy	Gov.Subsidy	Gov.Subsidy	Gov.Subsidy	Gov.Subsidy	Gov.Subsidy
- Second	Coop. dev.	Coop. dev.	Employment	Coop. dev.	Infrastruc.	Coop. dev.
- Third	Agrarian R./	Infrastruc.	Infrastruc.	Agrarian R.	Coop. dev.	Infrastruc.
- Fourth	Employment	Agrarian R.	P. services	Infrastruc.	Agrarian R.	Employment
15 Tenure						
- Land Owner	33%	32%	27%	30%	33%	31%
- Partly Owner	6%	12%	11%	10%	19%	12%
- Lessee/Share holder	44%	41%	42%	50%	40%	43%
16 Lease Condition						
- Rental	19%	22%	7%	10%	17%	15%
- Harvest Sharing	81%	78%	93%	90%	83%	85%
17 Share Condition						
- First	20-30%	20-30%	20-30%	20-30%	above 50%	20-30%
- Second	10-20%	40-50%	30-40%	40-50%	40-50%	40-50%
- Third	40-50%	10-20%	40-50%	5-10%	20-30%	30-40%
18 Credit						
- availment %	45%	44%	26%	31%	47%	39%
- amount	P1000-5000	P1000-5000	P1000-5000	P1000-5000	P1000-5000	P1000-5000
- interest	16-20%	16-20%	less than 5%	11-15%	16-20%	16-20%
- source	Private	Rural Banks	Private	Rural Banks	Cooperatives	Rural Banks
19 Satisfaction with Credit (%)	39%	46%	31%	17%	59%	39%
20 Reason for Dissatisfaction on Credit						
- First	Interest	Interest	Interest	Interest	Interest	Interest
- Second	Procedure	Procedure	Procedure	Procedure	Procedure	Procedure
21 Farm Input Source						
- Seed	Prev.harvest	Prev.harvest	Prev.harvest	Prev.harvest	Prev.harvest	Prev.harvest
- Fertilizer	Dealer	Dealer	Dealer	Dealer	Dealer/Owner	Dealer
- Agro-chemicals	Gov.Subsidy	Gov.Subsidy	Gov.Subsidy	Gov.Subsidy	Dealer	Gov.Subsidy
22 Marketing Destination						
- Paddy	Wholesaler	Wholesaler	Domestic	Wholesaler	Domestic	Wholesaler
- Vegetables	Wholesaler	Middleman	Public mark.	Public mark.	Public mark.	Public mark.
- Fruits	Public mark.	Wholesaler	Public mark.	Public mark.	Middleman	Public mark.
- Fish	Middleman	W.saler/Mid.	Public mark.	Public mark.	Middleman	Public mark.
- Livestock	Middleman	W.saler/Mid.	Middleman	Middleman	Middleman	Middleman
- Poultry	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic
23 Satisfaction on Marketing (%)	29%	35%	17%	25%	21%	25%
24 Reason for Dissatisfaction on Marketing						
- First	Low price	Low price	Low price	Low price	Low price	Low price
- Second	Facilities	Facilities	Facilities	Facilities	Facilities	Facilities
- Third	No inform.	No inform.	No inform.	No inform.	No inform.	No inform.
25 Satisfaction on Harvest (%)	30%	41%	13%	24%	34%	39%
26 Reason for Dissatisfaction on Harvest						
- First	Nat.Disaster	Nat.Disaster	Nat.Disaster	Nat.Disaster	Nat.Disaster	Nat.Disaster
- Second	Insect/Disease	Insect/Disease	Insect/Disease	Insect/Disease	Insect/Disease	Insect/Disease
- Third	Low input	Low input	Low input	Low input	Low input	Low input

Source : JICA Study Team (1990)

Table A.6 The Result of Crop Budget Analysis on Paddy

Cost Benefit Analysis of Paddy by Type of Province						
Type of Cultivation	Nos. of Samples	Area (ha)	Yield (ton/ha)	Gross Benefit	Production Cost	Net Income per ha
Irrigated	368	2.19	4.5	43912	16899	27014 12345
Rainfed	134	1.80	3.3	26894	11020	15874 8817
Upland	181	1.15	1.8	10646	3842	6804 5936

IR series is dominant variety on irrigated condition. Major varieties on irrigated condition are: IR-10, 72 and 74. Those on rainfed condition are also mainly IR series with C varieties while upland paddy varieties are mostly local ones such as KINANDA, BENERNAL, SINAMPAGA, etc. In some cases, farmers plant IR series on upland, that is not recommendable for their unfavorable physiological characteristics. Rainfed and upland paddy are planted in wet season between May and August in most cases.

Sample Number on Crop Budget of Paddy by

Type of Cultivation				
Province	Irrigated	Rainfed	Upland	Total
Cavite	103	36	24	163
Laguna	147	8	11	166
Batangas	20	20	106	146
Rizal	98	70	40	208
Total	368	134	181	683

The Amount of Fertilizer Applied for Paddy by Type of Cultivation

Type of Cultivation	Nos. of Samples	Area (ha)	Urea (kg)	AS (kg)	Complete Phosphate (kg)	Potassium (kg)	Others (kg)	N	P2O5	K2O
Irrigated	362	2.1	279.1	14.2	130.8	47.8	3.9	3.8	149.7	8.6 2.1
Non-irrigated	134	1.0	133.4	6.8	62.5	22.8	1.8	1.8	71.6	4.1 1.0
		1.7	148.5	10.4	67.5	4.9	23.9	19.0	80.0	0.9 13.1
Upland	181	1.0	89.7	6.3	40.8	2.9	14.4	11.5	48.3	0.5 7.9
		1.2	135.9	13.3	56.6	0.0	0.0	2.5	73.2	0.0 0.0
		1.0	116.9	11.4	48.7	0.0	0.0	2.2	63.0	0.0 0.0

Breakdown of Production Cost on Paddy by Type of Cultivation

Breakdown of Irrigation Costs on a basis of 2.19 ha of Irrigation.														
Cultivation Type	Nos. of Samples	Area (ha)	Total Cost	Cost Breakdown (pesos)										per ha Cos (pesos)
				Seed	Fert.	Chem.	Water	Machine	Loan	Labor	Animal	Coop.		
IRRIGATED	368	2.19	16447	1067	2550	1253	1028	1762	19	7929	515	322	7516	
			100.0%	6.5%	15.5%	7.6%	6.3%	10.7%	0.1%	48.2%	3.1%	2.0%		
RAINFED	134	1.80	10438	737	1447	744	136	803	2	4484	977	1108	5798	
			100.0%	7.1%	13.9%	7.1%	1.3%	7.7%	0.0%	43.0%	9.4%	10.6%		
UPLAND	181	1.15	3810	446	926	175	28	208	0	1822	202	3	3323	
			100.0%	11.7%	24.3%	4.6%	0.7%	5.5%	0.0%	47.8%	5.3%	0.1%		

Source: JICA Study Team (1990)

Table A.7 The Result of Crop Budget Analysis on Corn

Sample Number by Province		
Cavite:	18	Batangas:
Laguna:	14	Rizal:
		1

Summary of crop budget analysis on corn by variety in CALABAR

Variety	Nos. Sample	Area (ha)	Gross Income	Production Cost	Cost/ Benefit	Net Benefit	Benefit per ha
Hybrid	9	1.7	28767	5400	18.77%	23367	14020
IBP VAR I	27	1.7	16601	6274	37.79%	10327	6142
Pop Corn	5	1.0	13840	3693	26.68%	10147	9757
Sweet Corn	59	1.3	21590	5071	23.49%	16519	12301
White Corn	26	0.6	4722	774	16.40%	3948	7054
Yellow Corn	36	1.1	10002	3424	44.55%	6920	6032

Breakdown of Production Cost on Corn by Variety

VARIETY	Nos. of Sample	Area (ha)	Cost of Production	Cost per ha	COST COMPONENT					
					Seed	Fertilizer	Agro-Chemicals	Machinery	Labor	Animal
Hybrid	8	1.8	4555	2513	0.7%	44.4%	0.0%	0.0%	54.9%	0.0%
IBP VAR I	27	1.7	6532	3885	7.8%	37.0%	9.3%	21.8%	21.0%	3.0%
Pop Corn	5	1.0	3637	3497	23.9%	29.1%	1.1%	7.1%	30.5%	8.2%
Sweet Corn	64	1.3	4643	3521	11.4%	36.7%	5.1%	4.4%	36.6%	5.8%
White Corn	25	0.5	800	1476	3.5%	48.8%	11.6%	11.9%	22.3%	2.0%
Yellow Corn	37	1.1	3202	2835	3.7%	35.8%	2.1%	5.6%	41.2%	11.6%

Amount of Fertilizer Used on Corn Cultivation by Variety

Nitrogen Fertilizer (sacks)					N/ha		
VARIETY	Area (ha)	Urea	Ammonium Sulfate	Complete	N_Total (kg)	N/ha (kg)	
Hybrid	1.7	8	0	0	176	102	
IPB	1.6	4	0	2	101	62	
IPB Var I	1.7	4	0	8	143	83	
Pop Corn	1.0	5	0	0	112	108	
Sweet Corn	1.4	5	1	2	142	105	
White Corn	0.6	1	0	0	35	63	
Yellow Corn	1.1	5	0	1	115	101	

Most farmers apply fertilizer on corn cultivation. Major nutrient applied is nitrogen. Urea is the most common fertilizer, followed by complete fertilizer. The amount of applied fertilizer is in the range between 60 and 110 kg per hectare according to the variety. IPB variety is applied less amount of fertilizer than other varieties. Some farmers apply 150 to 250Nkg/ha.

Table A.8 The Result of Crop Budget Analysis on Vegetables

Summary of crop budget analysis on vegetable in CALABAR

Species	Nos. Sample	Area (ha)	Gross Benefit	Production cost	cost/benefit	Net Benefit	Benefit per ha	Remarks
Ampalaya	14	0.3	14,914	7,148	50%	7,773	32,798	Cavite
Cowpea	9	0.6	10,278	1,541	17%	8,737	18,742	Laguna
Cucumber	1	0.3	12,500	3,490	28%	9,010	36,040	
Eggplant	19	0.8	25,134	6,061	23%	18,868	24,418	Laguna, Batangas, Rizal
Ginger	1	0.2	7,200	798	11%	6,402	32,010	
Peanut	7	0.9	8,736	2,076	20%	6,660	10,113	Rizal
Pole Sitao	12	0.3	7,288	1,439	22%	5,865	25,377	Batangas, Rizal
Radish	7	1.0	14,943	4,730	35%	10,213	15,156	Rizal
Sili	3	0.3	2,817	429	17%	2,388	9,905	Cavite
Sitao	20	0.2	13,615	2,279	21%	11,487	48,697	Cavite
Squash	20	1.0	31,000	4,151	18%	23,291	33,820	Laguna, Batangas
Tomato	18	0.9	24,244	12,182	43%	12,082	15,016	Laguna

Breakdown of Production Cost by Vegetable

Crops	Nos. Sample	Area (ha)	Total Cost (P)	Cost Component (%)						
				Seed	Fertil.	Chemic.	Mater	Labor	Animal	Others
Ampalaya	9	0.31	7,081	0.3	11.1	7.9	61.6	18.2	0.9	0.0
		1.00	23,173							
Cowpea	9	0.56	1,541	9.3	10.3	17.2	0.0	42.3	12.3	8.7
		1.00	2,746							
Eggplant	21	0.71	5,599	4.3	28.7	16.5	0.0	42.9	6.2	1.4
		1.00	7,865							
Habichuelas	4	0.43	2,994	20.0	2.2	10.3	0.0	48.3	19.2	0.0
		1.00	7,044							
Mustasa	3	0.32	9,457	7.0	6.3	2.7	0.0	83.1	1.1	0.0
		1.00	29,864							
Okra	4	0.30	1,866	14.7	9.3	23.1	0.0	52.3	0.0	0.7
		1.00	6,218							
Peanut	7	0.90	2,076	31.6	14.4	5.6	0.0	32.3	15.5	0.5
		1.00	2,307							
Pechay	4	0.56	2,625	10.0	8.8	21.9	0.0	46.5	12.9	0.0
		1.00	4,667							
Radish	7	0.96	4,730	29.6	3.9	15.0	0.0	19.8	3.0	28.6
		1.00	4,905							
Sili	3	0.24	429	3.9	71.5	24.6	0.0	0.0	0.0	0.0
		1.00	1,788							
Sitao	39	0.30	2,102	9.8	13.3	14.4	16.9	30.3	3.4	11.9
		1.00	7,042							
Squash	27	0.84	2,639	12.4	32.7	6.2	0.0	48.4	0.3	0.0
		1.00	3,136							
Sweet Corn	4	1.31	5,323	13.4	30.9	1.6	0.0	37.3	5.2	11.6
		1.00	4,056							
Tomato	17	0.84	12,426	3.5	21.1	16.8	10.4	35.6	7.7	4.8
		1.00	14,876							
Upo	11	0.59	1,576	6.4	44.9	1.7	0.0	46.4	0.6	0.0
		1.00	2,667							

Source: Interview survey by the JICA study team (1990)

Table A.9 Summary of Crop Budget Analysis on Fruits

Specy	Nos. Sample	Area (ha)	Average Tree Age	Gross Benefit	Production Cost	Cost/ Benefit	Net Benefit	Benefit per ha
Bananas	4	0.9	2	6,488	2,231	33%	4,257	4,602
Black Pepper	4	0.6	5	16,250	1,588	10%	14,662	23,459
Citrus	12	1.8	9	65,550	14,694	21%	51,873	28,685
Coconut	29	2.0	22	14,836	4,719	34%	9,952	4,879
Coffee	21	1.2	8	17,583	6,059	50%	10,697	8,827
Lanzones	11	1.7	21	57,210	3,103	15%	40,539	23,594
Lanzonesk, Coco	5	1.4	12	23,033	5,990	28%	17,043	12,624
Mango	49	0.7	14	25,593	7,113	28%	17,893	23,915
Mango, Multi	17	2.1	12	15,599	6,400	44%	8,372	4,078
Pineapple	52	0.9	1	56,741	11,734	25%	46,042	54,069
Rambutan	3	0.1	8	15,000	3,680	21%	11,487	86,150
Santol	3	0.8	60	11,000	2,867	23%	8,133	9,760
Watermelon	19	0.8	0	21,711	4,942	27%	16,322	19,382

Source: JICA Study Team (1990)

Table A.10 Harvested Area of Major Crops in Each Province

Crops	Cavite	Laguna	Batangas	Rizal	Quezon	('000 ha)	
						CALABAR- ZON Total	Share in Nation
Palay	16.8	34.0	33.7	7.1	76.1	167.7	5.06%
Corn	17.2	18.4	162.8	2.4	16.2	217.0	6.22%
Cassava	0.3	0.4	1.1	0.1	3.6	5.5	2.55%
Tomatoes	0.1	0.7	0.5	0.2	0.3	1.8	2.09%
Eggplant	0.1	0.1	0.3	0.1	0.7	1.3	8.44%
Onion	0.0	-	0.0	0.0	0.1	0.1	1.47%
Camote	0.6	0.2	0.2	0.2	3.5	4.7	2.91%
Mongo	0.2	0	0.3	0	0.6	1.1	2.99%
Peanut	0.6	0.0	0.2	0.1	0.1	1.0	2.07%
Garlic	-	0.1	0.3	0.0	0.1	0.5	7.94%
Coconut	18.1	73.5	33.9	0.3	276.2	402.0	12.31%
Sugarcane	-	13.1	26.1	-	-	39.2	12.37%
Banana	6.0	2.3	6.5	0.4	19.8	35.0	10.91%
Calamansi	0.0	0.5	0.3	0.1	0.8	1.7	16.30%
Pineapple	3.3	0.5	0.0	-	0.2	4.0	6.78%
Mango	1.1	0.1	3.1	0.8	0.6	5.7	11.15%
Coffee	8.8	1.2	3.8	0.1	2.8	16.7	11.52%
Cacao	0.1	0.0	0.0	0.0	0.3	0.4	2.75%

Note: All figures shown are average of past five years from 1984 to 1988

Source: Bureau of Statistics, Department of Agriculture

Table A.11 Production of Major Crops in Each Province

Crops	Cavite	Laguna	Batangas	Rizal	Quezon	('000 tons)	
						CALABAR- ZON Total	Share in Nation
Palay	42.4	114.3	52.6	22.8	176.7	408.8	4.75%
Corn	17.1	36.2	129.1	1.7	12.7	196.8	5.14%
Cassava	0.9	4.5	13.3	1.0	19.4	39.1	2.44%
Tomatoes	0.3	10.2	1.5	1.1	3.0	16.1	11.00%
Eggplant	0.1	0.7	1.4	0.9	16.6	19.7	20.31%
Onion	0.0	-	0.3	0.1	0.2	0.6	1.12%
Camote	3.3	2.1	2.0	1.7	16.9	26.0	3.30%
Mongo	0.0	0.0	0.1	0.0	0.6	0.7	2.66%
Peanut	0.3	0.0	0.1	0.0	0.1	0.5	1.15%
Garlic	-	0.3	1.0	0.1	0.5	1.9	11.80%
Coconut	41.3	145.9	205.1	1.1	1,538.9	1,932.3	38.97%
Sugarcane	-	786.2	1,392.5	-	-	2,178.7	12.49%
Banana	25.3	8.6	26.1	1.4	47.4	108.8	3.00%
Calamansi	0.0	0.2	1.8	1.2	10.8	14.0	28.63%
Pineapple	30.5	3.5	0.1	-	3.2	37.3	2.28%
Mango	5.6	0.8	11.7	2.3	7.4	27.8	7.85%
Coffee	16.4	1.0	2.5	0.0	1.7	21.6	16.29%
Cacao	0.0	0.0	0.0	0.0	0.0	0.0	0.84%

Note: All figures shown are average of past five years from 1984 to 1988

Source: Bureau of Statistics, Department of Agriculture

Table A.12 Unit Yield of Major Crops in Each Province

Crops	Cavite	Laguna	Batangas	Rizal	Quezon	(tons/ha)	
						CALABAR- ZON Average	National Average
Palay	2.5	3.4	1.6	3.2	2.3	2.4	2.6
Corn	1.0	2.0	0.8	0.7	0.8	0.9	1.1
Cassava	2.6	13.5	12.2	8.4	5.4	7.1	5.4
Tomatoes	2.5	13.5	3.2	7.0	10.3	8.9	8.5
Eggplant	1.6	6.1	4.9	8.8	25.5	15.2	6.3
Onion	3.5	-	5.6	4.9	3.2	5.2	7.9
Camote	5.3	8.1	9.6	9.3	4.8	5.5	4.9
Mongo	0.2	0.6	0.4	0.8	1.1	0.6	0.7
Peanut	0.5	1.2	0.6	0.3	0.8	0.5	0.9
Garlic	-	3.6	4.0	4.6	1.0	3.8	2.5
Coconut	2.3	2.0	6.0	3.7	5.6	4.8	1.5
Sugarcane	-	60.1	54.9	-	-	55.6	56.4
Banana	4.2	3.8	3.8	3.7	2.4	3.1	11.3
Calamansi	0.3	0.2	6.3	26.2	14.2	8.2	4.6
Pineapple	9.3	6.5	8.0	-	20.0	9.3	27.7
Mango	4.9	5.7	3.7	3.0	12.6	4.9	7.1
Coffee	1.9	0.8	0.7	0.2	0.6	1.3	0.9
Cacao	0.2	0.1	0.2	0.0	0.1	0.0	0.4

Note: All figures shown are average of past five years from 1984 to 1988

Source: Bureau of Statistics, Department of Agriculture

Table A.13 Value of Agricultural Output (in 1988 farmgate prices) in CALABARZON

Output : '000 metric ton
Price : Peso/metric ton
Value : '000 Pesos

I. CROP OUTPUT VALUE

Commodities	1984			1985			1986			1987			1988		
	Price	Output	Value	Price	Output	Value	Price	Output	Value	Price	Output	Value	Price	Output	Value
Crops															
Mango	14,059	0.8	11,247	0.8	11,247	11,247	0.8	11,247	11,247	0.8	11,247	11,247	0.9	12,653	12,653
Camote	2,560	23.9	61,184	24.2	61,952	61,952	26.1	66,816	66,816	27.5	70,400	70,400	28.1	71,936	71,936
Cassava	1,520	33.4	50,768	36.2	55,024	55,024	39.5	60,040	60,040	37.7	57,304	57,304	48.7	74,024	74,024
Pineapple	5,000	32.9	164,500	33.7	168,500	168,500	36.8	184,000	184,000	39.9	199,500	199,500	43.2	216,000	216,000
Banana	2,780	100.8	280,224	109.8	305,244	305,244	113.8	316,364	316,364	114.3	317,754	317,754	104.9	291,622	291,622
Calamansi	5,350	12.4	66,340	13.2	70,620	70,620	14.7	78,645	78,645	14.6	78,110	78,110	14.6	78,110	78,110
Mango	8,770	30.4	266,608	32.6	285,902	285,902	25.9	227,143	227,143	27.1	237,667	237,667	23.3	204,341	204,341
Coffee	36,000	20.0	720,000	23.0	828,000	828,000	22.0	792,000	792,000	20.4	734,400	734,400	16.9	608,400	608,400
Peanut	5,770	0.5	2,885	0.6	3,462	3,462	0.5	2,885	2,885	0.5	2,885	2,885	0.6	3,462	3,462
Eggplant	6,100	23.5	143,350	18.7	114,070	114,070	18.4	112,240	112,240	18.4	112,240	112,240	19.5	118,950	118,950
Garlic	24,536	2.2	53,980	2.2	53,980	53,980	2.1	51,527	51,527	1.7	41,712	41,712	1.4	34,351	34,351
Onion	4,187	0.8	3,349	0.8	3,349	3,349	0.5	2,093	2,093	0.5	2,093	2,093	0.4	1,675	1,675
Tomato	8,080	10.1	81,608	12.2	98,576	98,576	20.2	163,216	163,216	19.9	160,792	160,792	18.1	146,248	146,248
Blackpepper	96,540	0	0	0	0	0	0	0	0	0.1	7,723	7,723	0.1	9,654	9,654
Coconut	5,560	1,870.0	10,397,200	1,931.1	10,736,916	10,736,916	2,057.3	11,438,588	11,438,588	1,988.8	11,057,728	11,057,728	1,814.1	10,086,396	10,086,396
Corn	2,850	168.0	478,800	199.0	567,150	567,150	208.9	595,365	595,365	209.3	596,505	596,505	199.3	568,005	568,005
Palay	3,490	402.0	1,402,980	424.0	1,479,760	1,479,760	423.3	1,477,317	1,477,317	383.4	1,338,066	1,338,066	413.7	1,443,813	1,443,813
Sub-Total Crops			14,185,024		14,843,753	14,843,753		15,579,486	15,579,486		15,026,127	15,026,127		13,969,640	13,969,640

II. LIVESTOCK OUTPUT VALUE

Commodities	1984			1985			1986			1987			1988		
	Price	Output	Value	Price	Output	Value	Price	Output	Value	Price	Output	Value	Price	Output	Value
Beef	36,800	-	0	13.0	476,818	476,818	14.2	522,744	522,744	13.8	506,221	506,221	10.5	387,946	387,946
Chicken	28,510	-	0	25.4	724,838	724,838	37.2	1,060,515	1,060,515	37.8	1,077,678	1,077,678	53.5	1,525,285	1,525,285
Hogs	23,500	-	0	49.0	1,150,349	1,150,349	55.6	1,306,107	1,306,107	62.7	1,473,450	1,473,450	78.8	1,851,800	1,851,800
Sub-Total Livestock			-		2,352,004	2,352,004		2,889,365	2,889,365		3,057,349	3,057,349		3,765,031	3,765,031

!! Sugarcane is not included, because the available price information is for sugar, but not sugarcane. Considering the decline in sugarcane production, the crop output value would have declined if it were included.

Table A.14 Livestock and Poultry Production by Species in CALABARZON

	(tons)					
	1985	1986	1987	1988	1989	Average
Carabao (Carabeef)						
Cavite	330	376	433	329	661	426
Laguna	159	144	206	250	342	220
Batangas	216	221	277	352	305	274
Rizal	98	90	117	143	135	117
Quezon	1,874	2,628	2,987	3,405	3,690	2,917
Sub-Total	2,677	3,459	4,020	4,479	5,133	3,954
Cattle (Beef)						
Cavite	1,340	1,413	1,664	1,379	1,888	1,537
Laguna	955	897	932	935	812	906
Batangas	5,996	6,492	6,757	3,931	7,414	6,118
Rizal	563	532	498	561	528	536
Quezon	4,103	4,871	3,856	3,742	3,192	3,952
Sub-Total	12,957	14,205	13,707	10,548	13,834	13,050
Hog						
Cavite	4,136	3,578	4,167	4,926	4,719	4,305
Laguna	7,047	9,369	16,650	20,742	24,932	15,748
Batangas	11,023	11,365	13,322	15,455	18,917	14,016
Rizal	12,204	14,067	9,743	15,536	15,940	13,498
Quezon	14,541	17,214	18,781	22,086	20,815	18,687
Sub-Total	48,951	55,593	62,663	78,745	85,323	66,255
Chicken Meat						
Cavite	3,851	3,411	2,187	1,772	2,181	2,680
Laguna	3,829	4,642	8,577	9,534	6,426	6,602
Batangas	8,960	15,911	15,933	24,917	38,547	20,854
Rizal	6,784	5,234	3,269	3,893	5,353	4,907
Quezon	2,044	7,995	7,839	13,375	499	6,350
Sub-Total	25,468	37,193	37,805	53,491	53,006	41,393
Total	90,052	110,449	118,194	147,263	157,296	124,651

Source: Department of Agriculture

**Table A.15 Livestock and Poultry: Total Inventory (heads) by Province
as of January 1, 1985 - 1990**

Province	1985	1986	1987	1988	1989	1990*
Carabao						
Cavite	12840	10740	11570	11640	12510	12310
Laguna	17420	16520	15540	16420	15570	17550
Batangas	26610	28080	25430	24640	27690	25200
Rizal	7930	6680	6580	6670	6880	6900
Quezon	77910	88410	86880	87790	86940	70510
Total	142710	150430	146000	147160	149590	132470
Cattle						
Cavite	19740	18890	20160	15990	17860	19200
Laguna	14060	12000	11290	10840	12280	14170
Batangas	88300	86800	81860	68770	66520	57140
Rizal	8290	7110	6030	6500	7170	4890
Quezon	52540	58410	41730	39650	32490	29720
Total	182930	183210	161070	141750	136320	125120
Hog						
Cavite	59460	44190	45750	51150	62650	60540
Laguna	101320	115720	182810	215390	206200	246000
Batangas	158490	140370	146270	160490	198960	215040
Rizal	175470	173740	106980	161330	166570	159290
Quezon	175290	180970	171590	195180	171130	167980
Total	670030	654990	653400	783540	805510	848850
Chicken						
Cavite	1042720	890780	541010	574370	730120	866560
Laguna	1036930	1212270	2121410	2552410	3673060	3180210
Batangas	2426230	4155170	3940730	6670850	4797910	4975010
Rizal	1836950	1366900	808570	1042270	2061100	1604900
Quezon	283870	1059830	987000	1772870	1376110	1259310
Total	6626700	8684950	8398720	12612770	12638300	11885990
Duck						
Cavite	17840	21460	18020	15440	19080	7660
Laguna	719540	565190	552130	672790	550920	467180
Batangas	78570	89690	79350	85680	82500	87730
Rizal	107520	112950	100990	123000	193130	86270
Quezon	35530	43950	34230	32040	27960	46290
Total	959000	833240	784720	928950	873590	695130

* - Preliminary estimates

Source: Bureau of Statistics, DA

Table A.16 Herd Performance in CALABARZON (1990)

Area	Total Member- ship of Cooperative	No. of Animals as of Dec.		Milk Production	
		Impt.	Local	No. of Milking Dams	Total Milk Production (liter)
Cavite	92	185	2	28	35783
Laguna	278	401	7	96	175892
Batangas	79	116	1	72	214003
Rizal	-	-	-	-	-
Quezon	24	77	1	15	24670
Total	473	779	11	211	450347

Source: Philippine Dairy Corporation

Table A.17 Fishery Production in CALABARZON by Province

	(tons)				
	1984	1985	1986	1987	1988
Cavite					
Marine Fishery	7,221	7,871	7,008	7,583	6,724
Municipal	3,917	4,331	2,834	2,992	2,398
Commercial	3,304	3,540	4,174	4,591	4,326
Aquaculture	10,347	8,486	11,252	4,913	7,523
Inland Fishery	11	9	15	16	15
Sub-total	17,579	16,366	18,275	12,512	14,262
Laguna					
Marine Fishery	-	-	-	-	-
Municipal	-	-	-	-	-
Commercial	-	-	-	-	-
Aquaculture	10,627	8,269	6,229	4,445	4,789
Inland Fishery	147,668	112,412	110,107	42,269	42,228
Sub-total	158,295	120,681	116,336	46,714	47,017
Batangas					
Marine Fishery	15,908	17,064	22,688	22,395	19,829
Municipal	12,884	12,616	18,801	18,630	15,952
Commercial	3,024	4,448	3,887	3,765	3,877
Aquaculture	198	280	722	722	1,072
Inland Fishery	11,826	13,641	11,982	14,738	17,596
Sub-total	27,932	30,985	35,392	37,855	38,497
Rizal					
Marine Fishery	-	-	-	-	-
Municipal	-	-	-	-	-
Commercial	-	-	-	-	-
Aquaculture	64,858	40,280	32,055	35,071	25,838
Inland Fishery	82,197	86,089	90,530	150,193	133,007
Sub-total	147,055	126,369	122,585	185,264	158,845
Quezon					
Marine Fishery	43,302	47,209	54,697	56,244	70,252
Municipal	23,214	26,242	34,190	38,201	51,861
Commercial	20,088	20,967	20,507	18,043	18,391
Aquaculture	8,165	9,551	7,088	7,088	7,423
Inland Fishery	n.a.	326	360	318	316
Sub-total	51,467	57,086	62,145	63,650	77,991
CALABARZON Total					
Marine Fishery	66,431	72,144	84,393	86,222	96,805
Municipal	40,015	43,189	55,825	59,823	70,211
Commercial	26,416	28,955	28,568	26,399	26,594
Aquaculture	94,195	66,866	57,346	52,239	46,645
Inland Fishery	241,702	212,477	212,994	207,534	193,162
Total	402,328	351,487	354,733	345,995	336,612

Table A.18 Road Condition in CALABARZON by Province, 1989

Province	Road by Administration				Total	Road Density (km/km ²)
	National	Provincial	City/Mun.	Barangay		
Cavite	304 18.5%	430 26.2%	173 10.5%	736 44.8%	1,643 100.0%	1.28
Laguna	346 24.9%	252 18.1%	147 10.6%	645 46.4%	1,390 100.0%	0.79
Batangas	522 12.6%	1,099 26.6%	277 6.7%	2,235 54.1%	4,133 100.0%	1.31
Rizal	254 20.2%	67 5.3%	143 11.4%	792 63.1%	1,256 100.0%	0.96
Quezon	692 21.7%	355 11.1%	273 8.6%	1,869 58.6%	3,189 100.0%	0.37
Total	2,119 18.2%	2,204 19.0%	1,013 8.7%	6,279 54.1%	11,615 100.0%	0.72

Source: DPWH Region IV

Table A.19 Inventory of Irrigation Systems in CALABARZON

Item	Province					Total
	Cavite	Laguna	Batangas	Rizal	Quezon	
Total Potential Area (Ha)	20,344	19,877	13,594	5,865	21,048	80,728
Total Service Area (Ha)	17,704	18,385	7,407	4,388	14,349	62,233
Percentage of Development (%)	87	92	54	75	68	78
National Irrigation Systems						
Number	1	10	1	0	4	16
Service Area (Ha)	14,708	12,111	852	0	4,814	32,485
No. of Irrigators' Association	18	21	3	0	20	62
Communal Irrigation Systems						
NIA-Assisted CIS						
Number	6	25	28	28	55	142
Service Area (Ha)	346	2,512	1,551	1,058	2,484	7,951
Constructed by other agencies						
Number	-	4	2	32	22	60
Service Area (Ha)	-	216	120	2,081	937	3,354
Privately-owned CIS						
Number	-	60	12	0	57	129
Service Area (Ha)	-	2,335	619	0	2,747	5,701
No. of Irrig. Association	6	89	42	62	55	254
Total Number	6	89	42	60	134	331
Total Area	346	5,063	2,290	3,139	6,168	17,006
Pump Irrigation Systems						
Individually Owned						
Number	390	400	1,092	323	629	2,834
Service Area (Ha)	2,650	1,211	4,265	1,249	3,367	12,742
Programmed for Development						
National						
Number	0	0	1	0	1	2
Service Area (Ha)	0	0	2,000	0	1,000	3,000
Communal						
Number	10	6	35	6	52	109
Service Area (Ha)	1,735	1,261	3,214	524	2,915	9,649
Pump						
Number	7	4	10	11	43	75
Service Area (Ha)	905	231	973	953	2,720	5,782
Total Number	17	10	46	17	96	186
Total Area (Ha)	2,640	1,492	6,187	1,477	6,635	18,431

Source: National Irrigation Administration

Table A.20 Crop and Livestock Insurance Coverage by Province

Year	Province	Paddy			Corn			Cattle			Swine			Carabao		
		Area (ha)	Nos. Farmers	Amount (P1000)	Area (ha)	Nos. Farmers	Amount (P1000)	No. of Farmers	Nos. of Heads	Sum Insured	No. of Farmers	Nos. of Heads	Sum Insured	No. of Farmers	Nos. of Heads	Sum Insured
1984	Cavite	1,217	726	735	39	7	153	-	-	-	-	-	-	-	-	-
	Laguna	7,321	4,657	10,120	-	-	-	-	-	-	-	-	-	-	-	-
	Batangas	766	522	1,489	496	214	2,053	-	-	-	-	-	-	-	-	-
	Rizal	516	613	1,613	-	-	-	-	-	-	-	-	-	-	-	-
	Quezon	899	780	1,992	24	174	638	-	-	-	-	-	-	-	-	-
	Total	9,820	6,518	13,957	559	395	2,844	-	-	-	-	-	-	-	-	-
1985	Cavite	1,434	776	5,159	10	1	60	-	-	-	-	-	-	-	-	-
	Laguna	6,603	3,917	20,924	-	-	-	-	-	-	-	-	-	-	-	-
	Batangas	575	414	1,738	515	131	2,729	-	-	-	-	-	-	-	-	-
	Rizal	453	521	1,635	-	-	-	-	-	-	-	-	-	-	-	-
	Quezon	911	714	2,636	49	235	1,272	-	-	-	-	-	-	-	-	-
	Total	9,065	5,628	29,456	574	367	4,061	-	-	-	-	-	-	-	-	-
1986	Cavite	1,145	615	4,204	-	-	-	-	-	-	-	-	-	-	-	-
	Laguna	6,480	3,649	22,868	30	3	180	-	-	-	-	-	-	-	-	-
	Batangas	467	298	1,558	167	36	985	-	-	-	-	-	-	-	-	-
	Rizal	640	763	2,331	-	-	-	-	-	-	-	-	-	-	-	-
	Quezon	422	479	1,804	13	79	471	-	-	-	-	-	-	-	-	-
	Total	8,732	5,325	30,961	210	118	1,636	-	-	-	-	-	-	-	-	-
1987	Cavite	1,397	716	5,232	-	-	-	-	-	-	-	-	-	-	-	-
	Laguna	6,397	3,624	23,653	-	-	-	-	-	-	-	-	-	-	-	-
	Batangas	123	87	424	40	8	240	-	-	-	-	-	-	-	-	-
	Rizal	781	956	2,932	-	-	-	-	-	-	-	-	-	-	-	-
	Quezon	188	381	1,432	13	79	486	-	-	-	-	-	-	-	-	-
	Total	8,698	5,383	32,241	53	87	726	-	-	-	-	-	-	-	-	-
1988	Cavite	1,555	828	5,833	-	-	-	5	5	23	-	-	-	-	-	-
	Laguna	7,126	4,057	26,537	-	-	-	24	86	199	56	142	258	-	-	-
	Batangas	177	160	665	25	3	113	108	131	901	1	8	14	-	-	-
	Rizal	549	649	2,059	-	-	-	-	-	-	2	15	23	-	-	-
	Quezon	1,060	605	3,972	51	12	178	-	-	-	-	-	-	-	-	-
	Total	9,407	5,694	35,094	76	15	291	137	222	1,122	59	165	295	-	-	-
1989	Cavite	3,259	1,749	12,231	170	111	596	4	6	34	26	68	96	-	-	-
	Laguna	8,064	4,851	30,123	-	-	-	34	34	201	489	701	1,426	55	55	346
	Batangas	307	282	1,153	11	7	52	123	142	601	30	90	162	56	57	437
	Rizal	935	1,065	3,505	-	-	-	1	6	30	183	335	686	-	-	-
	Quezon	1,851	1,344	6,935	10	8	35	-	-	-	41	52	147	-	-	-
	Total	12,565	7,947	47,012	191	126	683	162	188	866	769	1,246	2,518	111	112	783
1990*	Cavite	446	247	2,007	16	7	56	1	1	7	25	29	55	33	33	123
	Laguna	3,460	2,018	14,807	-	-	-	10	11	80	92	143	376	34	34	197
	Batangas	103	76	429	17	7	102	122	122	914	41	122	221	19	19	143
	Rizal	246	240	1,102	-	-	-	6	7	48	115	123	343	6	8	50
	Quezon	860	643	3,912	191	190	1,071	24	26	137	62	127	270	-	-	-
	Total	4,255	2,581	18,345	224	204	1,229	163	167	1,185	335	544	1,265	92	94	513

Note: *: Figure showing as of June 1990

Source: PCIC

Table A.21 Accomplishment of Agrarian Reform as of December, 1989

Particular	Cavite		Laguna		Batangas		Rizal		Quezon		Total	
	Target	Accomp.	Target	Accomp.	Target	Accomp.	Target	Accomp.	Target	Accomp.	Target	Accomp.
I. Land Acquisition												
VOS	-	351.6	-	291.1	-	1,608.9	-	676.2	-	2,573.0	-	5,500.8
CACF	-	1,594.9	900.8	1,423.6	3,763.9	6,895.2	5,330.3	5,577.6	4,899.7	12,598.3	14,894.7	28,089.6
Total	-	1,946.5	900.8	1,714.7	3,763.9	8,504.1	5,330.3	6,253.8	4,899.7	15,171.3	14,894.7	33,590.4
II. Land Distribution												
EPS	604.0	591.1	1,160.0	925.5	908.0	2,334.1	677.0	1,016.2	1,420.0	1,345.8	4,769.0	6,212.7
CLOA	1,344.0	117.4	408.0	308.4	501.0	0.0	189.0	11.7	780.0	50.9	3,222.0	488.4
HP	-	-	0.0	91.0	-	-	345.0	374.2	870.0	191.8	1,215.0	657.0
DS	6.0	4.8	6.0	7.3	54.0	111.6	-	-	-	-	66.0	123.7
Total	1,954.0	713.3	1,574.0	1,332.2	1,463.0	2,445.7	1,211.0	1,402.1	3,070.0	1,588.5	9,272.0	7,481.8
III. Number of Beneficiaries Served by DAR	2,764		6,371		no data		no data		5,192			

VOS - Voluntary Offer to Sell

CACF - Certificate of Acquisition Claim Folder

EPS - Emancipation Patent

CLOA - Certificate of Land Ownership Award

HP - Homestead Patent

DS - Deed of Sale

**Table A.22 CARP Five-Year Program for CALABARZON
(Land Acquisition and Distribution)**

Province	Targets					Total
	1990	1991	1992	1993	1994	
Cavite	1,310	1,692	1,050	2,050	2,250	8,352
Laguna	2,529	2,479	2,620	1,850	2,100	11,578
Batangas	1,841	2,952	3,120	3,250	3,350	14,513
Rizal	1,400	2,677	1,860	2,100	2,400	10,437
Quezon	3,822	9,224	9,500	9,800	10,010	42,356
Total	10,902	19,024	18,150	19,050	20,110	87,236

Source: Department of Agrarian Reform, Region IV

Table A.23 Inventory of Cooperatives in CALABARZON

Type of Cooperatives	Province					Total
	Cavite	Batangas	Laguna	Rizal	Quezon	
Credit	19	44	40	50	70	223
Consumer	2	19	10	-	9	40
Service	4	9	5	-	2	20
Multi-purpose	2	15	20	23	32	92
Producers	2	6	6	2	1	17
Marketing	9	-	8	3	14	34
Operators & Drivers Coop.	-	-	-	2	-	2
Irrigators' & Water Service	-	-	-	5	-	5
Total	38	93	89	85	128	433

Sources:

Provincial Agriculture Office, Cavite
Provincial Agriculture Office, Laguna
Provincial Agriculture Office, Batangas
Provincial Agriculture Office, Rizal
Provincial Agriculture Office, Quezon

Table A.24 Target Yield of Major Crops in CALABARZON for the Years of 1995, 2000 and 2010 by Province

Crop	Cavite						Laguna						Batangas						Rizal						Quezon						CALABARZON					
	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010
Paddy	2.3	3.0	3.3	3.5	3.4	3.8	4.0	4.5	1.4	1.8	2.2	3.0	3.1	3.4	3.7	4.0	2.4	2.7	3.0	3.5	2.4	2.8	3.1	3.6	2.4	2.8	3.1	3.6	2.4	2.8	3.1	3.6	2.4	2.8	3.1	3.6
Corn	1.1	1.5	1.9	2.5	1.8	2.2	2.5	3.0	0.8	1.3	1.7	2.3	0.7	1.2	1.7	2.3	0.9	1.3	1.8	2.3	0.9	1.4	1.8	2.4	0.9	1.4	1.8	2.4	0.9	1.4	1.8	2.4	0.9	1.4	1.8	2.4
Tomatoes	2.3	5.0	7.0	10.0	11.9	13.0	14.0	16.0	4.2	5.0	6.0	8.0	6.9	8.0	9.0	10.0	9.5	10.0	10.5	12.0	8.8	9.3	10.3	12.5	8.8	9.3	10.3	12.5	8.8	9.3	10.3	12.5	8.8	9.3	10.3	12.5
Mango	4.7	6.0	7.5	10.0	3.6	5.0	6.5	9.0	3.3	4.5	6.0	8.5	2.4	3.5	4.5	7.0	9.8	10.0	10.0	10.0	4.2	5.2	6.4	8.7	4.2	5.2	6.4	8.7	4.2	5.2	6.4	8.7	4.2	5.2	6.4	8.7
Sugarcane	-	-	-	-	65.5	70.0	75.0	80.0	70.8	73.0	77.0	83.0	-	-	-	-	-	-	-	-	-	-	-	82.1	69.0	72.0	76.4	82.1	69.0	72.0	76.4	82.1	69.0	72.0	76.4	82.1
Coconut	2.0	2.5	3.0	4.0	2.0	2.5	3.0	4.0	5.9	6.1	6.2	6.5	3.3	3.5	3.5	3.5	5.4	5.6	5.8	6.3	4.7	4.9	5.2	5.8	4.7	4.9	5.2	5.8	4.7	4.9	5.2	5.8	4.7	4.9	5.2	5.8
Coffee	1.3	1.5	1.7	2.0	0.5	0.7	0.9	1.2	0.7	0.9	1.1	1.5	0.2	0.4	0.6	1.0	0.2	0.4	0.6	1.0	0.2	0.4	0.6	1.0	0.2	0.4	0.6	1.0	0.2	0.4	0.6	1.0	0.2	0.4	0.6	1.0

Table A.25 Estimated Harvest Area of Major Crops in CALABARZON for the Years of 1995, 2000 and 2010 by Province

Crop	Cavite						Laguna						Batangas						Rizal						Quezon						CALABARZON					
	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010
Paddy	17.7	23.0	23.0	23.0	33.9	35.0	35.0	35.0	35.5	39.9	44.2	44.2	7.6	8.0	8.0	8.0	75.1	79.8	84.4	84.4	169.8	185.6	194.6	194.6	169.8	185.6	194.6	194.6	169.8	185.6	194.6	194.6	169.8	185.6	194.6	194.6
Corn	17.7	16.0	15.0	13.0	16.1	15.0	15.0	15.0	16.7	17.0	17.0	18.0	2.1	2.0	2.0	2.0	15.4	18.0	23.0	30.0	219.2	221.0	230.0	240.0	219.2	221.0	230.0	240.0	219.2	221.0	230.0	240.0	219.2	221.0	230.0	240.0
Tomatoes	0.1	0.3	0.4	0.5	1.0	1.1	1.2	1.5	0.5	0.6	0.6	0.6	0.2	0.3	0.4	0.4	0.3	0.4	0.5	0.6	2.1	2.7	3.1	3.6	2.1	2.7	3.1	3.6	2.1	2.7	3.1	3.6	2.1	2.7	3.1	3.6
Mango	1.1	1.3	1.5	2.0	0.2	0.2	0.2	0.2	2.9	3.0	3.1	3.2	0.8	1.0	1.2	1.5	0.6	0.6	0.6	0.6	5.6	6.1	6.6	7.5	5.6	6.1	6.6	7.5	5.6	6.1	6.6	7.5	5.6	6.1	6.6	7.5
Sugarcane	-	-	-	-	9.6	8.0	6.5	6.0	18.5	17.0	15.0	15.0	-	-	-	-	-	-	-	-	28.1	25.0	21.5	21.0	28.1	25.0	21.5	21.0	28.1	25.0	21.5	21.0	28.1	25.0	21.5	21.0
Coconut	17.5	17.5	17.5	17.5	72.1	72.0	72.0	72.0	31.0	31.0	31.0	31.0	0.3	0.3	0.3	0.3	270.3	270.0	270.0	270.0	391.2	390.8	390.8	390.8	391.2	390.8	390.8	390.8	391.2	390.8	390.8	390.8	391.2	390.8	390.8	390.8
Coffee	10.8	12.0	13.0	15.0	1.2	1.4	1.6	2.0	3.0	4.0	5.0	7.0	0.1	0.2	0.3	0.5	2.8	3.0	3.3	4.0	17.9	20.6	23.2	28.5	17.9	20.6	23.2	28.5	17.9	20.6	23.2	28.5	17.9	20.6	23.2	28.5

Table A.26 Estimated Production of Major Crops in CALABARZON for the Years of 1995, 2000 and 2010 by Province

Crop	Cavite						Laguna						Batangas						Rizal						Quezon						CALABARZON					
	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010
Paddy	40.7	69.0	75.9	80.5	115.3	133.0	140.0	157.5	49.7	71.7	97.2	132.6	23.6	27.2	29.6	32.0	180.2	215.3	253.2	295.4	409.5	516.3	595.9	698.0	409.5	516.3	595.9	698.0	409.5	516.3	595.9	698.0	409.5	516.3	595.9	698.0
Corn	19.5	24.0	28.5	32.5	29.0	33.0	37.5	45.0	134.3	221.0	297.5	414.0	1.5	2.4	3.4	4.6	13.9	23.4	41.4	69.0	198.1	303.8	406.3	565.1	198.1	303.8	406.3	565.1	198.1	303.8	406.3	565.1	198.1	303.8	406.3	565.1
Tomatoes	0.2	1.5	2.8	5.0	11.9	14.3	16.8	24.0	2.1	3.0	3.6	4.8	1.4	2.4	3.6	4.0	2.9	4.0	5.3	7.2	18.5	25.2	32.1	45.0	18.5	25.2	32.1	45.0	18.5	25.2	32.1	45.0	18.5	25.2	32.1	45.0
Mango	5.2	7.8	11.3	20.0	0.7	1.0	1.3	1.8	9.6	13.5	18.6	27.2	1.9	3.5	5.4	10.5	5.9	6.0	6.0	6.0	23.3	31.8	42.6	65.5	23.3	31.8	42.6	65.5	23.3	31.8	42.6	65.5	23.3	31.8	42.6	65.5
Sugarcane	-	-	-	-	628.8	560.0	487.5	480.0	1309.8	1241.0	1155.0	1245.0	-	-	-	-	-	-	-	-	1938.6	1801.0	1642.5	1725.0	1938.6	1801.0	1642.5	1725.0	1938.6	1801.0	1642.5	1725.0	1938.6	1801.0	1642.5	1725.0
Coconut	35.0	43.8	52.5	70.0	144.2	180.0	216.0	288.0	182.9	189.1	192.2	201.5	1.0	1.1	1.1	1.1	1459.6	1512.0	1566.0	1701.0	1822.7	1925.9	2027.8	2261.6	1822.7	1925.9	2027.8	2261.6	1822.7	1925.9	2027.8	2261.6	1822.7	1925.9	2027.8	2261.6
Coffee	14.0	18.0	22.1	30.0	0.6	1.0	1.4	2.4	2.1	3.6	5.5	10.5	0.0	0.1	0.2	0.5	0.6	1.2	2.0	4.0	17.3	23.9	31.2	47.4	17.3	23.9	31.2	47.4	17.3	23.9	31.2	47.4	17.3	23.9	31.2	47.4

Table A.27 Target Animal Production in CALABARZON for the Years of 1995, 2000 and 2010 by Province

	Cavite						Laguna						Batangas						Rizal						Quezon						CALABARZON					
	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010
Carle	1379	1400	1500	1800	935	950	1000	1100	3931	4000	4100	4500	561	580	600	700	3742	3800	4000	4500	10548	10730	11200	12600	4479	4030	4030	4030	4479	4030	4030	4030	4479	4030	4030	4030
Carabao	329	350	350	350	250	250	250	250	352	300	300	300	143	130	130	130	3405	3000	3000	3000	78745	89500	97000	105000	53491	73000	83300	107000	53491	73000	83300	107000	53491	73000	83300	107000
Hog	4926	4500	5000	6000	20742	25000	25000	25000	15455	20000	25000	28000	15536	16000	17000	19000	22086	24000	25000	27000	78745	89500	97000	105000	53491	73000	83300	107000	53491	73000	83300	107000	53491	73000	83300	107000
Chicken	1772	2000	2300	3000	9534	10000	11000	12000	24917	40000	45000	60000	3893	6000	8000	12000	13375	15000	17000	20000	53491	73000	83300	107000	53491	73000	83300	107000	53491	73000	83300	107000	53491	73000	83300	107000
Milk (kl)	36	50	100	200	176	300	500	1000	214	500	700	1200	-	-	-	-	25	100	250	500	450	950	1550	2900	450	950	1550	2900	450	950	1550	2900	450	950	1550	2900

Table A.28 Target Fish Production in CALABARZON for the Years of 1995, 2000 and 2010 by Province

	Cavite						Laguna						Batangas						Rizal						Quezon						CALABARZON					
	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010
Marine Fish	6724	6700	6700	6700	-	-	-	-	19829	24000	30000	40000	-	-	-	-	70252	75000	80000	90000	96805	105700	116700	136700	46645	46700	46700	46700	46645	46700	46700	46700	46645	46700	46700	46700
Aquaculture	7523	7500	7500	7500	4789	4800	4800	4800	1072	1000	1000	1000	25838	26000	26000	26000	7423	7400	7400	7400	96805	105700	116700	136700	46645	46700	46700	46700	46645	46700	46700	46700	46645	46700	46700	46700
Inland Fish	15	20	20	20	42228	42000	42000	42000	17596	17600	17600	17600	133007	133000	133000	133000	316	300	300	300	193162	192920	192920	192920	193162	192920	192920	192920	193162	192920	192920	192920	193162	192920	192920	192920
Total	14262	14220	14220	14220	47017	46800	46800	46800	38497	42600	48600	58600	158845	159000	159000	159000	77991	82700	87700	97700	336612	345320	356320	376320	336612	345320	356320	376320	336612	345320	356320	376320	336612	345320	356320	376320

Table A.29 Estimated Value Added of Agriculture Sector by Sub-sector in CALABARZON for the Years of 1995, 2000 and 2010 by Province

	Unit: 10 ⁶ Pesos											
	Cavite			Laguna			Batangas			Rizal		
	1988	1995	2000	1988	1995	2000	1988	1995	2000	1988	1995	2000
Crop												
Paddy	110.8	242.2	266.4	282.6	404.6	466.8	491.4	552.8	174.4	251.8	341.3	465.4
Corn	45.5	68.9	81.8	93.3	83.2	94.7	107.6	129.2	385.5	634.3	859.8	1188.2
Tomatoes	1.3	8.3	15.4	27.5	65.5	78.8	92.5	132.2	11.6	16.5	19.8	26.4
Mango	38.7	58.3	84.2	149.6	5.4	7.5	9.7	13.5	71.6	101.0	139.1	203.5
Sugarcane	-	-	-	-	471.6	420.0	365.6	360.0	982.4	930.8	866.3	933.8
Coconut	155.7	194.6	233.5	311.4	641.4	800.6	960.8	1281.0	813.5	841.1	854.9	896.3
Coffee	429.6	550.8	676.3	918.0	18.4	30.0	44.1	73.4	64.3	110.2	168.3	321.3
Other Vegetables	6.3	45.4	92.5	192.8	327.7	433.2	555.2	925.3	57.8	90.9	119.0	185.1
Other Perennials	240.1	353.6	512.4	901.5	73.1	108.2	156.0	274.4	219.2	324.7	467.9	823.1
Sub-total	1028.0	1524.1	1962.5	2876.6	2090.8	2439.8	2782.9	3741.8	2780.3	3301.1	3830.4	5043.0
									183.2	268.0	369.9	517.9
									7800.3	8484.3	9305.8	11088.5
									13496.9	16017.4	18251.5	23267.7
Animals												
Cattle	50.7	51.5	55.2	66.2	34.4	35.0	36.8	40.5	144.7	147.2	150.9	165.6
Carabao	12.1	12.9	12.9	12.9	9.2	9.2	9.2	9.2	13.0	11.0	11.0	11.0
Hog	115.8	105.8	117.5	141.0	487.4	587.5	587.5	587.5	363.2	470.0	587.5	658.0
Chicken	50.5	57.0	57.0	57.0	271.7	285.0	313.5	342.0	710.1	1140.0	1282.5	1710.0
Milk	0.4	0.5	1.0	2.0	1.8	3.0	5.0	10.0	2.1	5.0	7.0	12.0
Sub-total	229.48	227.65	243.58	279.12	804.524	919.66	952	989.18	1233.08	1773.24	2038.92	2556.64
									501.954	573.128	654.364	819.044
									1163.47	1242.74	1332.1	1485.5
									3932.49	4736.42	5220.96	6129.48
Fish												
Marine Fish	134.5	134.0	134.0	-	-	-	-	-	396.6	480.0	600.0	800.0
Aquaculture	188.1	187.5	187.5	187.5	119.7	120.0	120.0	120.0	26.8	25.0	25.0	25.0
Inland Fish	0.2	0.3	0.3	0.3	633.4	630.0	630.0	630.0	263.9	264.0	264.0	264.0
Sub-total	322.8	321.8	321.8	321.8	753.1	750.0	750.0	750.0	687.3	769.0	889.0	1089.0
									2641.1	2645.0	2645.0	2645.0
									1595.4	1689.5	1789.5	1989.5
									5999.7	6175.3	6395.3	6795.3
TOTAL	1580.3	2073.6	2527.9	3477.5	3648.5	4109.5	4484.9	5481.0	4700.7	5843.4	6758.3	8688.6
									3326.2	3486.1	3669.2	3981.9
									10539.1	11416.6	12427.4	14563.5
									23429.1	26929.1	29867.8	36192.5

Table A.30 Estimated Labor Requirement of Agriculture Sector by Sub-sector in CALABARZON for the Years of 1995, 2000 and 2010 by Province

	Unit : '000 man-days											
	Cavite						Batangas					
	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010
	CALABARZON											
	Laguna						Rizal					
	1988	1995	2000	2010	1988	1995	2000	2010	1988	1995	2000	2010
Palay	1239	1610	1610	1610	2373	2450	2450	2450	532	560	560	560
Corn	885	800	750	650	805	750	750	750	105	100	100	100
Tomatoes	12	36	48	60	120	132	144	180	24	36	48	48
Mango	66	78	90	120	12	12	12	12	48	60	72	90
Sugarcane	-	-	-	-	1728	1440	1170	1080	-	-	-	-
Coconut	805	805	805	805	3317	3312	3312	3312	14	14	14	14
Coffee	432	480	520	600	48	56	64	80	4	8	12	20
Other Vegetables												
Other Fruits												
Sub-total	3439	3609	3823	3845	8403	8152	7902	7864	727	778	806	832
					15990	16188	16428	16764	18645	18907	19206	19096
									50023	50773	51225	51581

Table A.31 Principle Measures to be Applied to Development Sub-regions (1/2)

Development Sub-region	General Measures to be applied				Crop Production			Livestock Production				
	Irrigation Farm-market Post-harvest Research & Credit, insurance Coop. dev. & guarantee				Auction Research & AI and Food			Coop. Credit, insurance		dev. & guarantee		
	road	facilities	extension		market	extension	veterinary	processing	dev.			
Lowland												
Cavite Coastal Agricultural Area	x	x	x	x								
Laguna West Agricultural Area		x	x	x								
Laguna South Agricultural Area		x	x	x								
Sta. Maria Lowland Agricultural Area		x	x	x								
Batangas Eastern Lowland Agricultural Area	x	x	x	x								
Batangas Western Lowland Agricultural Area		x	x	x								
Quezon West Lowland Agricultural Area	x	x	x	x								
Infanta Delta Agricultural Area	x	x	x	x								
Lopez-Calauag Coastal Agricultural Area	x	x	x	x								
Tayabas Bay Coastal Agricultural Area	x	x	x	x								
Upland												
Cavita Lower Upland Agricultural Area		x	x	x								
Cavite Higher Upland Agricultural Area		x	x	x								
Laguna Highland Horticultural Area	x	x	x	x								
San Pablo-Alaminos Upland Agricultural Area		x	x	x								
Middle Santa Cruz River Upland Agricultural Area	x	x	x	x								
Upper Santa Cruz River Upland Agricultural Area		x	x	x								
Canlubang Upland Agricultural Area	x	x	x	x								
Lipa-Tanauan Upland Agricultural Area		x	x	x								
Batangas Sub-urban Agricultural Area		x	x	x								
Tuy-Balayan Upland Agricultural Area		x	x	x								
Lucban-Sampaloc Agricultural Area	x	x	x	x								
Tagkawayan Upland Agricultural Area		x	x	x								
Bondoc Peninsula Agricultural Area		x	x	x								
Agro-forestry Area												
Marikina Watershed Agro-forestry Area			x	x								
Batangas South-east Agro-forestry Area			x	x								

Table A.31 Principle Measures to be Applied to Development Sub-regions (2/2)


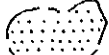


Development Sub-region	General Measures to be applied				Fish Production			Diversification			Sustainable Agriculture		
	Law enforcement on illegal fishing	Artificial reef	Research extension	Post harvest dev. & marketing	Insurance	Coop. dev.	Credit	Research extension information	Market information	Credit	Erosion control	Agro-forestry	Re-forestation
Lowland													
Cavite Coastal Agricultural Area	x	x	x	x	x				x				
Laguna West Agricultural Area								x					
Laguna South Agricultural Area									x				
Sta. Maria Lowland Agricultural Area									x				
Batangas Eastern Lowland Agricultural Area								x					x
Batangas Western Lowland Agricultural Area								x					
Quezon West Lowland Agricultural Area								x					
Infanta Delta Agricultural Area										x			
Lopez-Calauag Coastal Agricultural Area	x		x	x				x					-x
Tayabas Bay Coastal Agricultural Area	x		x	x				x					x
Upland													
Cavita Lower Upland Agricultural Area											x		
Cavite Higher Upland Agricultural Area								x		x			x
Laguna Highland Horticultural Area								x		x		x	
San Pablo-Alaminos Upland Agricultural Area													
Middle Santa Cruz River Upland Agricultural Area								x		x			
Upper Santa Cruz River Upland Agricultural Area								x		x			
Canlubang Upland Agricultural Area													
Lipa-Tanauan Upland Agricultural Area								x					
Batangas Sub-urban Agricultural Area								x					
Tuy-Balayan Upland Agricultural Area								x					
Lucban-Sampaloc Agricultural Area												x	
Tagkawayan Upland Agricultural Area											x		
Bondoc Peninsula Agricultural Area													
Agro-forestry Area													
Marikina Watershed Agro-forestry Area								x			x	x	x
Batangas South-east Agro-forestry Area								x			x	x	x

Figures

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Legend

Figure A.1

-  Lowland Agriculture Area
-  Upland Agriculture Area
-  Agro-Forestry Area
-  Coconut Planted Area

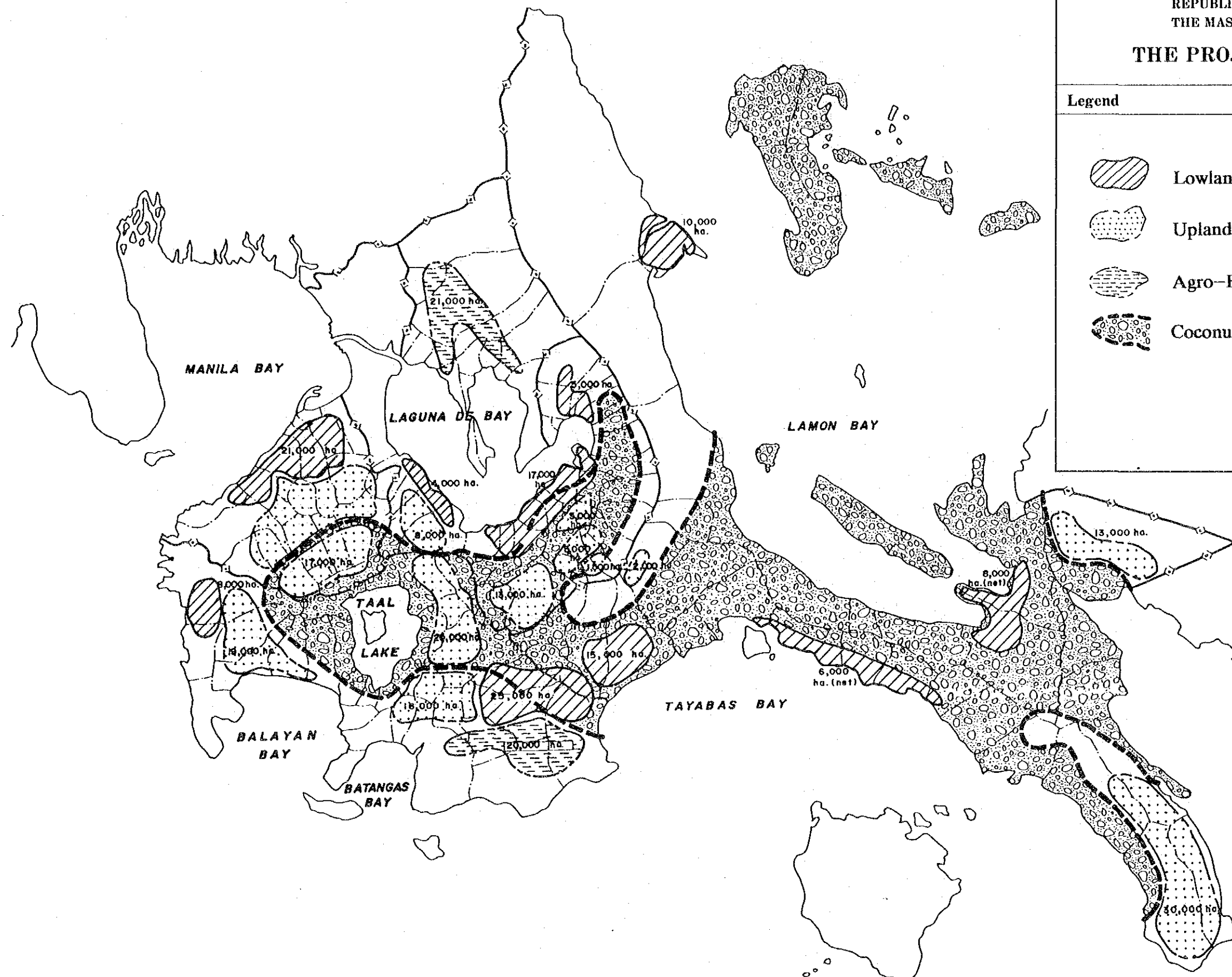


Figure A.1

Agricultural Subregions

Department of Trade and Industry

Japan International Cooperation Agency

JICA