4) Measures for indigenous people

The deterioration of living conditions for indigenous people stems from (1) the active development of forests by developers in nearby areas and (2) from the coercive conversion from hunting to agriculture. To counter this, an understanding of agriculture and improvements in technology are essential for the indigenous people. Therefore, they will be put on an equal footing with small-scale farmers by providing opportunities for participation in organizations and extending technical assistance through organizations. Special care will be taken to ensure that indigenous women are included in this.

Concrete plans will be prepared in consideration of the process of trial and error concerning the conversion to agriculture, as well as the option to continue hunting and gathering in parallel.

7.4.2 Measures for farmland conservation

1) Basic concept

There are two methods of implementing measures for farmland conservation: the physical method and the agricultural method. The former incorporates contour ridge creation, rainwater dispersion, etc., while the latter generally employs green manure cultivation, the rotation system, non-tillage cultivation, agro-forestry, agro-silvo-pastoril, etc. Effective soil conservation is ensured only when the physical and agricultural methods are combined in an organic manner. As discussed in 8.3.2, a demonstration study on the contents of the FAO Soil Conservation Technology Guideline Manual will be conducted on sandy soil to diffuse soil conservation technology as a means of developing sustainable agriculture.

In order to promote effective soil conservation, a technical guidance manual will be prepared. In addition, the following materials necessary for soil conservation will be introduced through farmers' organizations for collective utilization. Non-tillage cultivation will be introduced to 6,900 households within the framework of the project for the utilization of land leased from large-scale farmers for soybean cultivation etc. by small-scale farmers (the project for the efficient use of farmland). Green manure cultivation will be introduced in cotton producing areas with serious soil degradation. The direct cost of the project will be accounted separately.

2) Details of the measures

(1) Distribution of technical guidance manual

A technical guidance manual on soil conservation will be prepared for distribution to model small-scale farms (2,500 households). These model farms will constitute cores (leaders) to provide experience-based education and guidance for

small-scale farmers participating in farmers' organizations (committees; see Figure 7.2.6.4).

(2) Contour ridge creation

As described in 4.7.2, only 1.3% of small-scale farmers (1,660 households) practice contour farming (see Table 4.7.2.1). As a model case, the project will introduce sets of equipment consisting of surveying instruments (levels), tractors for ridge creation (80HP), disk harrows, and others in the six zones of the Study Area (see Chapter 8).

(3) Green manure cultivation

5.5% of small-scale farmers (7,034 households) practice green manure cultivation (see Table 4.7.2.1). Field research indicates that an increasing number of small-scale farmers want to introduce green manure farming. As a model case, 250 sets of materials comprising seed sowers (manual), traction cattle (one pair), and rolofaca will be provided for committees (2,750 households) organized around the core of 250 households, accounting for 10% of the model small-scale farms to be supported (2,500 households; see Figure 7.2.6.5).

(4) Non-tillage cultivation

21.1% of small-scale farmers (26,836 households) practice non-tillage cultivation (see Table 4.7.2.1). The number is increasing among ethnic Japanese and Germans as well as cultivators from Brazil. As a model case, the project will provide 250 sets of equipment comprising seed sowers (motorized), tractors, pesticide sprayers, and others for committees (2,750 households) organized around the core of 250 households, accounting for 10% of the model small-scale farms to be supported (2,500 households).

3) Direct cost of the project

Gs 13,533 million (see CUADRO A 7.4.2.1 for details).

4) Benefits

A synergic effect can be expected from soil conservation measures when the physical method is implemented in combination with the agricultural method. Since the combination of green manure and non-tillage cultivation would also bring better effects, both of these will be implemented by committees organized around the 250 model small-scale farms mentioned above. The committees will assume responsibility for increasing the proportion of small-scale farmers implementing two or more soil cultivation measures from the current 12.9%, as shown in Table 4.7.2.1.

As a direct effect, the promotion and expansion of these measures will stop soil degradation, thus facilitating sustainable agriculture.

7.5. WID measures

WID will be considered in individual projects. This section discussed measures specifically directed towards WID.

1) Basic concept

Sexual discrimination will be eradicated so that small-scale farmers may become free of the vicious socio-economic cycle they face and so that socially and economically balanced rural development may be ensured. Women will participate in development on an equal footing with men and will receive equitable benefits from development. Since mutual understanding is essential to correct the social gap between men and women, it is important to increase mutual understanding by experiencing each other's respective position through role-playing practice and the like.

In implementing the measures, the participation of women in various organizations will be encouraged to ensure the effective utilization of financial and human resources. Education and training will first focus on leaders of rural women to transform their way of thinking. They will be then trained as educational diffusion workers. It is essential that education is spread throughout the committees through these workers.

Measures for the alleviation of women's burden of labour and the encouragement of their participation in economic activities will also be considered.

2) Content of measures

a) Human resource development focused on rural women

The education of rural women will be conducted as adult education from a long-term perspective in training centres to be established at development bases in individual departments. Various subjects will be handled in the education, such as health, sanitation, and nutrition, as well as household economy, organizational management, environment (both social and natural) and basic knowledge. In order to promote economic activity by women, leadership training and guidance for apiculture, vegetable cultivation, handicraft, farm produce processing, and others will be provided in training centres. Of course, the socio-economic conditions and educational needs differ according to the area. Concrete contents of the education must therefore be determined for each locality. For the purpose of identifying such needs precisely, the opinions of local women will be actively incorporated in education and training programmes according to the ZOPP (zone-oriented programming pattern) method, and others. Vehicles to transport women to the centres will be provided in 13 departments, the exception being Central.

Local radio broadcasting and TV programmes for rural areas will be fully utilized to communicate information and public announcements to rural women in isolated areas. Primary protagonists in providing education for rural women will be

local cooperatives, under the guidance and coordination of departmental divisions in charge of agriculture and livestock, or those responsible for women. At the grassroots level, education will be provided through women's committees created around a core of women's leaders in individual localities.

As a complementary measure for educational activities in training centres, vehicles equipped with audio-visual materials will be introduced to facilitate the education of inhabitants in isolated areas ("mobile guidance"). Vehicles for mobile guidance will be provided for training centres in 13 departments in the Study Area, the exception being Central. The vehicles to be introduced will be four-wheel-drive, in view of the poor road conditions in the area. These vehicles will be equipped with audio-visual education materials, cooking utensils, and so on.

b) Establishment of collective purchasing centres

Collective purchasing centres will be established for women's committees in isolated areas in order to improve the availability of daily commodities. The purchasing centres will also be used as meeting rooms for local women's committees and as bases for educational diffusion activities. The centres will be managed primarily by members of the women's committees, who will take turns to purchase and sell produce. Centres will be established in 10 key locations in each department excluding Central.

c) Participation of rural women in economic activities

Due to instability of their lifestyles, many young women in low-income farming households have moved out of rural areas in search of employment opportunities, exerting a considerable impact on the socio-economic development of local communities. Therefore, local communities will be revitalized by encouraging rural women's active participation in economic activities to improve their daily lives and livelihoods. Production activities manageable by women will be introduced for this purpose.

① Vegetable cultivation

In view of the small consumption of vegetables by farmers, the production and consumption of vegetables will be encouraged. In addition to the cash crops to be introduced in the cultivation project, subsistence farming of vegetables by farmers' housewives will have the primary objective of supplying home consumption produce and the secondary objective of selling the surplus amount in local communities to acquire cash income. Vegetables to be introduced include leafy vegetables such as cabbage and lettuce, which are unavailable from other areas, as well as leeks, onions, parsley, sweet corn, carrots, etc., which are relatively unsusceptible to disease and pests. These crops are to be cultivated progressively in small lots according to the season. Cooking lessons will also be provided to improve nutrition by encouraging vegetable consumption by farmers.

② Apiculture

Honey production will be the primary objective. The number of colonies rearable in a given area depends on the amount of honey-source plants in that area. Rural women will assume partial responsibility for the rearing and maintenance of bee colonies introduced by the livestock project.

③ Sericulture

Women will be made responsible for sericulture, to be introduced by the livestock project. Women will be particularly fit for meticulous rearing and maintenance activities in the silkworm house.

④ Farm produce processing

Farm produce processing facilities to be introduced by the farm produce processing project will provide excellent employment opportunities for rural women. In addition, household processing of surplus produce for home consumption into cheese, jam, marmalade, and others will be encouraged to ensure improvement of nutritional conditions.

⑤ Others

Medium- and small domestic animals such as pigs and chickens are reared by most farmers. In many cases, however, they are grazed in an extensive manner, leading to low productivity and bad sanitation. Nonetheless, these animals will be retained because they literally represent "piggy banks" for rural women in general. Rationalization will be ensured through improvement of rearing methods and the utilization of home-grown forage.

Other measures include the introduction of wool processing and handicrafts such as woodwork, leather processing, and embroidery. Local materials and human resources will be utilized effectively to increase the cash income of women.

3) Direct cost of the project

Gs 11,856 million (see CUADRO A 7.5.1 for details).

4) Benefits

(1) Human resource development focused on rural women

① Adult education of women will help transform rural women's way of thinking in various aspects and contribute to the promotion of their social status.

② Mobile guidance will erase the barrier between isolated areas and the outside world. Women in these areas will be given equal opportunities for education.

(2) Establishment of collective purchasing centres

① This will facilitate the purchase of daily commodities in isolated areas. The labour burden of rural women will be reduced, for they will no longer need to go shopping in town.

② Bulk purchasing will reduce prices and help improve farmers' livelihood.

③ Collective management according to a shift system will strengthen solidarity among local women and provide opportunities for training on organizational management.

(3) Participation of rural women in production activities

① The independence of rural women will be indirectly supported by their potential for securing their own incomes.

② The nutritional balance of farmers will be improved.

③ Farmers' livelihoods will be stabilized.

④ The stabilization of household economies will reduce the number of young women leaving rural areas, thus revitalizing local communities.

7.6 Design of facilities

7.6.1 Agricultural & rural infrastructure improvement projects

1) Farmland improvement

For farmland improvement, lime and phosphate will be applied. Ploughing by disk plough and harrowing and grading by disk harrow will be carried out. Access roads will be 7 metres in width and 1km/km^2 in density.

2) Grassland improvement

For grassland improvement, phosphate materials will be applied. Ploughing by disk plough and harrowing and grading by disk harrow will be carried out. Access roads will be 7 metres in width and 0.5km/km^2 in density.

3) Paddy field irrigation facilities

For grouped paddy fields, the amount of water required in the area will be estimated, and principal and secondary lines of earth canals and principal drains will be planned on this basis.

4) Dry field irrigation facilities

An irrigation plan for small-scale dry-field irrigation will be drawn up.

In principle, fixed concrete dams will be constructed in streams and water will be pumped out by power motors. The pumped water will be diverted to fields via pipelines from reservoirs.

5) Agricultural land

Unpaved roads of 7 metres in width will be constructed.

6) Drinking water facilities

The construction of standard waterworks is planned by SENASA. However, water supply facilities (pipelines) to individual households are not planned.

7.6.2 Construction plans

1) Typical structure

Typical buildings have main pillars of reinforced concrete, brick walls, a wooden framework, and a tiled roof.

① Factories and warehouses will have high ceilings. A reinforced assembly material called "tinglado" ("shed") will be used for the frameworks of buildings that require large spans. Outer walls will either be open or made of brick or tin,

while roofs are made of tin.

② Architectural structures will be as described above. Design will be made as economical as possible, keeping in mind the local availability of materials. Construction plans in the Study Area will mainly consider measures against heat and humidity in summer, as well as windproofing measures.

③ The structure of the main parts of typical buildings will be as presented in Table 7.6.2.1. Typical buildings are shown in GRAFICO A 7.6.2.1-10.

2) Cost estimation and construction unit prices

No official criteria exist for cost estimation in Paraguay. As a reference for estimating unit prices for construction, a price list has been prepared and published by the Construction Industry Association. In this Study, unit prices will be adopted with reference to this price list, experience in the Study Area, and other factors.

Table 7.6.2.1 Structure of main parts of buildings

Facility	Pillars	Framework	Walls	Roof
a. Research institute				
(Artificial Insemination Centre)				
Administration and research building	Reinforced concrete	Wooden frame	Brick	Tile
Warehouse	Reinforced concrete	Steel frame	Brick	Tin
Dried grass storage	Reinforced concrete	Steel frame	Brick	Tin
Dormitory	Reinforced concrete	Wooden frame	Brick	Tile
(Artificial Insemination Subcentre)				
Office	Reinforced concrete	Wooden frame	Brick	Tile
(sericulture promotion support facilities)				
Administration building	Reinforced concrete	Wooden frame	Brick	Tile
Silkworm egg production centre	Reinforced concrete	Wooden frame	Brick	Tile
Juvenile silkworm collection centre	Reinforced concrete	Wooden frame	Brick	Tile
Juvenile silkworm nursery building	Reinforced concrete	Wooden frame	Brick	Tile
Laboratory	Reinforced concrete	Wooden frame	Brick	Tile
(Food Processing Research Centre)				
Administration and research building	Reinforced concrete	Wooden frame	Brick	Tile
Warehouse	Reinforced concrete	Steel frame	Brick	Tin
Farm tool storage	Reinforced concrete	Steel frame	Brick	Tin
b. Farmer support				
Training facilities	Reinforced concrete	Wooden frame	Brick	Tile
Training centre	Reinforced concrete	Wooden frame	Brick	Tile
c. Farm produce distribution and processing				
Precooling storage	Reinforced concrete	Wooden frame	Brick	Tin (heat-insulation structure)
Low-temperature storage	Reinforced concrete	Wooden frame	Brick	Tin (heat-insulation structure)
Sorting and packing centre	Tinglado	Tinglado	Open	Tin
Warehouse, machinery storage	Tinglado	Tinglado	Open	Tin
Fresh milk processing plant	Reinforced concrete	Steel frame	Brick	Tin (heat-insulation structure)
Macadamia nut processing plant	Tinglado	Tinglado	Tile	Tin
Cottage industry-type processing centre	Wood	Wooden frame	Tile	Tin
Plant quarantine office	Reinforced concrete	Wooden frame	Brick	Tile
Pesticide residue testing laboratory	Reinforced concrete	Wooden frame	Brick	Tile

7.7 Estimation of project costs

Table 7.7.1 presents the total cost of the projects described in this chapter. Details of individual cost items are shown for each project. The estimation of project costs is based on the following.

(1) Base year for estimation

1995 is the base year for estimation.

(2) Total project cost

Total project cost comprises implementation planning cost, direct project cost, land acquisition cost, administration cost, engineering service cost, material reserve cost, and price reserve cost.

(3) Implementation planning cost

Implementation planning cost represents the expenses for consultation with implementing bodies to ensure smooth operation of the projects. The cost corresponds to 0.5% of direct project cost.

(4) Direct project cost

Expenses for construction works and installation of equipment include costs incurred by contractors.

(5) Land acquisition cost

Land acquisition cost represents the expenses for acquiring land on which to construct new roads and facilities.

(6) Administration cost

Administration cost represents the current expenses incurred by bodies implementing the projects. The cost corresponds to 10% of the direct project cost.

(7) Engineering service cost

Engineering services will be provided by overseas consultants and others in implementing the projects. The cost of such services corresponds to 16% of the direct project cost.

(8) Physical contingency

Physical contingency is to provide for any increase in construction cost due to contingencies brought on by changes in design or climatic conditions. The cost corresponds to 10% of the direct project cost.

(9) Price contingency

Price contingency, corresponding to 10% of the direct project cost, is to prepare for any price fluctuations during the project implementation period.

(10) Value added tax (VAT)

Value added tax represents 10% of the total project cost.

Table 7.7.1 Summary of project costs

	Project volume		Project cost	
	Volume	Unit	Gs1,000,000	US$1,000
1. Implementation planning cost	0.5	%	5,499	2,791
2. Direct project cost			1,099,776	558,263
1) Land use project			1,434	728
2) Agricultural development projects			572,858	290,790
(1) Cultivation project			318,920	161,890
(2) Livestock project			30,077	15,267
(3) Farm produce distribution project			112,039	56,872
(3) Farm produce distribution project			111,822	56,761
3) Agricultural & rural infrastructure improvement project			492,279	249,889
(1) Agricultural infrastructure improvement project			347,989	176,644
(2) Rural infrastructure improvement project			144,290	73,245
4) Measures for environmental conservation			15,439	7,837
(1) Measures for environmental conservation			1,906	968
(2) Measures for soil conservation			13,533	6,869
5) WID measures			11,856	6,019
(1) Education & training			5,876	2,983
(2) Establishment of collective purchasing centres			5,980	3,036
6) Development of project implementation bodies			5,910	3,000
3. Land acquisition cost	5,000.0	ha	2,955	1,500
4. Engineering service cost	15.0	%	164,966	83,739
5. Administration cost	10.0	%	109,978	55,826
6. Physical contingency	10.0	%	109,978	55,826
7. Price contingency	10.0	%	109,978	55,826
Indirect project costs: total			497,855	252,717
Total project cost			1,603,130	813,771
Value added tax (VAT)	10.0	%	160,313	81,377

PROJECTS IN MODEL AREAS

CHAPTER 8 PROJECTS IN MODEL AREAS

8.1 Zoning

8.1.1 Methods and results of zoning

To zone the Study Area, we gathered and analyzed various data, in addition to the field surveys. In terms of the natural environment, this concerned the density of roads, average annual rainfall, the state of soil distribution, the cultivation area for different crops by small-scale farmers, their farm-occupied land area, and so on. For the social environment, meanwhile, we created indices for the level of basic needs in rural areas (quality of housing, standard of education, domestic sanitation facilities, and capacity for subsistence), the density of small-scale farms, gross incomes, the diffusion rates of electricity and water supply, etc., then calculated an overall average index for the rural level in each department (see CUADRO A 8.1.1.1).

The results are shown in Figures 8.1.1.1 to 9 and Table 8.1.1.1, while a comprehensive assessment is shown in Figure 8.1.1.10. Based on these, we brought together neighbouring and similar departments into single zones, classifying the 14 departments into 6 zones (see Figure 8.1.1.10).

From an overall standpoint, in terms of the natural environment (rainfall, soil, etc.) the regional conditions are progressively more suited to agriculture from west to east. The density of roads and small-scale farms is high in departments close to the capital and in areas containing large provincial cities to the east. On the other hand, the farm-occupied land area of small-scale farmers increases progressively as one moves further away from the capital. Meanwhile, in terms of crop cultivation ratios, San Pedro & Caaguazú (Zone 2) and Alto Paraná & Itapúa (Zone 4) cultivate the majority of their crops on 20% or more, but in other departments the majority of crops are cultivated on less than 19% of the land.

As for the social environment, the diffusion ratios of electric power and water supply are high in the capital region and provincial cities with a relatively long history, but decrease progressively into the provinces. In addition, rural standards, expressed as the proportion of farm households deficient in basic rural needs, are progressively lower in regions where the diffusion ratio of electric power and water supply is low.

8.1.2 Characteristics of respective zones

1) Zone 1 (Departments of Amambay and Concepción)

This region lies in the northernmost part of the Study Area, adjacent to Brazil. An access road to the capital has only recently been surfaced. Therefore,

contacts with Brazil are more prominent. In addition, since the elevation varies from 100 to 700 metres, the soil is complex. Moreover, while the density of roads and small-scale farms is low, the farm-occupied land area of small-scale farmers is above the average for the Study Area. Many crop types are cultivated but the cultivation areas are small.

2) Zone 2 (Department s of San Pedro and Caaguazú)

This region has the most typical environment for small-scale farmers in the Study Area. Many types of crop are cultivated, the cultivation areas and gross incomes ranking as standard for small-scale farmers as a whole.

3) Zone 3 (Department s of Cordillera, Central, and Paraguarí)

Due to its location on the outskirts of the capital, the density of small-scale farmers and roads is high in this zone. Conversely, the farm-occupied land area and cultivation areas are small. In addition, the topography is complex, forests are few, and perennial crops and vegetables are most often cultivated. The rates of diffusion of electric power, telephones, and water supply are also high.

4) Zone 4 (Department s of Canindeyú, Alto Paraná, and Itapúa)

This is a tierra roja soil zone, fertile and optimally suited to agriculture. There are many Brazilian farmers as well as ethnic Japanese, German and other immigrant medium-scale farmers in this granary zone. Development of this region is the slowest of all, but has progressed rapidly since the opening of a north-south trunk road. The farm-occupied land area and gross incomes of small-scale farmers are some of the highest class in the Study Area.

5) Zone 5 (Department s of Guairá and Caazapá)

Though located in the centre of the Study Area, soil conditions are poor while the farmland and forest areas are small. Gross incomes are also at the lowest levels. While more than 30% of the Study Area's land for sugar cane cultivation is concentrated here, it has 9% or less of the areas for other crops. In view of this, many of its small-scale farmers are ranked in the impoverished class.

6) Zone 6 (Department s of Misiones and Ñeembucú)

A flat zone mostly occupied by wet grasslands. The road density is low in this poor-draining silt alluvial zone. For these reasons, the main type of farming practice is livestock pasture.

Figure 8.1.1.1 Density of roads

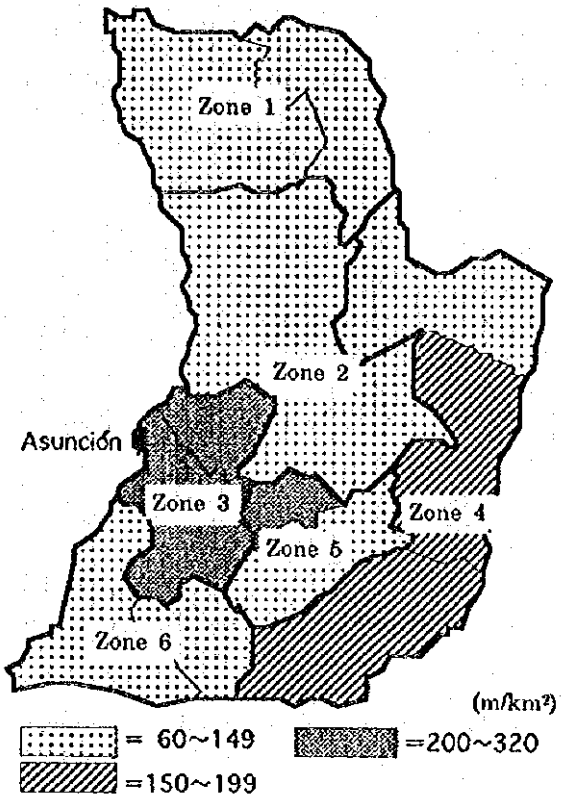


Figure 8.1.1.2 Average rainfall

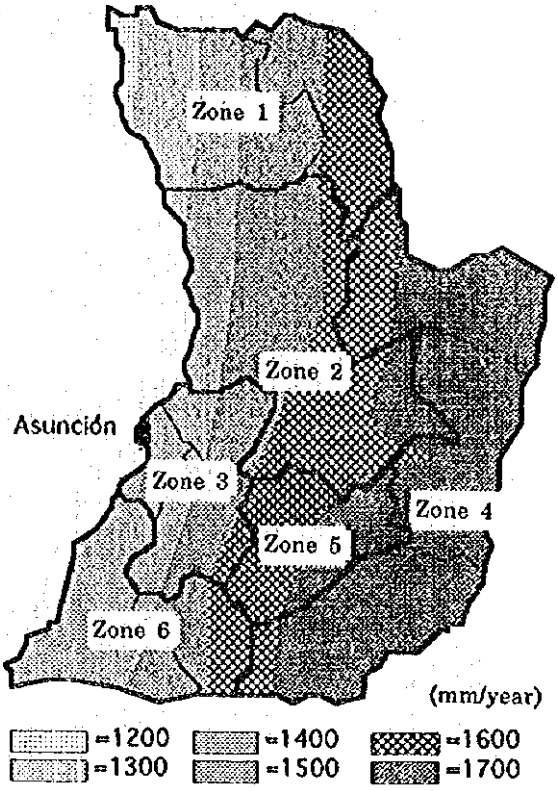


Figure 8.1.1.3 Density of small-scale farmers

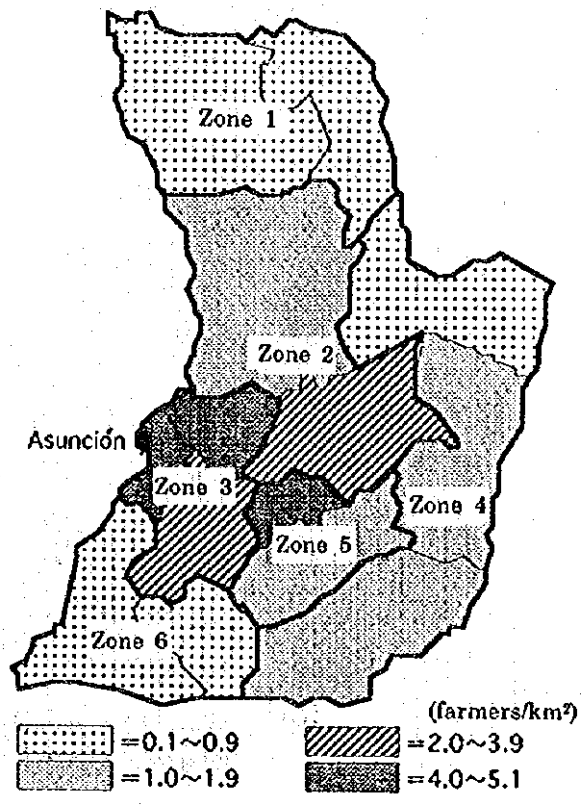


Figure 8.1.1.4 Land area occupied by small-scale farmers

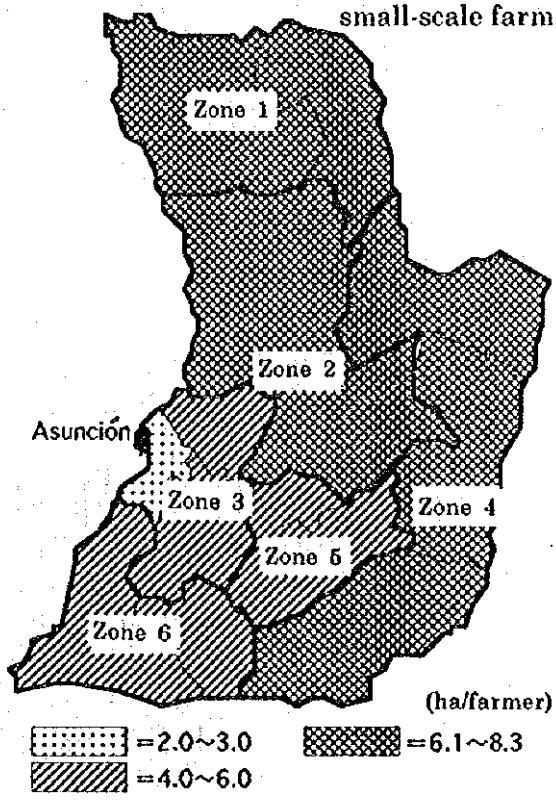
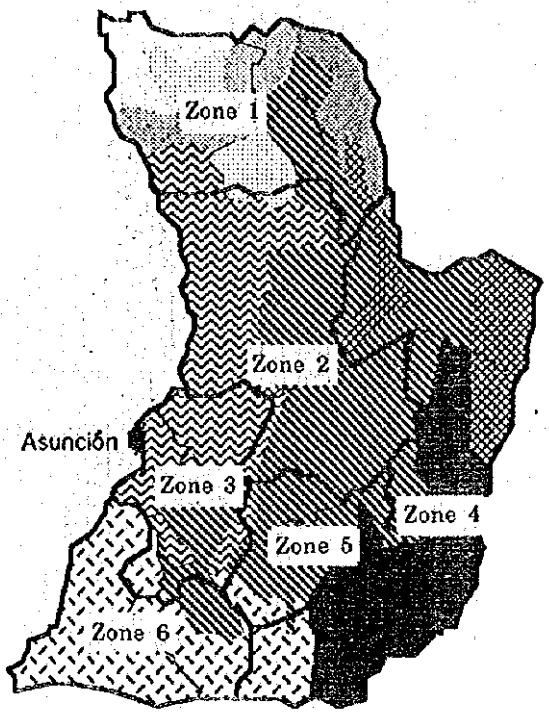


Figure 8.1.1.5 Soil distribution



Mollic Planosols
Poor-draining soil and non-porous subsoil developed in flatlands or hollows, giving rise to frequent flooding.

Pellic Vertisols
Soil heavy in clay properties, mainly used as pasture land.

Eutric Planosols
Similar to Mollic Planosols.

Dystric Gleysols
Soil produced from alluvial deposits of river flood plains in a low base state.

Acric Ferralsols
Intensely weathered soil originating from iron and aluminium.

Rhodic Ferralsols
Similar to Acric Ferralsols.

Orthic Acrisols
Clay deposit soil with extremely low base saturation. Water permeability is poor, making it susceptible to landslides, surface erosion, and gully erosion.

Dystric Nitosols
Soil optimally suited to agriculture, with low base plateau basalt as its parent material. Commonly known as Terra Roxa.

Figure 8.1.1.6 Diffusion of power supply in rural areas

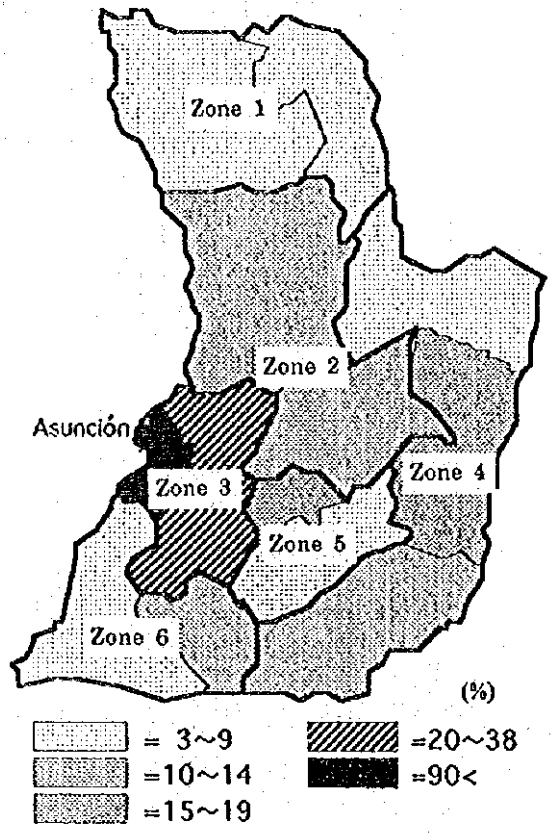


Figure 8.1.1.7 Diffusion of water supply in rural areas

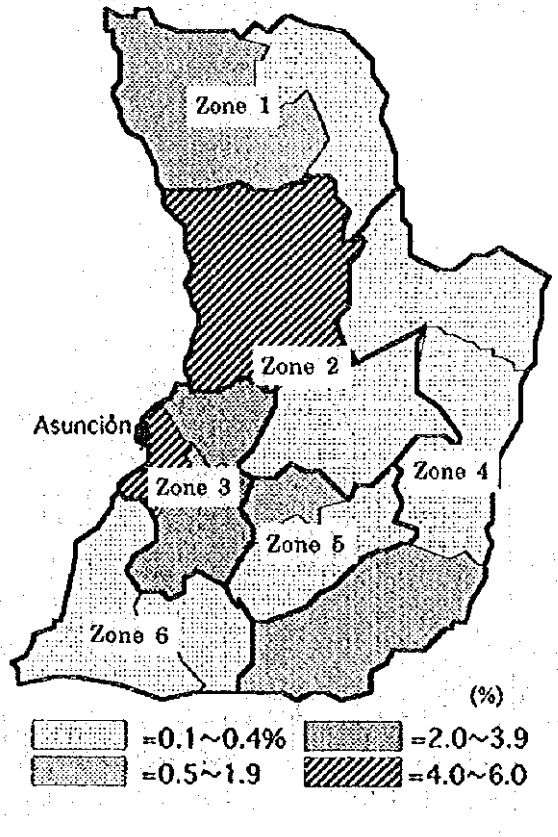


Figure 8.1.1.8 Gross income of small-scale farmers

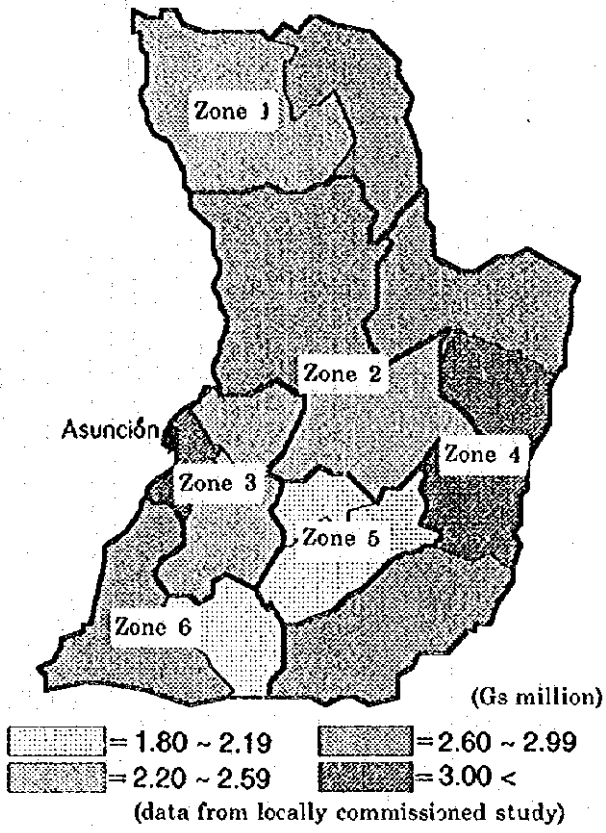


Figure 8.1.1.9 Level of basic needs deficiency in rural areas

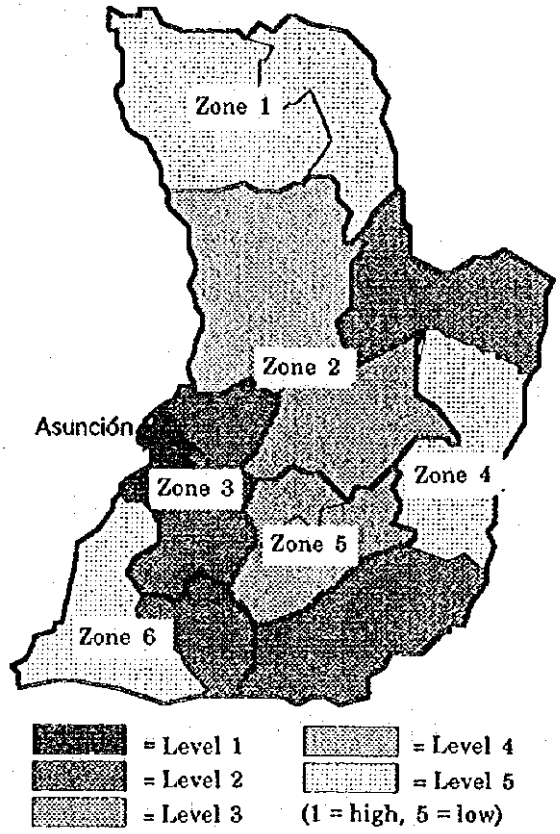
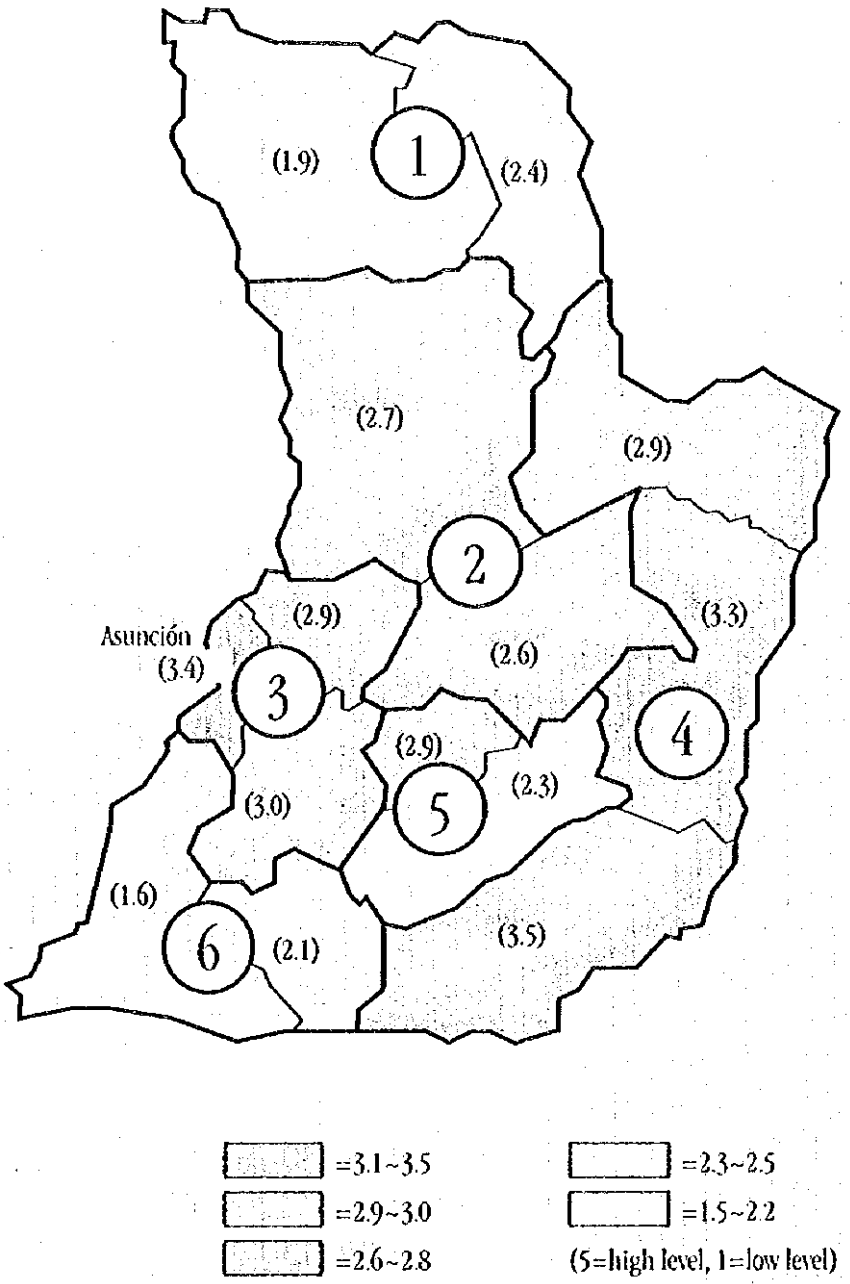


Table 8.1.1.1 Cultivation area ratios for small-scale farmers' crops (agricultural year 1994-95)

Zone	1		2		3			4			5		6	
Department / Crop	AMAMBAY	CONCEPCION	SAN PEDRO	CAAGUAZU	CORDILLERA	CENTRAL	PARAGUARI	CANINDEYU	ALTO PARANA	ITAPUA	GUAIRA	CAAZAPA	MISIONES	ÑEEMBUCU
Cassava														
Maize														
Cotton														
Poroto														
Peanuts														
Sugar cane														
Sweet potatoes														
Soybeans														
Adzuki beans														
Tobacco														
Dry-field rice														
Mint														
Paddy rice														
Wheat														
Potatoes														
Sunflowers														
Vegetable														
Perennial crops														

0.1 ~ 9 %	10 ~ 19%	20 ~ 29%	30% or more

Figure 8.1.1.10 Overall average index of rural levels



8.2 Selection of model areas

8.2.1 Selection of model areas

As outlined above, the departments that make up the respective zones share common features such as the density of small-scale farmers, soil distribution, crops cultivated, and the density of roads. We will select high-priority model areas that typify the characteristics of each zone. The method of selection will be as follows. In principle each administrative district will have one model area.

1) Conditions for selecting candidate model areas

When selecting model areas, we will first choose candidate model areas from those given below. The conditions for selection will be as follows.

① Three candidate areas, in order of preference, as recommended by departmental governors or competent departmental staff (see Table 5.2.1).
② Candidate areas specified in Form 1 of the local commission (see ANEXO 1.4).
③ Candidate areas raised by the field survey.
④ Candidate areas recommended by the Department of General Planning of the Ministry of Agriculture and Livestock.

2) Method of selection

The method of selection will be to give points according to the following categories. Candidate model areas with the highest points total in each department will then be designated as model areas for selection at the departmental level. When two or more candidate areas share top position in any one department, the area recommended by the department becomes the model area for selection, thus producing one model area for selection from each department.

① Candidate areas: the three candidate areas recommended by departments are given 3 points for 1st preference, 2 points for 2nd preference, and 1 point for 3rd preference. Other model areas are given one point each. When the same candidate model area is recommended from more than one source, the sum of the points is totalled. Higher points will be set when evaluating the three candidate areas recommended by departments, since the trends towards democratization and regional devolution in Paraguay are thought certain to gather pace in future.
② Individual items

- Income improvement: the incomes of small-scale farmers can be improved by implementing a model area project.
- Economic contribution: implementation may contribute economically to the agricultural sector, including imports and exports.

- Leaders: to achieve smooth and steady progress in model areas, there should be farms recognized by the Ministry of Agriculture and Livestock (Agricultor Galardonado) or farm schools exist in the said area, or many pioneering settlers or other leaders living in the surrounding area.
- Farmers' organizations: there are active comités and other farmers' organizations.
- Demonstrable effects: the candidate area is near a national highway or other trunk road and thus has demonstrable effects.
- Employment opportunities: opportunities for employment may be provided by implementing the project.
- WID: women will take part in the project, and improvements in their labour and living conditions may be sought.

  Each of the above categories will be graded with 1 point = good, 0 points = average, -1 point = bad.
- Environmental consideration: necessary = 1 point, hardly or not at all necessary = 0 points.

③ Support from international organizations and others (excluding NGOs): no = 1 point, yes = 0 points.

Categories ② and ③ above will be decided in discussion between the study team and local personnel.

From the model areas selected according to the method of preliminary selection above (one selected model area per department), we will select one model area per zone. The method of selection will be to identify selected model areas that, in the above evaluation, amass the highest points total in each zone.

3) Results of selection

As shown in Table 8.2.1.1, there are a total of 52 candidate model areas, of which 36 are double areas (giving a total of 88 areas). This doubling ratio of about 69% will be significant when screening selected model areas (see Table 8.2.1.1).

The selection of model areas was decided as follows, after the study team and counterparts had jointly confirmed the evaluation points (see Table 8.2.1.1).

(1) Zone 1: Pedro Juan Caballero (Amambay) .....13 points
2nd: Horqueta (Concepción) ..... 9 points
(2) Zone 2: Coronel Oviedo (Caaguazú) ..... 9 points
2nd: Choré (San Pedro) ..... 8 points
(3) Zone 3: Ybycuí (Paraguarí) ..... 11 points
2nd: Itá (Central) ..... 10 points
(4) Zone 4: Minga Guazú (Alto Paraná) ..... 10 points
2nd: Corpus Cristi (Canindeyú) ..... 8 points
2nd: C.A.López (Itapúa) ..... 8 points

(5) Zone 5: Caazapá (Caazapá) ..... 13 points
2nd: Independencia (Guairá) ..... 10 points
(6) Zone 6: Isla Umbú (Ñeembucú) ..... 9 points
2nd: Santa Rosa (Misiones) ..... 8 points

After taking account of requests from departments and districts (as described above) and the results of the local commission and others, between 4 and 8 projects were proposed for each department for work such as small-scale irrigation, farm roads, drinking water, and farm product processing. Of these, we drafted proposals for 2 projects in each zone, giving a total of 12 projects.

8.2.2 Wishes of local inhabitants

The study team and the Ministry of Agriculture and Livestock held explanatory meetings in six locations in the Study Area with a view to reflecting the wishes and requests of local inhabitants in the model area development projects (for the explanatory materials used, see ANEXO 8.2.2). More than 40 participants (including representatives of local departments, districts, cooperatives and farmers) attended each meeting and took part in a lively exchange of opinions. The wishes of the local inhabitants are as follows.

① Improvement of rural social infrastructure (e.g. farm roads, irrigation, drinking water, education, etc.)
② Procurement of farming capital and establishment of a system for its deployment and management
③ Establishment of a rational system of farming and thoroughgoing technical guidance related to it
④ Location of sources of production equipment and destinations of farm produce sales
⑤ Formulation of plans incorporating participation and activities by women
⑥ Assurance of employment opportunities through improvements to farm product processing facilities and others
⑦ Support for the organization of farmers
⑧ Training of personnel
⑨ Combined support in technology and capital

8.2.3 Selection of projects

On the basis of the wishes expressed in local explanatory meetings, the following projects were selected after adjustment with the local investigation and the Ministry of Agriculture and Livestock (for more details, see 8.3).

(1) Zone 1: P.J. Caballero (Amambay)
① Project for the efficient use of farmland (exports outside MERCOSUR)
② Project for the enhancement of settlement land (exports within MERCOSUR)

(2) Zone 2: Coronel Oviedo (Caaguazú)
③ Project for the enhancement of irrigation facilities in dry fields (domestic sale)
④ Project for the demonstration of farmland conservation (demonstration study)

(3) Zone 3: Ybycuí (Paraguarí)
⑤ Project for the development of agriculture including consideration for the environment (exports within MERCOSUR)
⑥ Project for soil improvement and the promotion of cotton crops (exports within MERCOSUR)

(4) Zone 4: Minga Guazú (Alto Paraná)
⑦ Project for the development of fruit producing estates (exports within MERCOSUR)
⑧ Project for the promotion of suburban dairy farming (domestic sale)

(5) Zone 5: Caazapá (Caazapá)
⑨ Project for the improvement of adult education for farmers, etc. (exports within MERCOSUR)
⑩ Project for the promotion of sericulture (exports outside MERCOSUR)

(6) Zone 6: Isla Umbú (Ñeembucú)
⑪ Project for the promotion of combined agriculture & livestock farming (exports within MERCOSUR, domestic sale)
⑫ Project for the development of model rural areas for paddy field development (exports outside MERCOSUR)

As for the prospective consumption destinations of these projects, in view of the impact on small-scale farmers caused by Paraguay's membership of MERCOSUR, more than 80% will be export-oriented to regions outside MERCOSUR. In addition, although none of the four types of consumption destinations in these favoured projects involve improvement of living standards, the component elements in the other three types include the diversification of self-sufficiency crops and improvement of nutrition, elements that play a part in life-style improvement.

In order to start implementing these projects, funds must be procured from domestic and overseas sources. In the latter case, requests from the government of

Paraguay will be required, but in either case the readiness of the area in question, in terms of the motivation to take part in the project and the organization of farmers, is a prerequisite.

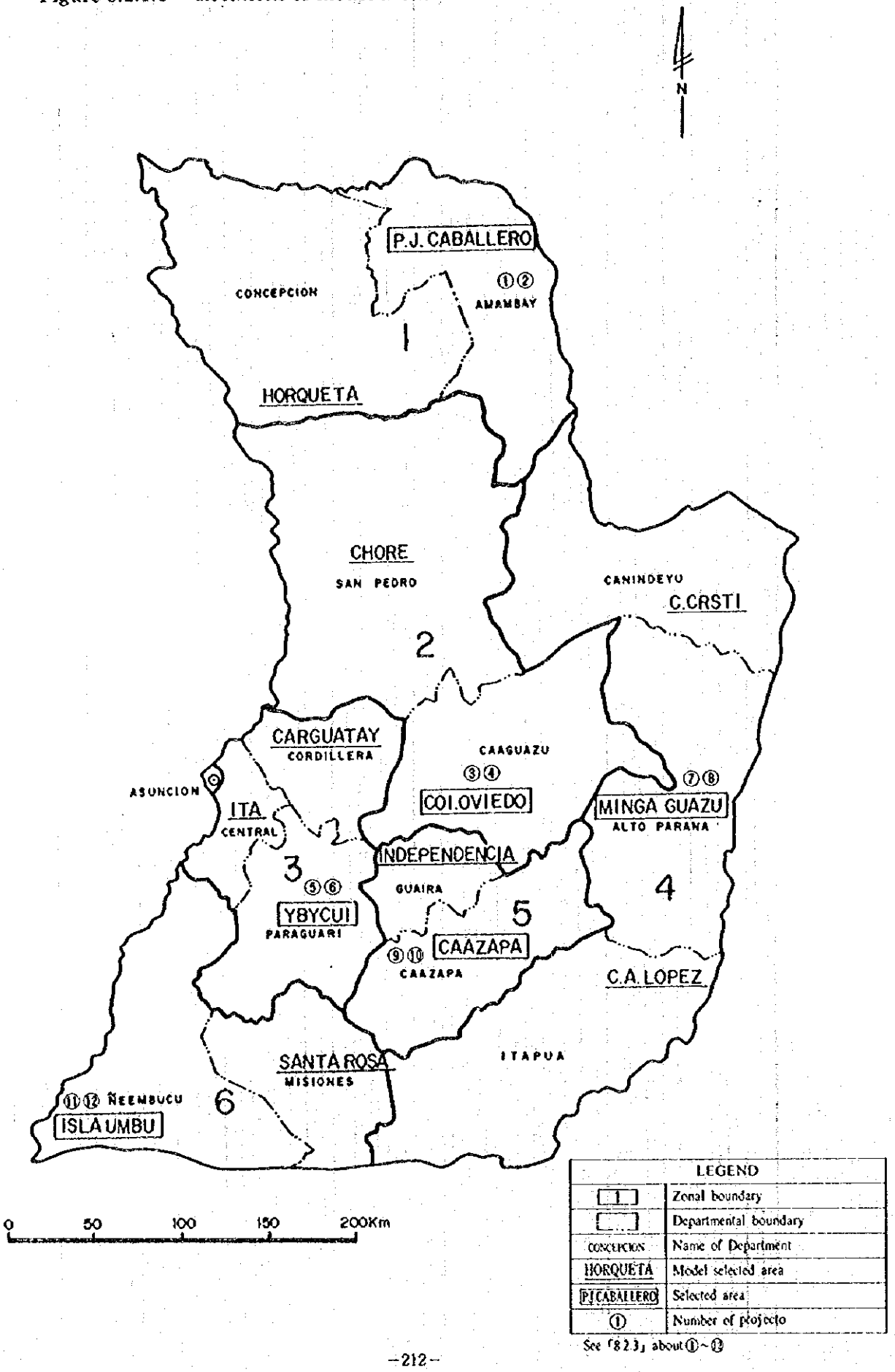
Table 8.2.1.1 Results of evaluation of selected model areas

(● : selected model area ◆ : model area)

	Department	District	Candidate areas	Income improvement	Economic contribution	Leaders	Farmers' organization	Demonstrable effects	Employment opportunities	WID	Environment	Support	Total	Selection
1	CONCEPCION	HORQUETA	4	1	1	0	0	1	1	0	0	1	9	●
		YBY YAU	3	0	0	0	0	1	0	0	0	1	5	
	Zone 1	CONCEPCION	2	1	1	0	0	1	1	0	1	1	8	
2	SAN PEDRO	CHORE	3	1	1	1	0	0	1	0	0	1	8	●
		CAPIBARY	2	1	1	0	0	0	1	0	0	1	6	
	Zone 2	GUAYAIBI	2	0	0	0	0	1	1	0	0	1	5	
3	CAAGUAZU	R.A. OVIEDO	3	1	0	0	0	-1	0	0	0	1	4	
		REPATRIACION	2	1	0	0	0	0	1	1	0	1	6	
	Zone 2	SAN JOAQUIN	2	1	0	0	0	-1	1	1	0	1	5	
	(model area)	CNEL. OVIEDO	3	1	0	1	1	1	1	1	0	0	9	◆
4	CAAZAPA	CAAZAPA	6	1	0	1	1	1	1	1	0	1	13	◆
		MACIEL	2	1	0	0	0	0	0	0	0	1	4	
	Zone 5	YEGROS	3	1	0	0	0	0	0	0	0	1	5	
	(model area)	S.J. NEPOMUCENO	1	1	0	0	0	-1	0	0	1	1	3	
5	CORDILLERA	ARROYOS Y ESTEROS	3	1	1	0	0	-1	0	0	0	1	5	
		PIRIBEBUY	3	1	0	0	0	1	0	0	0	1	6	
	Zone 3	CARAGUATAY	2	1	1	0	0	0	1	1	0	1	7	●
6	GUAIRA	INDEPENDENCIA	4	1	1	1	1	0	0	1	1	0	10	●
		BORJA	2	1	1	0	0	0	0	0	0	1	5	
	Zone 5	M.I. TROCHE	1	1	0	0	0	-1	0	1	0	1	3	
7	ITAPUA	CNEL. BOGADO	4	0	0	0	0	0	0	0	0	1	5	
		S.P. DEL PARANA	2	1	1	0	0	-1	1	1	0	1	6	
		SAN COSME Y DAMIAN	1	0	1	0	0	-1	1	0	0	1	3	
	Zone 4	C.A. LOPEZ	1	1	1	1	1	1	1	0	0	1	8	●
8	MISIONES	SANTA ROSA	4	1	0	0	1	0	1	0	0	1	8	●
		SANTA MARIA	2	0	0	0	0	0	0	1	0	1	4	
	Zone 6	AYOLAS	2	1	1	0	0	0	1	0	1	1	7	

	Department	District	Candidate areas	Income improvement	Economic contribution	Leaders	Farmers' organization	Demonstrable effects	Employment opportunities	WID	Environment	Support	Total	Selection
9	PARAGUARI	YBYCUI	5	1	1	1	0	0	0	1	1	1	11	◆
		SAPUCAI	2	1	1	0	0	0	0	0	0	1	5	
		CARAPEGUA	1	1	1	0	0	0	0	1	0	1	5	
	Zone 3	PARAGUARI	1	1	1	0	1	1	1	0	0	1	7	
	(model area)	ACAHAY	1	1	1	-1	0	1	0	0	1	1	5	
10	ALTO PARANA	J.E. O'LEARY	3	0	0	-1	0	1	0	0	0	1	4	
		MINGA PORA	3	1	1	0	0	1	1	0	1	1	9	
		HERNANDARIAS	1	1	1	0	0	0	1	1	1	1	7	
		MINGA GUAZU	2	1	1	1	1	1	1	1	0	1	10	◆
	Zone 4	S.R. DEL MONDAY	1	0	0	0	0	1	0	0	0	1	3	
	(model area)	COLONIA YGUAZU	1	1	1	1	1	1	1	0	0	0	7	
11	CENTRAL	J.A. SALDIVAR	4	1	1	0	0	1	0	0	0	1	8	
		ITA	4	1	1	0	1	1	0	1	0	1	10	●
		VILLETA	1	1	0	0	0	0	0	0	0	1	3	
	Zone 3	NUEVA ITALIA	1	1	1	0	0	0	0	0	0	1	4	
12	ÑEEMBUCU	GRAL. DIAZ	3	1	1	0	0	-1	0	0	0	0	4	
		MAYOR MARTINEZ	2	1	1	0	0	-1	0	0	0	0	3	
	Zone 6	ISLA UMBU	3	1	1	1	0	1	1	1	0	0	9	◆
	(model area)	PILAR	1	1	0	1	0	1	1	1	0	0	6	
13	AMAMBAY	P.J. CABALLERO	5	1	1	1	1	1	0	1	1	1	13	◆
	Zone 1	CAPITAN BADO	2	0	0	0	0	0	0	0	0	1	3	
	(model area)	B.V. DEL NORTE	2	-1	-1	0	0	-1	0	0	1	1	1	
14	CANINDEYU	CURUGUATY	4	1	0	0	0	0	0	0	0	1	6	
		C. CRISTI	3	1	1	1	0	0	0	1	0	1	8	●
	Zone 4	YGATIMI	1	1	1	0	0	-1	0	0	0	1	3	

Figure 8.2.1.1 Locations of model areas



8.3 Model area development projects

8.3.1 Zone 1

1) Project for the efficient use of farmland

(1) Project location: P.J. Caballero District (Amambay Department)

(2) Present situation of the Department

Amambay Department lies in the northeast of Paraguay, bordering on Brazil to the north and east (see GRAFICO A 8.3.1.2).

The total land area of the Department is 12,933 square kilometres, accounting for 8.1% of the Study Area. Of this, the area occupied by farm businesses is a large 1,049,062 hectares. The formats of land use are: farmland, 769,014 hectares (73%); woodland, 264,108 hectares (25%); others, 15,868 hectares (2%). Thus a high proportion is taken up by farmland (see CUADRO A 8.3.1.1 for the principal indices of the Department).

The total population is 99,860, only 3% of the Study Area total, and the population density is a low 7.7 persons per square kilometre. The frontier with the Brazilian town of Ponta Porá is an ordinary road and can be passed without any border formalities. The area also enjoys special conditions whereby goods can be bought cheaply due to the difference in import duty tax with neighbouring Brazil, and since there is a thriving trend for purchasing by travellers, the non-farming population ratio is an extremely high 83.6%.

As for transport conditions, as well as roads and air routes, there is a railway in neighbouring Ponta Porá, allowing access domestically and with Brazil.

There are 3,294 farm businesses, accounting for a mere 1% of the Study Area total. Since the proportion of large-scale and medium-scale farms is high, the farm-occupied land area per farm business is 323 hectares, of which the farmland area is 273 hectares. This is about 15 times the average size for the Study Area as a whole.

Farmland use is extensive (45% forage fields and 47% natural grassland), thus the land productivity is low. Annual crop cultivation land is mainly used for land-intensive crops: soybeans (40%), maize (22%), and wheat (19%).

There are concerns that P.J. Caballero may lose its merits as a purchasing economy for travellers and may face economic stagnation accompanying Paraguay's membership of the Southern Cone Common Market (MERCOSUR), owing to the adoption of common tariffs for external trade and the removal of tariffs on internal trade.

Therefore, it is vital that effective use be made of the vast farmland area and

that the industrial structure be improved to a balanced one by expanding agricultural production and fostering related industries.

(3) Present situation of the area

P.J. Caballero lies at the northeastern edge of Amambay, and forms the political, economic, and cultural centre of the Department (see GRAFICO A 8.3.1.2).

Although its land area is only 24% of the Department total, the population is 77,270, or 77% of the departmental total. Of this, the non-farming population is 67,751, an extremely high 88%.

There are 1,838 farm businesses; the farm population numbers 9,519, and 5,678 people are employed in farm work, these both accounting for 56-58% of the departmental totals. Conversely, the farm-occupied land area is 356,348 hectares and the farmland area 257,994 hectares, in each case occupying only 34% of the departmental total.

Farmland use shows a large weight of crop cultivation but a low proportion of natural grassland, the principal crops being soybeans, maize, cassava, wheat, and the forage crop known as colonial.

Medium-scale farmers rent land from large-scale farmers and cultivate soybeans, maize, wheat, and other land-intensive crops using heavy machinery, thereby providing high incomes.

Some small-scale farmers have started to cultivate land-intensive crops by renting land and machinery, but the scale is small and the machinery and capital equipment inferior, making productivity low. The business situation is unstable because the duration of land lease is only about 1-3 years.

Due to its soil and climatic conditions, this district is suited to the cultivation of soybeans, maize, and wheat. Moreover, storage and processing facilities for these exist, and means of conveyance are in place.

It will be possible to make more efficient use of farmland and thus aim for increased production of export crops as well as higher incomes for small-scale farmers, by establishing a public body that will assist and mediate with funds and capital equipment. Given this prerequisite, the above locational conditions may be put to best advantage and small-scale farmers with their surplus manpower will be able to farm land currently used extensively by large-scale farmers.

(4) Details of the project

a) Bodies responsible for the project:

Overall responsibility: Department of General Planning (DGP), Ministry of Agriculture and Livestock (MAG)

Implementing body: organization for the efficient use of land ("public mediation agency ") centred in the Ministry of Agriculture and Livestock (see Figure 8.3.1.1).

b) Outline of the project

Farmland will be put to efficient use by rationally combining the surplus manpower of small-scale farmers and under-utilized land owned by large-scale farmers. Small-scale farmers will form growers' organizations to cultivate soybeans, wheat, maize, and other export cereals on large areas of land and using heavy machinery, thus improving productivity.

To this end, a project for the efficient use of farmland will be started by creating a public mediation agency from the Ministry of Agriculture and Livestock and other organizations relevant to this work. The aim of this will be to coordinate the respective lease conditions of farmers who wish to lease out land and those who wish to rent it, and to ensure the smooth implementation of ground preparation, lease of agricultural machinery, loans of farm management funds, guidance on farm management, collection of land rent and equipment rental fees, and so on.

The public mediation agency will carry out the following work.

① Designation of area for efficient use: 5,000 hectares

The public mediation agency will designate an area for efficient use from the area in which extensive land use is currently practiced, taking account of the soil, hydrological and other natural conditions.

② Adjustment of land rights and use: 5,000 hectares

The public mediation agency will liaise between landowners wishing to lease out land and growers' organizations that wish to rent land. It will also select land for efficient use, carry out surveys in order to fix boundaries, confirm land rights, and prepare lease contracts.

③ Ground preparation: 2,000 hectares of crop fields, 10 kilometres of farm access roads, 25 kilometres of internal roads

The public mediation agency will prepare the necessary ground in order to turn natural grasslands into arable fields, as well as preparing farmland conservation forests, etc. (see GRAFICO A 8.3.1.3).

④ Guarantee of land rights: 2,500 hectares

The public mediation agency will make advance payment of guarantees equivalent to 5 years' land rent to those who wish to lease out land, and will also carry out the appropriate procedures on completion of the contract term.

⑤ Loans of farm management capital and collection and deployment of rental fees: farm management funds for 2,500 hectares

The public mediation agency will loan farm management funds to growers' organizations of small-scale farmers, as well as collecting rental fees and principal/interest on farm management funds. It will also deploy these funds by for example loaning some of the collected capital to organizations of small-scale farmers processing farm produce.

⑥ Loan of agricultural machinery: tractors, combines, trucks and others (10 of

each)

The public mediation agency will loan agricultural machinery to growers' organizations of small-scale farmers and will collect rental fees.

⑦ Farm management support: 250 farms, 5,500 hectares

The public mediation agency will provide support to increase the efficiency of farm management, such as through guidance on farm management, providing market information, and the promoting farmers' organizations.

(5) Benefits

a) Beneficiary farmers

Organizations of small-scale farmers that rent farmland and cultivate land-intensive crops (10 organizations, 250 farmers).

b) Beneficiary area: 5,500 hectares

2,500 hectares of rented land plus 3,000 hectares of privately owned land for cultivating land-intensive crops using agricultural machinery.

(6) Production plan (average per farmer)

Current			Planned		
Agricultural/livestock produce	Area (ha)	Production volume (t)	Agricultural/livestock produce	Area (ha)	Production volume (t)
Soybeans	3.1	5.6	Soybeans	20.0	70.0
Maize	1.9	3.4	Maize	–	–
Wheat	1.0	1.8	Wheat	(20.0)	50.0
Cotton	0.8	1.3	Cotton	–	–
Poroto	0.5	0.5	Poroto	–	–
Cattle (1 cow)	1.1	1.3kl	Cattle	–	–
Farm produce for home consumption, etc.	3.6		Farm produce for home consumption	2.0	–
			Rented land	10.0	
Total	12.0		Total	22.0	

Note 1: Figures in parentheses for wheat indicate second crops for soybeans.
Details of the production plan are shown in CUADRO A 8.3.1.2 and those of the land use plan in CUADRO A 8.3.1.3.

(7) Farm management plan

Consumption destination and typical farm practice	No. of cultivating farmers	Farmer's income (Gs 1,000)
For export outside MERCOSUR Soybeans + wheat + farm produce for home consumption	250	18,800

Note 1: Farmer's income shows the total of agricultural and non-agricultural incomes.
Note 2: For details of the farm management plan, see CUADRO A 8.3.1.4.

(8) Total project costs (for details, see CUADRO A 8.3.1.5)

Gs 16,681 million

(9) Project duration: 5 years

(10) Points of note and proposals

① In view of its nature as an affiliation of competent bodies, the public mediation agency should be a mutually collaborative organization that carries out its work fairly and clearly on the basis of collective responsibility.

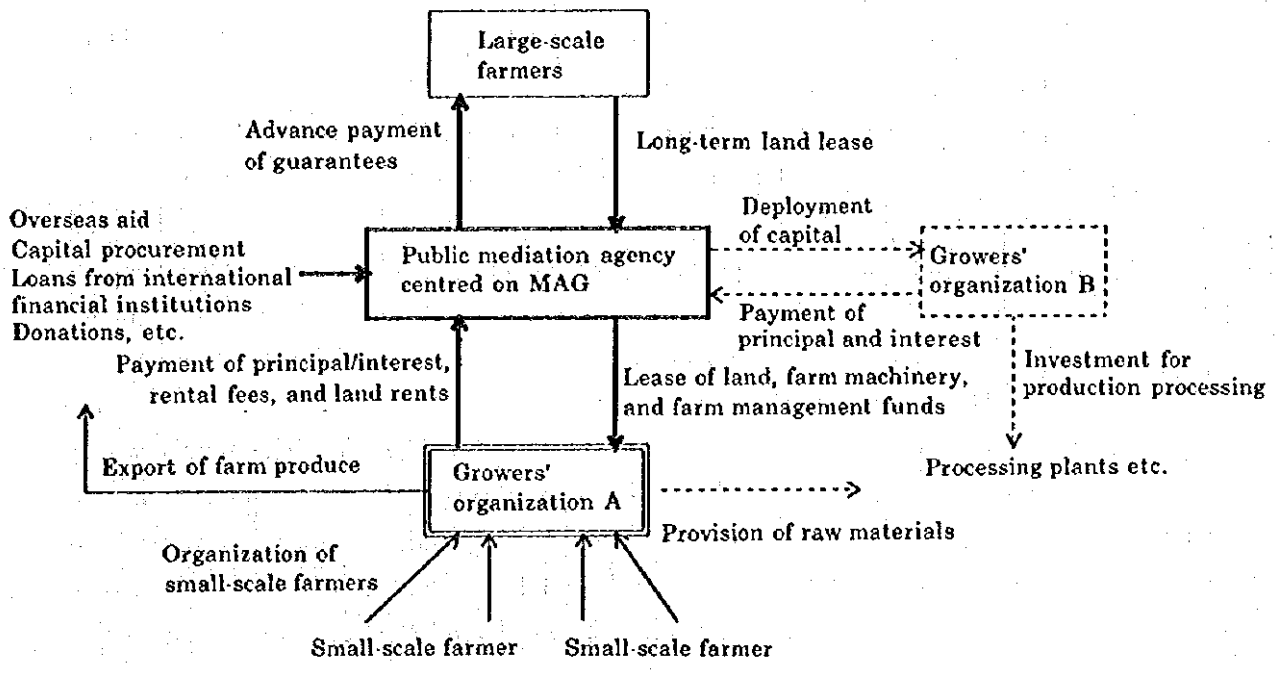
② With a view to supporting small-scale farmers and the development of agriculture in Paraguay, farmers leasing out land shall not set unreasonable land rents. They will need to adopt a cooperative attitude of agreeing to renew contracts as far as possible.

③ Farmers renting land shall manage the farmland well in order to facilitate land conservation and continuous agricultural production.

④ In future, a legal framework will need to be set up for the smooth implementation of efficient farmland use. Contract procedures will need to be simplified, tax incentives offered to farmers leasing land, and steps taken to prolong tenancy periods.

⑤ Once this project is capable of being diffused and implemented smoothly throughout the country, the work should be transferred to the private sector, whereupon the public mediation agency should guide and supervise the private-sector work.

Figure 8.3.1.1 Concept diagram of the project for the efficient use of farm land



2) Project for the enhancement of settlement land

(1) Project location: Santa Clara settlement, P.J. Caballero District (Amambay Department)

(2) Present situation of the Department

Amambay Department lies in the northeasternmost part of the eastern region. This region and the area along the Brazilian border are hilly zones, including the P.J. Caballero District (seat of the departmental capital). The frontier with the neighbouring Brazilian town of Ponta Porá is formed by a road, allowing free access to and fro. Some 530 kilometres away from the national capital Asunción, if anything a greater impact is exerted by the Brazilian economy. There are 33 settlements in this Department, of which just over half (17) are in P.J. Caballero District. Settlement is brisk in this region, the area of settlement land in this District (4th largest with 87,734 hectares) being large in comparison with the other districts in the Study Area. However, field surveys undertaken this time (implemented in 11 of the 33 locations) show that in about 80% of the settlements the number of settlers is less than when first settled, giving the impression that there may be some kind of social or economic problem.

(3) Present situation of the area

The Santa Clara settlement, comprising 311 settlement lots with a total land area of 5,209 hectares, was first settled in 1991. As of 1996, the clearance of forests near the residential area was complete, and ground firing is now underway with a view to next season's crop planting. Around the residential sites, meanwhile, cotton as well as cassava, bananas, papaya, and other self-sufficiency crops are cultivated. When first settled there was no drinking water, and farmers living in places where the groundwater level is shallow have dug and are now using their own wells for water. The number of farms that do this is 28, less than 10% of the total for the settlement. Due to its topographical conditions, the settlement is divided into three blocks. The first of these is high in altitude and has no rivers or other surface water. The second block has a number of small rivers and the groundwater level is relatively shallow. The third block has two small rivers but they are set apart from the living areas. The only means of transport from the settlement to P.J. Caballero, the nearest town and market, is a bus that makes the round trip three times a day, a journey that takes two and a half hours each way. Farm produce grown here is taken to market on this bus.

In some settlements created by the Institute of Rural Welfare (IBR) there is no water or power supply and the lives of the settling farmers are unstable. As a result, when issued with land certificates after living in the settlement for a number

of years, they tend to sell them off to better-off farmers, thereby gaining short-term capital but becoming landless farmers in the process. This sort of situation leads to a reemergence of illegal land tenancy, and the situation only grows worse both for the landless farmers and for those around them. In order to break out of this situation, the stability of life in the settlements must be provided before all else. This settlement is a relatively young one and the farmers do not yet feel settled. Thus by improving the settlement a stable way of life can be achieved and the rate of permanent settlement will improve.

(4) Details of the project

a) Bodies responsible for the project:

Overall responsibility: Department of General Planning, MAG

Implementing body: cooperative

b) Outline of the project

The cooperative will take up loans from financial institutions and carry out the following work to stabilize the lives of the settlers. In addition, after implementation of the project the cooperative will collect shares of payment for facilities except for the collection and shipment facilities.

① Provision of drinking and irrigation water

Drinking and irrigation water facilities will be set up to facilitate use by all settlers' families. Specifically, water obtained by damming rivers or digging wells (depending on the place) will be provisionally stored in water supply tanks, then distributed to each farm via natural downflow. Farmers will use this water mainly for irrigation purposes, but will also be able to introduce new farm produce (vegetables) by spraying the surplus on arable land. Of the 310 farmers, 210 will use streams and 100 will use well pumps.

② Provision of vehicles for transporting produce

Under present circumstances, even if cash crops are produced the only means of transporting them is by bus. Therefore, small trucks will be introduced as a means of conveyance for transporting produce to the market or purchasing production materiel from there.

Two trucks will be provided for each block, making a total of six.

③ Improvement of educational facilities

A certain standard of education is needed in order to access high-level employment opportunities, and to this end primary and secondary educational facilities are absolutely indispensable. The usual case is for schools to be built by the settlers themselves, and for them thereafter to rely on teachers sent in from elsewhere. One primary school will be set up in each block, making a total of three, while two secondary schools will be provided for the whole of the settlement.

④ Collection and shipment facilities (mangoes)

Under present circumstances, cotton is virtually the only cash crop farmed. Therefore, if the cotton harvest were to fail the cash income would fall. Thus, in order to disperse such risks, mangoes will be introduced into this settlement as a new cash crop, bearing in mind its soil, climate, and other conditions. To this end the requisite collection and shipment facilities (5,000-ton scale, two sites) will also be introduced.

(5) Benefits

a) Beneficiary farmers: 310

b) Beneficiary area: 5,209 hectares

(6) Production plan (average per farmer)

Current			Planned		
Agricultural/livestock produce	Area (ha)	Production volume (t)	Agricultural/livestock produce	Area (ha)	Production volume (t)
			Mangoes	2.0	30.0
Cotton	2.0	1.5	*Cotton	3.0	4.5
			**Pumpkins	1.0	15.0
			**Carrots	0.1	1.2
			*Maté tea	0.4	1.0
Cattle (1 cow)	1.1	1.3kl	Cattle	–	–
Farm produce for home consumption, etc.	5.4		Farm produce for home consumption	2.0	
Total	8.5		Total	8.5	

Note 1: * shows farm produce to be produced for sale using existing cultivation technology.

Note 2: ** shows farm produce to be produced for sale using irrigation water in addition to existing cultivation technology.

Note 3: Details of the production plan are shown in CUADRO A 8.3.1.6.

(7) Farm management plan

Consumption destination and typical farm practice	No. of cultivating farmers	Farmer's income (Gs 1,000)
For export inside MERCOSUR Mangoes + farm produce for home consumption, etc.	310	10,900

Note 1: Items marked * and ** in (6) have been included in "farm produce for home consumption, etc.".

Note 2: Farmer's income shows the total of agricultural and non-agricultural incomes.

Note 3: For details of the farm management plan, see CUADRO A 8.3.1.7.

(8) Total project costs (for details, see CUADRO A 8.3.1.8)

Gs 3,328 million

(9) Project duration: 5 years

8.3.2 Zone 2

1) Project for the enhancement of irrigation facilities in dry fields

(1) Project location: Calle 6 and the other eight estates in Coronel Oviedo District (Caaguazú Department)

(2) Present situation of the Department

Geographically, Caaguazú Department lies in the centre of the Study Area, with National Routes 2 and 7 running from east to west across its south (Route 2 between Asunción and Coronel Oviedo and Route 7 between Coronel Oviedo and Ciudad del Este). The land area of the Department is 1,147,119 hectares, of which farmland accounts for 611,888 hectares (53%). The population is 386,412, and the population density 33.7 persons per square kilometre (see CUADRO A 8.3.2.1). The city of Coronel Oviedo is 130 kilometres from Asunción and 190 kilometres from Ciudad del Este. It is expected to develop as a supply base for agricultural and livestock produce to these two major cities.

(3) Present situation of the area

This area is a dry-field zone of about 30,000 hectares lying in the east of Coronel Oviedo District. National Route 7 runs from east to west through the centre of the area, making it relatively well positioned for vehicular access. Farmland extends over a plateau that undulates gently at an altitude of 150-250 metres; there is little woodland and the farmland ratio is high. Rivers within the region have small basins and few of them are suitable as water sources for irrigation. Moreover, because they are found in the low-lying parts of the region, the area in which irrigation water can be led to crop fields using the natural downflow method is virtually nil. But, although providing water resources is difficult, the soil is suited to vegetable cultivation and transportation to the two major consumption cities (Asunción and Ciudad del Este) is easy, since traffic access is favorable. Taking advantage of these locational conditions, small-scale farmers have spontaneously started vegetable cultivation. In view of this, the Ministry of Agriculture and Livestock (MAG) made a request to the government of Japan for cooperation in a rural development programme mainly concerning vegetable production, and this cooperation has been provided since 1987 by a team dispatched by the Japan Overseas Cooperation Volunteers (since 1995, cooperation has been continued by individual JOCV volunteers). Meanwhile, Coronel Oviedo District was selected as a model area for the Fruit & Vegetable Distribution Improvement Programme (1991-98) implemented by JICA as project-type technical cooperation, and, thanks to this, a system of collective shipments has been developed. However, since there are

hardly any irrigation facilities and all depends on natural water, seasonal cultivation is not always possible, yields or quality are liable to decrease, and stable production is not possible. Thus the effects of the JICA cooperation are not making themselves adequately felt.

In view of this situation, small-scale farmers are calling strongly for the construction of irrigation facilities that will aid the stable cultivation of vegetables.

(4) Details of the project

a) Bodies responsible for the project:

Overall responsibility: Department of General Planning, Ministry of Agriculture and Livestock

Implementing body: Coronel Oviedo cooperative

The administrative organization of the Department and District, as well as the organization of the Coronel Oviedo cooperative, are shown in GRAFICO A 8.3.2.1 to 3. Since June 1995 the Department has appointed one agricultural officer, but in budgetary terms the project costs cannot be provided with the salary of this officer alone. At District level there isn't even an organization of agricultural officers. On the other hand, the Coronel Oviedo cooperative is highly active. The project will be implemented after strengthening the organization of this cooperative. The organization for implementing the project is proposed in GRAFICO A 8.3.2.4.

b) Outline of the project

The following three types of irrigation facilities will be planned in order to stabilize the cultivation of vegetables.

Type 1: Large-scale. One estate will be selected where a good water flow from river basins can be expected and where there is a geographical concentration of upland fields. The irrigation area will be set at around 10-15 hectares and approximately 1,220 tons of water will be pumped from the river daily.

Type 2: Medium-scale. Four estates will be selected in which the lack of surplus flow in rivers is a factor that restricts water resources, preventing the irrigable area from being increased. The irrigation area will be set around 3-5 hectares, and approximately 310 tons of water will be pumped from rivers daily.

Type 3: Small-scale. Four estates will be selected in which nearby river water cannot be used. The irrigation area will be set at around 1-2 hectares, and approximately 120 tons of water will be pumped from wells daily.

These 3 types of irrigation facilities will be built as models in 9 estates within the beneficiary area. The locations of the 9 estates are shown in GRAFICO A 8.3.2.5.

(5) Benefits

a) Beneficiary farmers: 60

b) Beneficiary area: 30 hectares

(6) Production plan (average per farmer)

Current			Planned		
Agricultural/livestock produce	Area (ha)	Production volume (t)	Agricultural/livestock produce	Area (ha)	Production volume (t)
			Tomatoes	0.1	8.0
			Carrots	0.1	1.5
			Green asparagus	0.2	0.8
			Melons	0.1	4.1
Cotton	1.0	1.5	Cotton	–	–
Maize	0.5	0.8	*Maize	1.1	1.7
Cattle (1 cow)	1.4	1.5kl	Cattle	–	–
Farm produce for home consumption, etc.	0.7		Farm produce for home consumption	2.0	
Total	3.6		Total	3.6	

Note 1: * shows farm produce to be produced for sale using existing cultivation technology.
Note 2: Details of the production plan are shown in CUADRO A 8.3.2 2, and those of the land use plan in CUADRO A 8.3.2.3.

(7) Farm management plan

Consumption destination and typical farm practice	No. of cultivating farmers	Farmer's income (Gs 1,000)
For domestic sale Tomatoes + carrots + green asparagus + melons + farm produce for home consumption, etc.	60	10,600

Note 1: Items marked * in (6) have been included in "farm produce for home consumption, etc.".
Note 2: Farmer's income shows the total of agricultural and non-agricultural incomes.
Note 3: For details of the farm management plan, see CUADRO A 8.3.2.4.

(8) Total project costs (for details, see CUADRO A 8.3.2.5)
Gs 1,158 million

(9) Project duration: 2 years

(10) Points of note and proposals

① In this study we were not able to adequately survey and confirm whether or not river water can be provided in a stable way. In future, datum points will have to be installed in rivers and continuous observation of water volumes made at those points with a view to diffusing irrigation facilities to the surrounding area.

② The development of suitable technology in Paraguay is required with a view to the planning, design, execution, and maintenance of irrigation facilities, as well as different methods of irrigation for various crops in plantations, decisions on irrigation water volumes, and so on. Technical support from international organizations, etc. will be vital in order to develop optimal technology for these.

2) Project for the demonstration of farmland conservation

(1) Project location: Colonia Mburupy and Colonia Juan M. Frutos in Coronel Oviedo District (Caaguazú Department)

(2) Present situation of the Department

Caaguazú Department lies in the centre of the Study Area. Coronel Oviedo District, the departmental capital, forms an intersection for National Routes 2, 3, 7, and 8, and is thus a hub for traffic. In terms of both production and distribution, this is one of the departments that have high potential for growth in future.

(3) Present situation of the area

The model area is 20 kilometres east of the departmental capital Coronel Oviedo (north of National Route 7). It belongs to the Coronel Oviedo cooperative, and vegetable production is in progress as part of the project-type technical cooperation from the Japanese government (the Fruit & Vegetable Distribution Improvement Programme, March 1991 - March 1998).

The soil in this area is sandy, and, as the difference in elevation is a considerable 125 metres (130-255m), soil erosion occurs frequently (see GRAFICO A 8.3.2.6).

This area is a privately-managed settlement, and small-scale farmers practice agriculture, concentrating mainly on dry field crops, on land of 6-12 hectares per farm. However, they face a number of problems, such as depressed vegetable prices, difficulty in diversifying crops, and soil erosion. In particular, producing farmers await measures for farmland conservation, including soil run-off prevention, but the local cooperative is doing nothing about it.

(4) Details of the project

a) Bodies responsible for the project:

Overall responsibility: Department of General Planning, MAG (implemented in cooperation with the Caacupé School of Agricultural Machinery (EAC), the Agricultural Machinery Centre (CEMA) and others)

Implementing bodies: the Agriculture & Livestock Division of Caaguazú Department and the Agriculture & Livestock Section of Coronel Oviedo District

b) Outline of the project

This demonstration project is designed to demonstrate the content of the

Soil Conservation Technology Guideline Manual prepared by the FAO in the local area from the point of view of farmland conservation, and to contribute to sustainable agricultural production. About 30 hectares of fallow land with varying elevation differentials and slope angles will be leased as demonstration fields in which a demonstration study will be undertaken. The results will be instructed and diffused to model small-scale farms selected for farmland conservation and farmers' organizations (committees) formed around a nucleus of these small-scale farmers.

(a) Engineering methods

Creation of contour-line ridges: introduction of surveying apparatus (levels), tractors, disk harrows, etc.

Non-tillage cultivation: introduction of tractors, seed sowers (motorized), and crop sprayers (light)

(b) Farming methods

Technical guidance manuals: rotation system, farm management technology, fertilizer technology, etc.

Green manure cultivation: introduction of seed sowers (manually operated), traction animals, and rolofaca

(5) Benefits

a) Beneficiary farmers: 165

b) Beneficiary area: 330 hectares (creation of contour-line ridges 82.5 hectares, non-tillage cultivation 82.5 hectares, green manure cultivation 165 hectares)

(6) Contents of the demonstration project

There are currently 3 committees for vegetable production in this area. These will be reorganized into 15 committees.

a) Distribution of technical guidance manuals

The results of the demonstration (e.g. rotation system, farm management, and fertilizer technology) will be added to the FAO Soil Conservation Technology Guideline Manual, and an easy-to-understand manual will be prepared and distributed to 165 farmers.

b) Selection of farmland conservation model farms and demonstration fields

(a) In this area, 15 farmers will be selected as model small-scale farmers for farmland conservation.

(b) 30 hectares will be selected as demonstration fields from fallow land with varying elevation differential and slope angles (the demonstration field area for creation of contour-line ridges, non-tillage cultivation, and green manure cultivation will each be 10 hectares).

c) Demonstration study

Demonstration fields will be created in line with the engineering methods for farmland conservation, and a demonstration study will be conducted on combinations with farming methods for farmland conservation, selection of suitable crops, soil erosion prevention effects, soil fertility, etc. As well as this, with the cooperation of model small-scale farmers for farmland conservation, we will conduct various tests for comparison with arable land currently in use.

d) Diffusion of demonstration results

The results of the demonstration will be instructed and diffused to model small-scale farmers and the comités to which they belong.

(7) Total project costs (for details, see CUADRO A 8.3.2.6)
Gs 379 million

(8) Project duration: 5 years

8.3.3 Zone 3

1) Project for the development of agriculture including consideration for the environment

(1) Project location: Ybycuí District, Paraguarí Department

(2) Present situation of the Department

There are 17 administrative districts in Paraguarí Department. The departmental capital Paraguarí lies about 63 kilometres to the southwest of Asunción. The land area of the Department is 870.5 square kilometres, including the Los Altos mountains in the north, the Ybycuí mountains in the east, and the Lake Ypoá National Park in the west. The rest of the area is taken up largely by natural grasslands, used by large-scale farmers for pasturing beef cattle. The cultivation areas of principal crops are topped by cotton with 26%, followed by maize and cassava, both with 16%. The population is 208,526 (population density 24.0 persons per square kilometre), of which the population of rural dwellers is a large 164,073 (79%).

(3) Present situation of the area

a) Ybycuí District

Ybycuí District, selected as a model area, includes a town situated 57 kilometres from the city of Paraguarí, and lies roughly to the east of the centre of the Department. The land area of the District is 77,050 hectares, its northeastern part consisting of mountainous land centred around the Ybycuí National Park, while its western part is a pasture region based on natural grassland. There are 3,167 farmers, with an average of 20.3 hectares of farm-occupied land per farm. 2,600 of these are small-scale farmers (average 5.9 hectares per farm), situated sporadically in settlements created by the Institute of Rural Welfare (IBR). The population is 21,737 (population density: 28.2 persons per square kilometre), the proportion taken up by rural dwellers being 79% (the same as for the Department as a whole). Similarly, cultivated crops show the same trends as the rest of the Department.

b) The Model Area

This District includes the Ybycuí National Park, lying some 15 kilometres east of the town of Ybycuí. The Park features a natural ecological environment that is representative of the central region of Paraguay. It has an area of 5,000 hectares and includes a natural river with 15 waterfalls, a pond, 20 natural springs, the site of South America's first ever blast furnace, a Visitors' Centre, a museum, a camp site, footpaths, and so on, and is visited by an average of 1,500 people at weekends in December-February alone.

The area surrounding this Park consists of 11,000 hectares of land designated as a buffer zone. 810 small-scale farmers live in or near this buffer zone, where they practice self-sufficiency farming. The National Park, meanwhile, has unclear boundaries and lacks boundary fences in many places, making it easy to penetrate from outside. As a result, it provides a source of firewood for some inhabitants.

As well as this, the area around the National Park presents obstacles to the improvement of small-scale farmers' livelihoods owing to the poor level of sales access (e.g. roads, means of transportation and distribution, etc.) and the underdevelopment of agricultural and mean rural infrastructure (e.g. soil deterioration due to successive cropping of cotton, occurrence of soil erosion on sloping land, shortages in the dry season, etc.).

Given the above conditions, this region is gradually losing its erstwhile functions of protecting forestry resources and wildlife facing extinction, and cultivating water resources in the National Park and buffer zone (see GRAFICO A 8.3.3.1).

(4) Details of the project

a) Bodies responsible for the project:

Overall responsibility:	Department of General Planning, MAG
Implementing body:	local cooperative; local office of DPNVS, Ministry of Agriculture and Livestock

b) Outline of the project

(a) Purpose of the project

As measures to aid small-scale farmers living in and around the National Park and buffer zone and practicing self-sufficiency farming, steps will be taken to improve production and subsistence by enhancing the production infrastructure (e.g. improving land productivity, diversifying crops, and setting up collection, shipment, & processing facilities) and improving the subsistence infrastructure (e.g. providing roads and irrigation water). To this end, ① paraíso, oranges, and maté tea will be introduced and soil erosion prevented using agro-forestry cultivation methods, ② soil deterioration will be prevented by rotating crops of cotton and green manure, ③ management will be stabilized by combining crop farming with livestock farming, and ④ the added value of farm produce will be increased and sales routes developed.

As for environmental conservation measures, meanwhile, in order to prevent an adverse impact on environmental conservation in the National Park, ① the boundaries of the Park will be clearly marked, ② the trunk road inside the Park will be removed (replaced), ③ facilities and surveillance inside the Park will be enhanced, ④ the inhabitants' self-sufficiency in firewood will be encouraged, and

⑤ their awareness of environmental conservation will be raised.

By undertaking these projects in an integrated fashion, it will be possible to sustain both the livelihoods of people living around the National Park and environmental conservation within the Park, making this a harmonious model project (for a sketch of the model project when complete, see Figure 8.3.3.1).

(b) Profile of the project

① Production infrastructure improvement plan

(Encouraging crop diversification)

- As cotton is the only cash crop at present, the minimum required cultivation area will be provided.
- Paraíso, oranges, and yerba meté tea will be introduced as new crops.
- Combined crop and livestock farming will be included.

(Increasing land productivity)

- As well as using some of the cultivation area and fallow fields as forage fields, some of the natural grassland will be turned into improved grassland and steps will be taken to increase the number of dairy cattle raised.
- On sloping land, paraíso, oranges, and yerbamaté tea will be planted in parallel strip formation along contour lines, thus preventing soil runoff. Annual crops will be grown in between the strips.

(Increasing the added value of farm produce)

- Milk cooler stations will be set up in 9 locations as collection and shipment facilities, and a milk lorry will be introduced.
- As for processing facilities, cottage industry-type factories for cheese and yoghurt will be set up in 8 places, and orange marmalade processing facilities in 3 places.

(Providing firewood)

- Paraíso will be planted as a source of commercial wood. In addition, wood from thinning operations will be used as firewood for home use.

(Supporting farmers)

- Steps will be taken to introduce 4 stud bulls and breed superior dairy cattle by establishing an artificial insemination subcentre.

② Subsistence infrastructure improvement plan

- 41 kilometres of farm roads will be newly laid in areas where the road density is low, while existing roads (155 kilometres) will be repaired and maintained, thus facilitating shipments of farm produce.
- Deep wells will be drilled in 4 places in order to provide drinking and irrigation water (see CUADRO A 8.3.3.3).

③ Environmental conservation measures

- With a view to environmental conservation inside the National Park, the trunk

road passing through the Park (earth road, 17 kilometres) will be moved to the buffer zone.

- The boundaries of the National Park will be ascertained and fences supplemented where they are lacking (40 kilometres).
- A track road for patrol (15 kilometres) will be laid inside the National Park and constant security maintained.
- Existing facilities etc. inside the National Park will be improved (rest areas, toilets, and other facilities in 2 places).
- Environmental conservation pamphlets (810 copies), listing matters for serious consideration in connection with environmental conservation, will be prepared and distributed.

(5) Benefits

a) Beneficiary farmers: 810

b) Beneficiary area: 7,970 hectares

(6) Production plan (average per farmer)

This region includes small-scale farmers who farm inside the buffer zone and on sloping land in and around the buffer zone, and others who farm on flat land in the surrounding area. Since their respective types of land use are therefore different, the project will classify the former as Type 1 (170 farmers, mainly on sloping land) and the latter as Type 2 (640 farmers, mainly on flat land; see CUADRO A 8.3.31 to 3).

Current			Planned		
Agricultural/livestock produce	Area (ha)	Production volume (t)	Agricultural/livestock produce	Area (ha)	Production volume (t)
Type 1			Type 1		
Dairy cattle (1 cow)	2.9	1.3kl	Dairy cattle (6 cows)	4.1	12.0kl
Cotton	1.8	2.2	*Cotton	1.0	1.2
			*Paraíso	0.3	31.8m³
			*Oranges	0.4	7.0
			*Maté tea	0.1	0.3
			*Green manure	(1.0)	60.0
Maize	0.4	0.4	Maize	–	–
Peanuts	0.3	0.3	Peanuts	–	–
Poroto	0.3	0.2	Poroto	–	–
Farm produce for home consumption, etc.	1.7		Farm produce for home consumption, etc.	2.0	
			Paraíso for home consumption	0.6	228.0m³
Fallow fields	1.1		Fallow fields	–	
Total	8.5		Total	8.5	
Type 2			Type 2		
Dairy cattle (1 cow)	2.6	1.3kl	Dairy cattle (5 cows)	3.6	10.0kl
Cotton	2.4	2.9	*Cotton	1.5	5.4
			*Paraíso	1.9	152.0m³
			*Oranges	0.5	8.8
			*Maté tea	0.1	0.3
			*Green manure	(1.5)	180.0
Maize	1.2	1.3	Maize	–	–
Peanuts	0.8	0.9	Peanuts	–	–
Poroto	0.7	0.6	Poroto	–	–
Farm produce for home consumption, etc.	2.5		Farm produce for home consumption, etc.	2.0	
			Paraíso for home consumption	0.6	228.0m³
Total	10.2		Total	10.2	

Note 1: Green manure crops in brackets are secondary crops for cotton.
Note 2: * shows farm produce to be produced for sale using existing cultivation technology.
Note 3: Details of the production plan are shown in CUADRO A 8.3.3.4, and those of the land use plan in CUADRO A 8.3.3.5.

(7) Farm management plan

Consumption destination and typical farm practice	No. of cultivating farmers	Farmer's income (Gs 1,000)
For export to MERCOSUR		
Type 1: Cotton + dairy produce + farm produce for home consumption, etc.	170	6,200
Type 2: Cotton + dairy produce + farm produce for home consumption, etc.	640	8,300

Note 1: Items marked * in (6) have been included in "farm produce for home consumption, etc.".
Note 2: Farmer's income shows the total of agricultural and non-agricultural incomes.

Note 3: For details of the farm management plan, see CUADRO A 8.3.3.6.

(8) Total project costs (for details, see CUADRO A 8.3.3.7)
Gs 8,862 million

(9) Project duration: 5 years

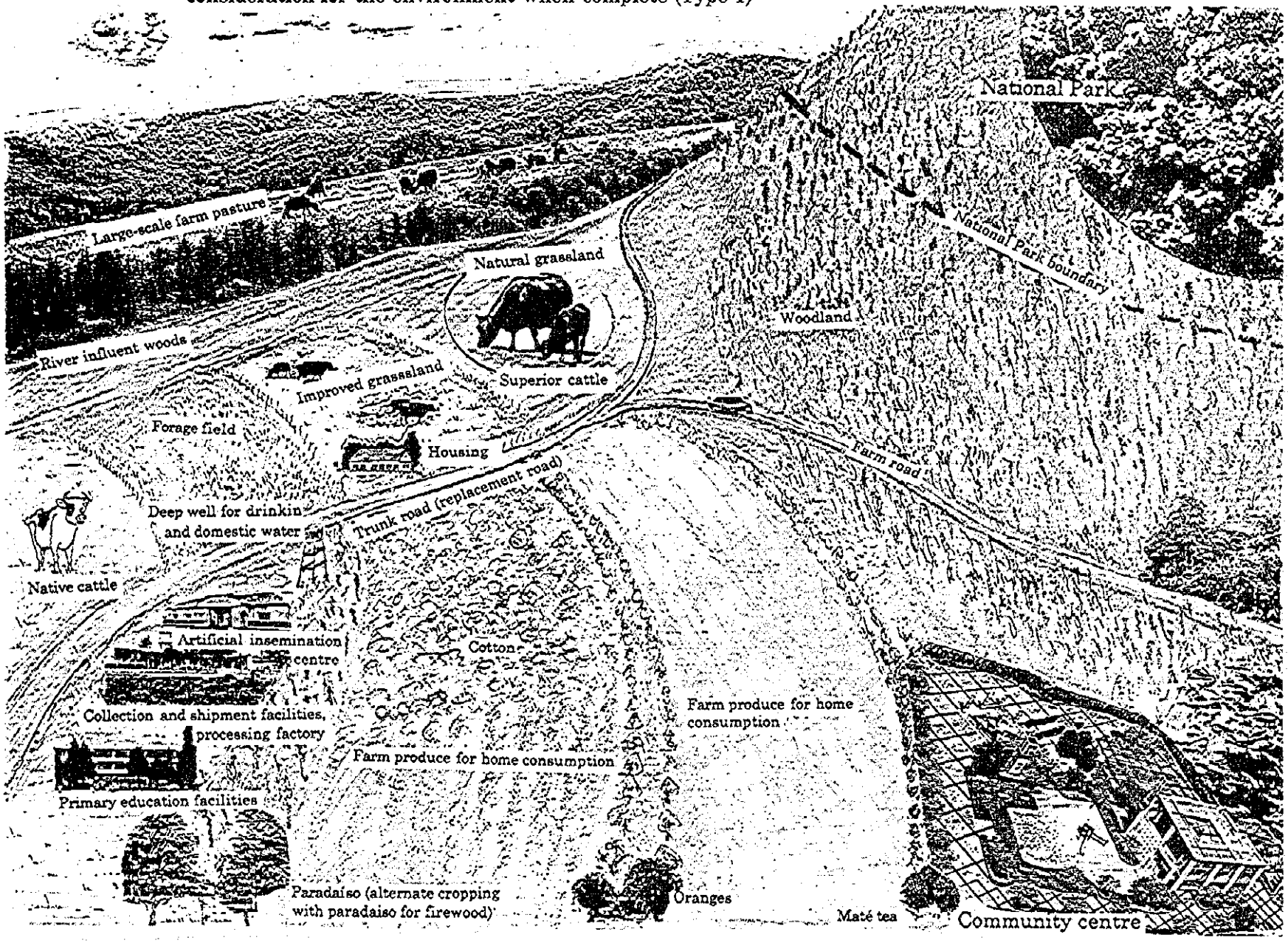
(10) Points of note and proposals

① Since the buffer zone has been created with the aim of conserving the Park itself, the responsibilities of the inhabitants need to be clarified while legal measures should be taken to reinforce regulations on land use, etc.

② The committees in the various villages have been amalgamated into a local cooperative, which heads projects for production and subsistence infrastructure improvement and the operation thereof. As well as this, technical guidance on production, cultivation, farm product processing, etc. is carried out with the cooperation, among others, of the UTP (Union of Private Sector Technology) due to be established as part of the Ministry of Agriculture and Livestock's Programme for Development and Modernization of Agriculture, Livestock Farming, and Forestry.

③ The DPNVS local office inside the National Park carries out work for environmental conservation.

Figure 8.3.3.1 Sketch of the project for the development of agriculture including consideration for the environment when complete (Type 1)



2) Project for soil improvement and the promotion of cotton crops

(1) Project location: near Ybycuí District, Paraguarí Department

(2) Present situation of the Department

Paraguarí Department lies to the southeast of Central Department. It has a land area of 870.5 square kilometres and a population of 208,526 (population density 24.0 persons per square kilometre). The population living in rural areas accounts for 79% of the whole. This proportion is high for the Study Area, although not as large as in Central Department.

There are mountains in the eastern part of this Department, including the Ybycuí National Park. However, on the whole it is covered by gently rolling hills. In areas near the national capital Asunción, high-income farming for vegetables, dairy farmer, and others are practiced. But in the southeast of the Department the majority is taken up by pasture land for large-scale farmers, while small-scale farmers cultivate cotton, sugar cane, and cassava and raise cattle as working animals. In this region, the soil is deteriorating, as protracted cotton cultivation has caused to soil compaction, loss of organic matter, and other problems.

(3) Present situation of the area

Ybycuí District includes 3,167 farmers, of which 2,600 are small-scale farmers. These occupy a land area of 15,438 hectares, or an average of 5.9 hectares per farmer. The crops cultivated are, in order of the land area occupied, cotton, maize, and cassava. The same trend holds true for small-scale farmers. Cotton, though a key crop for this region, has suffered a rapid decline in recent years as a result of soil deterioration stemming from long-term continuous cropping and the invasion of the picudo pest. Paraguay's export volume of cotton fibre in 1994 (in tons) had fallen to 53% of the 1991 figure. Owing to this slump in cotton crops, cotton spinning mills in Ybycuí District are facing closure.

According to the Paraguayan newspaper "abc" (2.8.1996), the Minister for Agriculture and Livestock has recommended a conversion from cotton cultivation to peanut, poroto, sugar cane, maize, and other crop cultivation in the departments of Central, Cordillera, and Paraguarí (excluding Ybycuí District). The conversion crops require more soil nutrients than cotton. Thus without measures for a recovery of high-level production (e.g. soil improvement, use of chemical fertilizers, etc.) it will be difficult to improve farm incomes even if crop conversion is achieved. Rather, since cotton is a crop whose cultivation is most suited to small-scale farmers, soil improvement and picudo countermeasures should be devised and cotton crops thereby promoted. In Paraguay there is a shortage of superior cotton seeds. This

area is near Asunción and IAN, and has access to technical support. Thus it should be possible to train small-scale farmers to cultivate cotton exclusively for seed production.

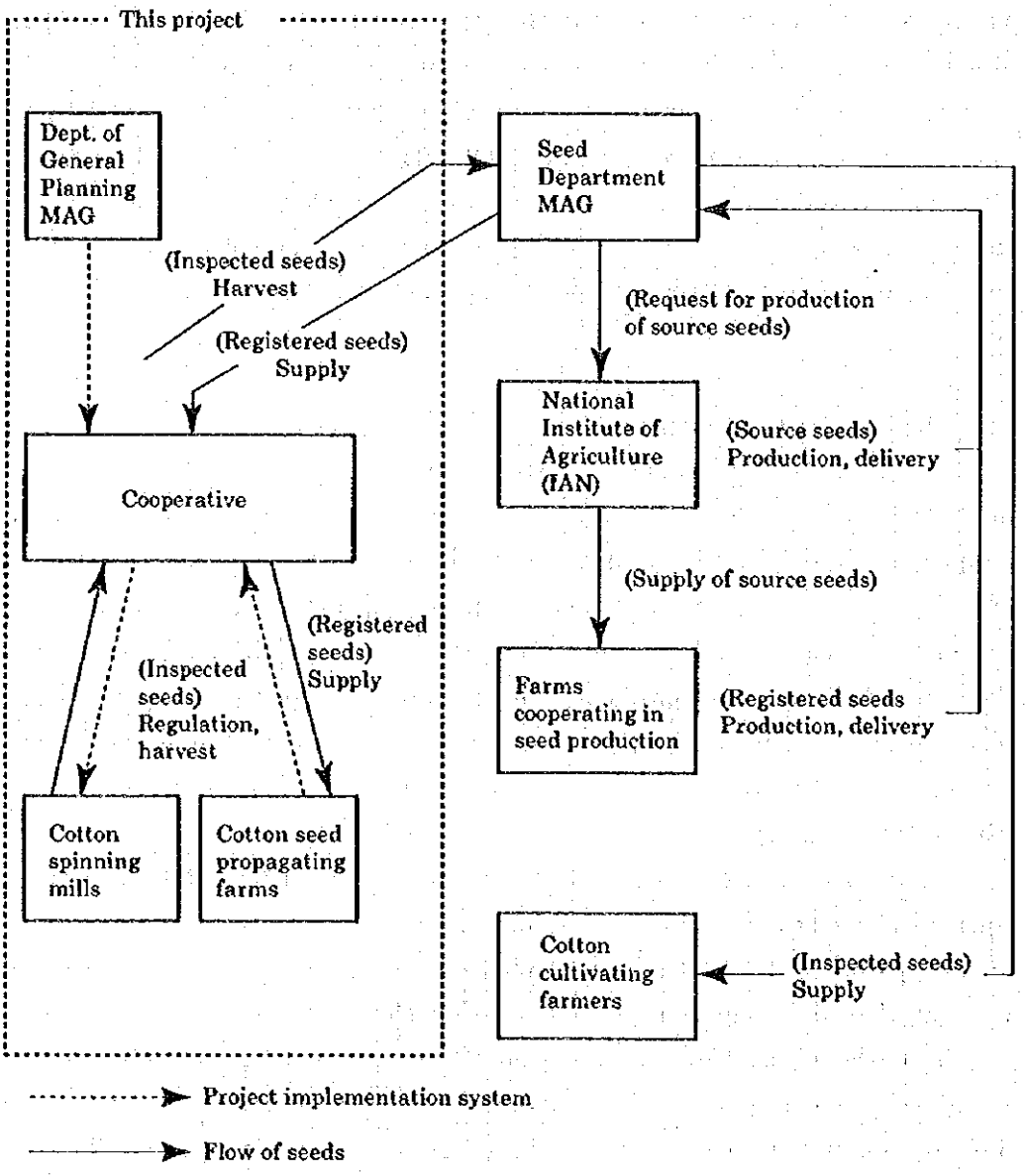
(4) Details of the project

a) Bodies responsible for the project:

Overall responsibility: Department of General Planning, MAG

Implementing body: cooperative (see Figure 8.3.3.2)

Figure 8.3.3.2 Project implementation and cotton seed extraction system



b) Outline of the project

(a) Purpose of the project

In this area, cotton yields have fallen dramatically owing to the invasion of the picudo pest and soil deterioration caused by excessive land use over a protracted period. Therefore, as measures for soil improvement, steps will be taken to recover land productivity through deep ploughing by tractors, then cultivating and ploughing-in green manure crops mixed in with barley and broad bean crops for soiling. As one countermeasure for the picudo pest, seeds should be sown early and uniformly, and this requires an adequate supply of superior seeds. In Paraguay there is a shortage of more than 4,000 tons of seeds. This project will be based on the mainstay of regular seed production through contracted cultivation.

(b) Profile of the project

① Soil improvement measures

Machinery for soil improvement: introduction of tractors, disk ploughs, disk harrows, and pan breakers.

Green manure cultivation: introduction of seed sowers.

② Cotton seed production

Factory conversion: existing cotton spinning mills, now idle, will be converted to factories devoted entirely to seed production.

(5) Benefits

a) Beneficiary farmers: 2,600 (cotton seed propagating farms)

b) Beneficiary area: 11,700 hectares

(6) Production plan (average per farmer)

Current			Planned		
Agricultural/livestock produce	Area (ha)	Production volume (t)	Agricultural/livestock produce	Area (ha)	Production volume (t)
Cotton	2.0	2.4	Cotton	1.6	2.9
			*Green manure crops	(1.6)	96.0
Dairy cattle (1 cow)	0.8	0.9kl	*Cattle (1 cow)	0.8	0.9kl
			*Oranges	0.1	1.8
Farm produce for home consumption, etc.	1.7		Farm produce for home consumption	2.0	
Total	4.5		Total	4.5	

Note 1: Green manure crops in brackets are secondary crops for cotton.

Note 2: * shows farm produce to be produced for sale using existing cultivation technology.

Note 3: Details of the production plan are shown in CUADRO A 8.3.3.8, and those of the land use plan in CUADRO A 8.3.3.9.

(7) Farm management plan

Consumption destination and typical farm practice	No. of cultivating farmers	Farmer's income (Gs 1,000)
For domestic sale Tomatoes + carrots + green asparagus + melons + farm produce for home consumption, etc.	2,600	4,100

Note 1: Items marked * in (6) have been included in "farm produce for home consumption, etc.".
Note 2: Farmer's income shows the total of agricultural and non-agricultural incomes.
Note 3: For details of the farm management plan, see CUADRO A 8.3.3.10.

(8) Total project costs (for details, see CUADRO A 8.3.3.11)

Gs 7,361 million

(9) Project duration: 3 years

8.3.4 Zone 4

1) Project for the development of fruit producing estates

(1) Project location: Minga Guazú District, Alto Paraná Department

(2) Present situation of the Department

This Department is situated in the east of Paraguay, and adjoins both Brazil and Argentina.

The Department has a land area of 14,895 square kilometres and a population of 406,584. The regional climate is semi-tropical and annual rainfall is 1,500-1,700 mm. The main agricultural products of the Department are soybeans (40% of the national total), wheat, and maize produced from fertile tierra roja soil, and mechanized agriculture is in progress. Meanwhile, as it includes Ciudad del Este, Paraguay's second-largest city, suburban-type vegetable cultivation is also practiced, as well as dairy and beef farming, making use of forage fields and natural grassland.

(3) Present situation of the area

Minga Guazú District, a hilly area sandwiched between the rivers Acaray and Monday, lies 13-34 kilometres to the west of Ciudad del Este. National Route 7 runs from west to east through its centre.

The area covers 460 square kilometres and has a population of 31,736, of which 8,447 live in rural areas. The principal crops in the area are soybeans, wheat, and maize produced by medium and large-scale farmers, and cotton, vegetables, and oranges produced by small-scale farmers. The livestock raised are dairy cattle, beef cattle, pigs, and chickens.

The vegetables produced by small-scale farmers are shipped to market in Ciudad del Este by individual farmers travelling by bus. But since the produce has no uniform standards, it is currently being sold at prices below that from Brazil. This is due to the tardiness of distribution infrastructure improvement (e.g. sorting, joint collection and shipment, etc.) and the immaturity of production technology.

A sketch map of the area is given in GRAFICO A 8.3.4.1 Ordinary roads 4 metres in width are arranged at 2 kilometre intervals, running north to south from the National Route 7. Farmers live on either side of these roads, but their daily lives are hindered by the bad condition of the roads resulting from poor maintenance.

Committees of farmers' organizations (13 committees with 115 members), though not undertaking any notable activities at present, can contribute through future enhancement of guidance.

In the Yguazú region near this area, the cultivation of macadamia nuts (120 hectares) that can be exported to Brazil is in progress as a form of crop diversification from the soybean + wheat crop planting system. Meanwhile, "Kimex", a general company in neighbouring Itapúa Department, owns 20,000 hectares of farmland and is engaged in producing, processing, and exporting farm produce. This company has a strong interest in cultivating grapes for export, and, in order to secure production volumes, is looking to small-scale farmers in the vicinity to engage in cultivating. Therefore, in this area it will be both necessary and effective to improve management by converting to the cultivation of fruit for export, taking advantage of the surrounding and geographical conditions.

In promoting this project, the Yguazú cooperative (based on a core of ethnic Japanese farmers) has also expressed a wish to support small-scale farmers. The farmers in the area are adjacent to JICA's Agricultural Test Centre in Paraguay (CETAPAR) and thus will also be able to obtain guidance from the Centre.

(4) Details of the project

a) Bodies responsible for the project:

Overall responsibility: Department of General Planning, MAG

Implementing body: Minga Guazú cooperative

b) Outline of the project

(a) Purpose of the project

With an eye to the MERCOSUR market, steps will be taken to promote agriculture in the area by creating fruit producing estates, taking advantage of the geographical conditions. By doing so, the aim will be to improve the agricultural income and livelihoods of small-scale farmers.

(b) Profile of the project

The project will designate the area to the north of the central National Route as the Acaray estate and those to the south as the Monday estate.

① Introduction of machinery; 20 water pumps, 20 agrochemical cleansing and processing units, planting machinery (3 tractors, 3 rippers), and 20 speed sprayers.

② Production materiel; purchase of saplings of trees to be newly introduced (macadamia nuts, mangoes).

③ Improvement of facilities; installation of farm implement storage and collection/shipment facilities, and introduction of fruit sorters, packers, and wrappers. In addition, introduction of macadamia nut shelling machines and conveyance vehicles as processing facilities.

④ Development of communication hardware; establishment of production organizations (fruit production divisions) will be set up to develop the estates, while radio equipment will be introduced to liaise with this organization and diffuse technology. Mobile guidance vehicles will also be introduced in order to promote the work smoothly.

(5) Benefits (see CUADRO A 8.3.4.1 for details)

a) Beneficiary farmers: 600

b) Beneficiary area: 2,860 hectares

(6) Production plan (average per farmer)

Current			Planned		
Agricultural/livestock produce	Area (ha)	Production volume (t)	Agricultural/livestock produce	Area (ha)	Production volume (t)
			Type 1		
			Grapes	1.6	16.0
			Macadamia nuts	0.5	2.7
			*Cotton	0.7	1.2
			Farm produce for home consumption	2.0	
			Total		
			Type 2		
Cotton	2.1	3.6	Mangoes	1.5	22.5
Maize	1.1	2.3	*Cotton	0.9	1.5
Poroto	0.5	0.6	*Bananas	0.4	3.9
Farm produce for home consumption, etc.	1.1		Farm produce for home consumption	2.0	
Total	4.8		Total	4.8	

Note 1: Type 1 refers to the Acaray area and Type 2 to the Monday area.

Note 2: * shows farm produce to be produced for sale using existing cultivation technology.

Note 3: Details of the production plan are shown in CUADRO A 8.3.4.3, and those of the land use plan in CUADRO A 8.3.4.2.

(7) Farm management plan

Consumption destination and typical farm practice	No. of cultivating farmers	Farmer's income (Gs 1,000)
For export to MERCOSUR		
Type 1: grapes + macadamia nuts + cotton + farm produce for home consumption	300	8,000
Type 2: mangoes + cotton + farm produce for home consumption, etc.	300	7,100

Note 1: Items marked * in (6) have been included in "farm produce for home consumption, etc.".
Note 2: Farmer's income shows the total of agricultural and non-agricultural incomes.
Note 3: For details of the farm management plan, see CUADRO A 8.3.4.4.

(8) Total project costs (for details, see CUADRO A 8.3.4.5)

Gs 5,297 million

(9) Project duration: 7 years

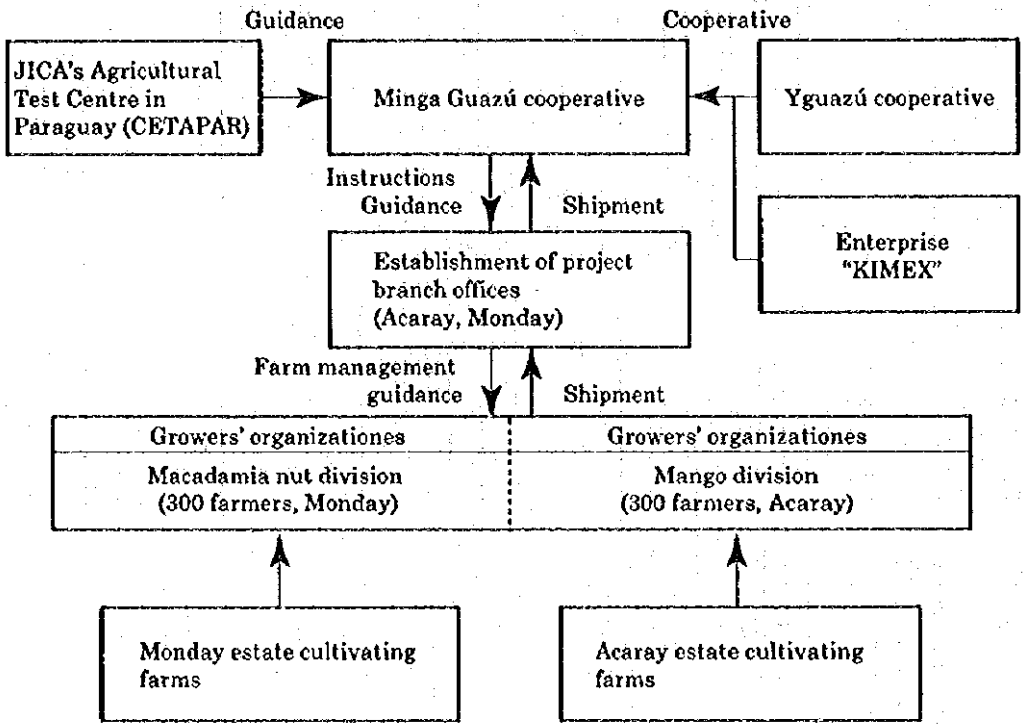
(10) Points of note and proposals

① The system for implementing the project will involve setting up individual fruit production divisions (fruit divisions) for each producing estate.

② The Minga Guazú cooperative will hold discussions with the "Kimex" enterprise and the Yguazú cooperative with a view to establishing sales routes for the fruit produced.

③ The system for implementation is shown in Figure 8.3.4.1.

Figure 8.3.4.1 Project implementation system



Note: The area to the north of the central National Route will be as the Acaray estate and that to the south as the Monday estate.

2) Project for the promotion of suburban dairy farming

(1) Project location: Minga Guazú District, Alto Paraná Department

(2) Present situation of the Department

Alto Paraná Department is in the east of Paraguay. It has a land area of 14,895 square kilometres and a population of 406,584. Its topography features gentle hilly land that is suited to mechanized agriculture. The soil is fertile tierra roja, formed from plateau basalt. Annual rainfall is 1,500-1,700 mm, and water resources are plentiful. Thus, the Department enjoys natural conditions that are well suited to agricultural production. The main agricultural products of the Department are soybeans, wheat, and maize for export, as well as milk, beef cattle, pigs, and others (see CUADRO A 8.3.4.6).

(3) Present situation of the area

Minga Guazú District lies to the west of Ciudad del Este, Paraguay's second largest city and a major centre for consumption of agricultural and livestock produce.

The area covers 460 square kilometres and has a population of 31,736. The principal farm crops in the area are annual crops such as soybeans, wheat, and maize produced by medium and large-scale farmers. Small-scale farmers are scattered in and amongst the farms of medium and large-scale farmers engaged in the production of soybeans, wheat, and other cereal crops. They raise cattle, pigs, chickens and other livestock, often combined with annual crop cultivation.

Approximately 2,517 dairy cattle are raised in the area, yielding a daily milk production of 13.5 tons. The number of dairy cattle raised by small-scale farmers ranges from two to about ten. Milk productivity is low on account of the underdevelopment of the fodder production infrastructure, the tardiness of livestock improvement, the immaturity of livestock rearing technology, the underdevelopment of collection and shipment facilities, and other factors. Meanwhile, the underdevelopment of roads creates difficulty in the transportation of milk.

Neighbouring Yguazú District is the site of JICA's Agricultural Test Centre in Paraguay (CETAPAR), where a dairy farming promotion programme for small-scale farmers is currently underway in collaboration with the Ministry of Agriculture and Livestock. Thus, for example, technical support for livestock rearing technology is available. Meanwhile, the Yguazú cooperative, led by ethnic Japanese farmers, plans to construct a fodder factory that will probably supply the Minga Guazú area.

(4) Details of the project

a) Bodies responsible for the project:

Overall responsibility: Department of General Planning, MAG
Implementing body: Minga Guazú cooperative

b) Outline of the project

(a) Purpose of the project

In this area, we will promote the improvement of dairy cattle, the enhancement of the fodder production infrastructure, the improvement of livestock rearing and management technology, and the development of collection/shipment facilities in the area, thus aiming to increase incomes and raise the dairy-farming productivity of small-scale farmers.

(b) Profile of the project

① Enhancement of dairy farming production infrastructure will involve improvement of farmland (from natural grassland to improved grassland, 180 hectares) and maintenance and management of farm roads

② Livestock improvement will involve introduction of stud bulls and construction of an artificial insemination centre

③ Distribution and processing of farm produce will involve installation of milk cooler stations, introduction of a milk lorry and construction of milk processing facilities (cheese, yoghurt, etc.)

(5) Benefits

a) Beneficiary farmers: 350

b) Beneficiary area: 3,300 hectares

(6) Production plan (average per farmer)

Current			Planned		
Agricultural/livestock produce	Area (ha)	Production volume (t)	Agricultural/livestock produce	Area (ha)	Production volume (t)
Dairy cattle (2 cows)	2.0	2.0kl	Dairy cattle (5 cows)	2.8	10.0kl
			*Bananas	0.5	4.9
Cotton	2.1	3.6	Cotton	–	–
Maize	1.1	1.7	*Maize	1.5	2.3
Poroto	0.5	0.6	*Poroto	0.5	0.6
Farm produce for home consumption, etc.	0.8		Farm produce for home consumption	2.0	
Fallow fields	0.8		Fallow fields	–	
Total	7.3		Total	7.3	

Note 1: * shows farm produce to be produced for sale using existing cultivation technology.
Note 2: Details of the production plan are shown in CUADRO A 8.3.4.7, and those of the land use plan in CUADRO A 8.3.4.8.

(7) Farm management plan

Consumption destination and typical farm practice	No. of cultivating farmers	Farmer's income (Gs 1,000)
For domestic sale Dairy farming + farm produce for home consumption, etc.	350	5,500

Note 1: Items marked * in (6) have been included in "farm produce for home consumption, etc.".
Note 2: Farmer's income shows the total of agricultural and non-agricultural incomes.
Note 3: For details of the farm management plan, see CUADRO A 8.3.4.9.

(8) Total project costs (for details, see CUADRO A 8.3.4.10)

Gs 2,963 million

(9) Project duration: 5 years

8.3.5 Zone 5

1) Project for the improvement of adult education for farmers, etc.

(1) Project location: Caazapá District, Caazapá Department

(2) Present situation of the Department

Caazapá Department is in the southeast of the Study Area, and is surrounded by four departments including Guair*. It has a land area of 9,496 square kilometres, mostly taken up by the basin of the Tebicuary river system. The northeastern part of the Department is a gently undulating hill region, featuring a distribution of relatively low-fertility Arenosoles and other sandy soil. The main agricultural products are cotton, maize, sugar cane, and others, all of these falling short of national levels in single yields. On the other hand, the southwest is a vast wetland zone covered with natural grasslands, where some 290,000 head of cattle are farmed by extensive pasturing. The Department consists of 10 districts and has a population of about 129,000, accounting for 3.1% of the national total. The population density of 13.5 persons per square kilometre is somewhat higher than the national average, while the population growth rate shows an annual average of 1.6%, somewhat lower than the national equivalent. The farm population is 106,954 and there are 20,682 farm businesses, 83% of the Department's population thus living on farms.

For primary education there are 254 schools with 28,000 pupils, more than 80% of whom live in rural areas.

The rate of electric power diffusion is 16.1% in the Department as a whole, considerably lower than the national figure of 57.7%. Electricity has only reached 5.6% of rural areas.

The rate of diffusion of water supply is 5.8%, lower than the national rate of 27.1%. In rural areas it is virtually non-existent (0.2%).

As for access, National Route 8 runs from north to south to the west of the Department's centre, while there are also 80 kilometres of railways. Main artery and trunk roads stretch for 367 kilometres and side roads for 543 kilometres, but, apart from the main arteries, they are nearly all undeveloped earth tracks, causing inconvenience to the transportation of farm produce as well as to daily life whenever rain falls.

(3) Present situation of the area

The model area lies in the north of Caazapá Department, and adjoins the southern end of Guairá Department. It has an area of 944 square kilometres and a population of 20,303. There are 2,816 farm businesses, of which 2,503 (89%) are run

by small-scale farmers. Low-fertility sandy soil is distributed throughout this region, while the principal crops cultivated include cotton and sugar cane.

National Route 8 runs from north to south, and is asphalted from the Coronel Oviedo town area (National Route 2) to the town of Caazapá (the departmental capital).

The rate of electric power diffusion is 20.9% in the area as a whole and 87.9% in urban areas, but only 1.9% in rural areas, the lowest level in the whole country.

The rate of diffusion of water supply is 11.2% in the area as a whole, but nil in rural areas.

As for farmers' organizations, the Ycua Bolaños cooperative, formed from 884 farms, undertakes savings and credit, education, purchasing, agriculture, and other work via 13 committees, consisting of women's committees and others

(4) Details of the project

a) Bodies responsible for the project:

Overall responsibility: Department of General Planning, MAG

Local implementing body: Ycua Bolaños cooperative

b) Outline of the project

(a) Purpose of the project

Caazapá Department is a rural region that has been developed for some considerable time. The area of farmland occupied by small-scale farmers is less than the Study Area average. Many of them drop out of compulsory education owing to poverty arising in turn from the low agricultural productivity. The farmers, given their Guaraní culture of hunting and gathering, are not well-versed in techniques of agricultural production. We will take steps to reverse this situation by enhancing farmers' education (including basic education) over the long term. The men will be trained mainly in acquiring agricultural production technology while, for women, development will take the direction of education and drills for personnel training, the practice of family planning, providing incomes for women, and collective purchasing. These will contribute to improving the status of women, enhancing livelihoods, training rural personnel, and stimulating local communities.

(b) Profile of the project

A Training Centre will be set up for this area, while at the same time a vehicle equipped with audio-visual teaching materials will be deployed to promote the education of women and organize activities. Meanwhile, as for infrastructure, drinking water facilities and roads will be improved.

① An adult education and training centre will be set up with audio-visual teaching

materials and lifestyle improvement facilities.

② Mobile education and guidance vehicles (equipped with audio-visual teaching materials), a minibus, and others will be located..

③ Apart from these, we will install beehives and develop drinking water facilities and roads.

(5) Benefits

a) Beneficiary farmers: 2,503 (small-scale farmers in the whole of Caazapá District)

b) Beneficiary area: 14,500 hectares

(6) Production plan (average per farmer)

Current			Planned		
Agricultural/livestock produce	Area (ha)	Production volume (t)	Agricultural/livestock produce	Area (ha)	Production volume (t)
			Apiculture (10 colonies)	–	0.3kl
			*Bananas	0.1	1.0
Cotton	1.5	1.3	*Cotton	1.5	2.4
Maize	0.7	1.3	*Maize	0.7	1.3
Poroto	0.3	0.3	*Poroto	0.4	0.4
Farm produce for home consumption, etc.	2.2		Farm produce for home consumption, etc.	2.0	
Total	4.7		Total	4.7	

Note 1: * shows farm produce to be produced for sale using existing cultivation technology.
Note 2: Details of the production plan are shown in CUADRO A 8.3.5.1.

(7) Farm management plan

Consumption destination and typical farm practice	No. of cultivating farmers	Farmer's income (Gs 1,000)
For export to MERCOSUR Apiculture + farm produce for home consumption, etc.	40	4,700

Note 1: Items marked * in (6) have been included in "farm produce for home consumption, etc.".
Note 2: Farmer's income shows the total of agricultural and non-agricultural incomes.
Note 3: For details of the farm management plan, see CUADRO A 8.3.5.2.

(8) Total project costs (for details, see CUADRO A 8.3.5.3)
Gs 3,626 million

(9) Project duration: 3 years

2) Project for the promotion of sericulture

(1) Project location: Caazapá District, Caazapá Department

(2) Present situation of the Department

Caazapá Department, in the southeast of the Study Area, is bordered to the north by Guairá and Caaguazú Departments, to the south by Itapúa Department, to the east by Alto Paraná Department, and to the west by Misiones Department. It has a land area of 9,496 square kilometres, most of this belonging to the Tebicuary river system. The northeastern part of the Department features a distribution of relatively low-fertility sandy soil. The main agricultural products of this region include cotton, maize, and sugar cane. But the yields of all of these fall short of the national averages. The southwest, meanwhile, is a wetland zone covered with vast natural grasslands, where beef cattle are farmed by extensive pasturing.

The Department consists of 10 districts and, according to the National Census of 1992, has a population of about 129,352, accounting for 3.1% of the national total. The population density of 13.5 persons per square kilometre is somewhat higher than the national average. The farmer population is 106,964 and there are 20,682 farm businesses, the majority of the Department's population thus living in rural areas.

(3) Present situation of the area

Caazapá District lies in the north of Caazapá Department, adjoining the southern end of Guairá Department. The Caaguazú town area lies a little over 95 kilometres from Cnel. Oviedo town and about 300 kilometres from Ciudad del Este. Trunk roads are well developed. The area covers 944 square kilometres and has a population of 20,303, with a population density of 21.5 persons per square kilometre. There are 2,816 farm businesses, of which about 90% are small-scale farms. Low-fertility red sandy soil is distributed. Crops with the largest cultivation areas are cotton and sugar cane. The productivity of cotton is declining owing to soil deterioration and the invasion of the picudo pest. Sugar cane planting is also in a declining trend owing to a lack of fertilizer management and poor marketability. Thus, farmers are facing problems in their selection of cash crops and can find no effective solutions.

The area includes the Ycua Bolaños cooperative (consisting of 631 members) that undertakes savings and credit, education, and other activities via women's committees and the like. There is no track record of mulberry cultivation. However, this would be effective as a means of soil conservation, and this area, with its plentiful rainfall, is suited to the production of mulberries. It also enjoys locational conditions that would enable transportation to Hernandarias in Alto Paraná

Department, where there is a silk-spinning factory. In addition, education and various other activities are in progress via women's comités, and the groundwork is being laid for the promotion of sericulture using female labour.

The basic indicators for the area are shown in CUADRO A 8.3.5.4.

(4) Details of the project

a) Bodies responsible for the project:

Overall responsibility: Department of General Planning, MAG

Local implementing body: Ycua Bolaños cooperative

(The organizational set-up for implementing the project is proposed in GRAFICO A 8.3.5.1.)

b) Outline of the project

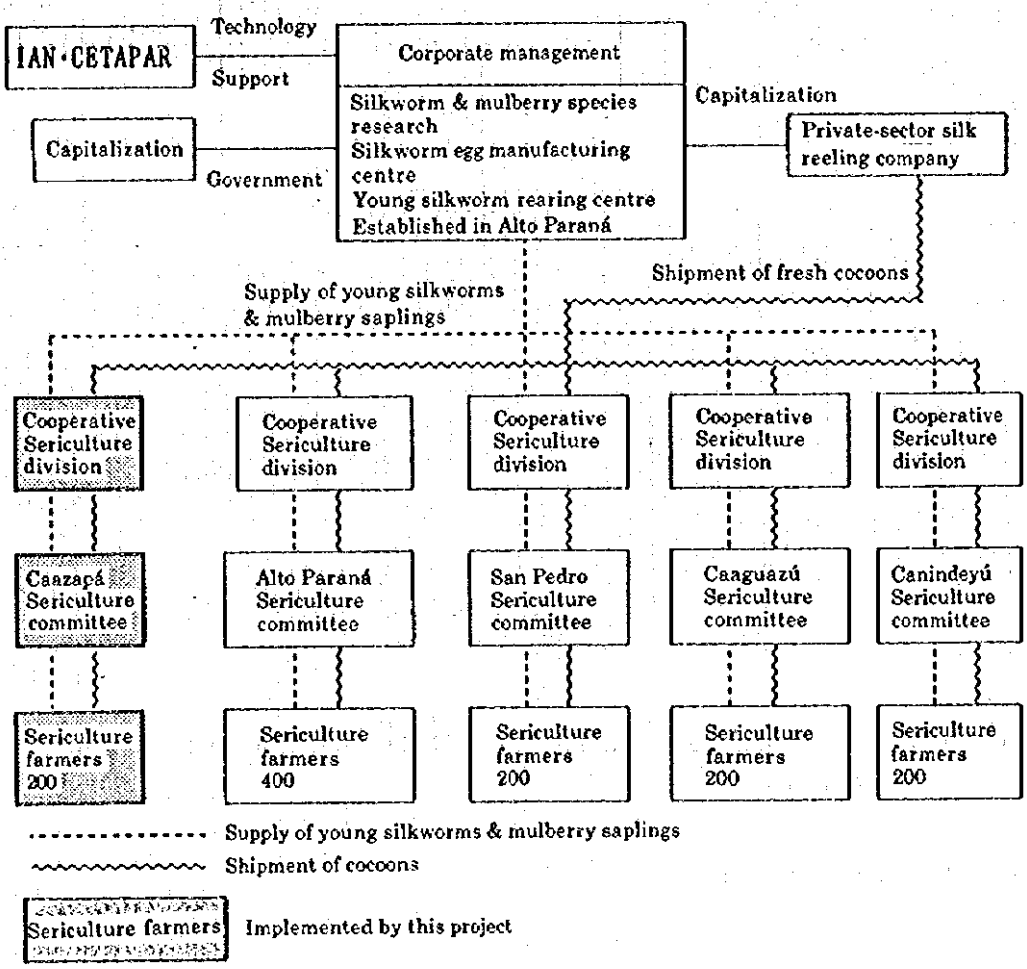
(a) Purpose of the project

This area has no promising crops that could replace cotton and sugar cane. Therefore, steps will be taken to increase small-scale farmers' incomes by forming a major production base for the promotion of sericulture, centring on Alto Paraná Department (see Figure 8.3.5.1).

(b) Profile of the project

Item	Structures & standards	Quantities
Creation of mulberry fields		3 hectares per farm, 200 farmers
Silkworm rearing rooms	Single-storey wooden shed, 200m²	1 per farm, 200 farmers
Machinery & apparatus	Bedstead, rotating cocoon frame, harvested cocoon floss cutter	1 set per farm, 200 sets
Joint cocoon collection & shipment centre	Simple steel-frame structure, 300m²	1
Trucks for collection & shipment	2-ton	2

Figure 8.3.5.1 Model chart of sericulture promotion



(6) Benefits

a) Beneficiary farmers: 200

b) Beneficiary area: 1,000 hectares

(6) Production plan (average per farmer)

Current			Planned		
Agricultural/livestock produce	Area (ha)	Production volume (t)	Agricultural/livestock produce	Area (ha)	Production volume (t)
			Cocoons	3.0	3.0
Cotton	1.0	0.8	Cotton	–	–
Farm produce for home consumption, etc.	3.0		Farm produce for home consumption, etc.	2.0	
Fallow fields	1.0		Fallow fields	–	
Total	5.0		Total	5.0	

Note 1: Details of the production plan are shown in CUADRO A 8.3.5.5, and those of the land use plan in CUADRO A 8.3.5.6.

(7) Farm management plan

Consumption destination and typical farm practice	No. of cultivating farmers	Farmer's income (Gs 1,000)
For export outside MERCOSUR Sericulture + farm produce for home consumption, etc.	200	10,800

Note 1: Farmer's income shows the total of agricultural and non-agricultural incomes.

Note 2: For details of the farm management plan, see CUADRO A 8.3.5.7.

(8) Total project costs (for details, see CUADRO A 8.3.5.8)

Gs 4,183 million

(9) Project duration: 3 years

8.3.6 Zone 6

1) Project for the promotion of combined agriculture & livestock farming

(1) Project location: Isla Umbú District, Ñeembucú Department

(2) Present situation of the Department

Ñeembucú Department lies at the southern end of Paraguay. Its topography is flat, and it is sandwiched in between the Paraguay and Parana rivers. It thus forms a vast wetland that drains poorly and is subject to frequent flooding. The soil is sandy and thus low in fertility, as well as being deficient in organic matter and phosphates. The wetland zone is a huge pasture where beef cattle are farmed extensively on natural grasslands.

The Department has a land area of 12,147 square kilometres and consists of 17 districts. The overall population is about 69,883, and the population density a sparse 5.7 persons per square kilometre. Small-scale farmers, scattered among large-scale farms, grow cotton, maize, poroto, vegetables for home consumption, and fruit on their meagre holdings of arable land, as well as raising cattle, chickens, honey bees, and other livestock. The main cash crop is cotton, but, owing to the soil conditions described above, the productivity is low. Faced with these unfavorable conditions, small-scale farmers here have the poorest livelihoods in the whole of Paraguay.

(3) Present situation of the area

Isla Umbú District is south of Pilar District, and its topography is extremely flat. The River Paraguay flows down the west of the area. The River Ñeembucú flows towards the River Paraguay in the north of the area and the River Hondo in the south, turning the area into a vast wetland surrounded by rivers.

Six villages (Valle Poi, Costa Pucu, Isleria, Tacuru Pyta, Camba Cua, and Loma Clavel) are scattered throughout the area, and 3,228 people live in a total land area of 575 square kilometres. It is adjacent to Pilar District, allowing easy access to markets.

Large-scale farmers use the majority of their farmland for pasturing beef cattle. Small-scale farmers use their meagre holdings of arable land to produce cotton and maize, as well as cassava and poroto for home consumption. In this area, dairy farming is also common among small-scale farmers. However, owing to the vast wetland zone and its poor drainage, agricultural productivity is extremely low.

In view of this, the government of Paraguay has formulated the Project for Rural Development and Environmental Improvement for Small-Scale Farmers in Southern Pilar (DERMASUR) and is starting to support small-scale farmers. With

this project as a precedent, since 1994 the government of Japan has also been providing project-type technical cooperation in the form of its Project for Rural Development in Southern Pilar (referred to below as "rural development") in the sectors of water management, works execution, agricultural diffusion, and cultivation. The projects in the DERMASUR Project include a variety of work related to regional development in rural areas. However, due partly to budgetary shortages on the part of the government, it remains at the planning stage and has yet to be implemented.

The basic indicators for the area are shown in CUADRO A 8.3.6.1.

(4) Details of the project

a) Bodies responsible for the project:

Overall responsibility: Department of General Planning, MAG

Implementing body: Ñeembucú cooperative (The organizational set-up for implementing the project is proposed in GRAFICO A 8.3.6.1.

b) Outline of the project

(a) Purpose of the project

Rural development with the participation of local farmers is gradually showing results in the tangible form of improved drainage, in technology transfer for water management, and so on. In addition, results are also being reaped gradually in intangible forms such as crop cultivation tests and farm practice diffusion. However, no progress is being seen in either tangible or intangible improvements (e.g. organization of farmers, improvement of the agricultural production infrastructure, or the distribution and processing of farm produce) through DERMASUR.

Therefore, in this project we will link up with the rural development project to plan work that leads to increased agricultural income and regional development, in order to bring DERMASUR to reality as soon as possible in areas not related to the rural development project.

(b) Profile of the project

① Agricultural infrastructure improvement project

Item	Structures & standards	Quantities	Basis for calculation, etc.
① Farmland improvement		170 ha	Types 1 & 2 170 hectares of forage fields
② Grassland improvement	Includes cattle fences and watering holes	585 ha	Types 1 & 2
③ Small-scale irrigation (pump irrigation)	Small pump 1,600 litres/hour with 100 m pipe	513 sets	Types 1 & 3

② Farmer support project

Item	Structures & standards	Quantities	Basis for calculation, etc.
① Reinforcement of cooperatives			
Integrated information centre		1	Set up inside training facilities
Training facilities	248 m²	1	
Introduction of farm implements	For subsoil improvement	1 set	Tractors, disk ploughs, disk harrows, and pan-breakers (two of each)
② Agricultural credit			
Introduction of stud bulls		2	Types 1 - 3
Artificial insemination centre		1	Types 1 - 3
Promotion of apiculture	Addition of 219 honey bee colonies	23 farms	Type 4

③ Distribution & farm product processing project

Item	Structures & standards	Quanti-ties	Basis for calculation, etc.
(Distribution)			
① Collection and shipment facilities			Types 1 - 3
Milk cooler stations	2,000-litre tank	4	
Milk lorry	4-ton vehicle	1	
Development of wholesale market		1	
(Processing)			Types 1 - 3
① Milk processing	Processing 4,000 litres/day	1	
Commercial type processing plant	Processing 600 litres/day	5	
Cottage-industry type processing plants			Type 4
② Honey processing		1	Type 2
Joint processing plant			
③ Farm product processing		1	
Marmalade processing			

Note: Types 1-4 are classified according to the respective areas of farmland occupied (Type 1: 10-19 hectares, Type 2: 5-9 hectares, Type 3: 1-4 hectares, Type 4: less than 1 hectare).

(5) Benefits

a) Beneficiary farmers: 540

b) Beneficiary area: 3,600 hectares

(6) Production plan (average per farmer)

Current			Planned		
Agricultural/livestock produce	Area (ha)	Production volume (t)	Agricultural/livestock produce	Area (ha)	Production volume (t)
Type 1			Type 1		
Dairy cattle (3 cows)	2.4	1.5kl	Dairy cattle (7 cows)	7.0	14.0kl
Cotton	1.5	1.5	Cotton	1.0	1.8
			*Carrots	0.1	1.1
Maize	0.9	0.7	Maize	–	–
Poroto	0.3	0.2	Poroto	–	–
Farm produce for home consumption, etc.	5.0		Farm produce for home consumption, etc.	2.0	
Total	10.1		Total	10.1	
Type 2			Type 2		
Dairy cattle (2 cows)	1.2	1.0kl	Dairy cattle (3 cows)	2.9	6.0kl
Cotton	1.3	1.3	Cotton	–	–
			*Oranges	0.2	3.5
			**Cabbages	0.1	0.3
			*Pumpkins	0.5	7.5
Maize	0.7	0.6	Maize	–	–
Poroto	0.2	0.1	Poroto	–	–
Farm produce for home consumption, etc	1.9		Farm produce for home consumption, etc.	2.0	
Fallow fields	0.4		Fallow fields	–	
Total	5.7		Total	5.7	
Type 3			Type 3		
			Dairy cattle (1 cow)	0.8	2.0kl
Cotton	0.8	0.8	Cotton	–	–
			**Tomatoes	0.1	4.1
Maize	0.8	0.6	Maize	–	–
Poroto	0.1	0.1	Poroto	–	–
Farm produce for home consumption, etc.	0.3		Farm produce for home consumption, etc.	1.1	
Total	2.0		Total	2.0	
Type 4			Type 4		
			Honey bees (10 colonies)	–	0.3kl
Farm produce for home consumption, etc.	0.2		Farm produce for home consumption, etc.	0.3	
Fallow fields	0.1		Fallow fields	–	
Total	0.3		Total	0.3	

Note 1: * shows farm produce to be produced for sale using existing cultivation technology.

Note 2: ** shows farm produce to be produced for sale using irrigation water in addition to existing cultivation technology.

Note 3: Details of the production plan are shown in CUADRO A 8.3.6.2, and those of the land use plan in CUADRO A 8.3.6.3.

(7) Farm management plan

Consumption destination and typical farm practice	No. of cultivating farmers	Farmer's income (Gs 1,000)
For export to MERCOSUR		
Type 1: cotton + dairy farming + farm produce for home consumption, etc.	160	5,900
Type 4: apiculture + farm produce for home consumption, etc.	23	4,200
Domestic sale		
Type 2: dairy farming + farm produce for home consumption, etc.	132	5,100
Type 3: dairy farming + farm produce for home consumption, etc.	221	5,000

Note 1: Items marked * and ** in (6) have been included in "farm produce for home consumption, etc.".
Note 2: Farmer's income shows the total of agricultural and non-agricultural incomes.
Note 3: For details of the farm management plan, see CUADRO A 8.3.6.4.

(8) Total project costs (for details, see CUADRO A 8.3.6.5)

Gs 5,881 million

(9) Project duration: 5 years

2) Project for the development of model rural areas for paddy field development

(1) Project location: Isla Umbú District, Ñeembucú Department

(2) Present situation of the Department

Ñeembucú Department is in the southernmost part of Paraguay. The departmental capital Pilar lies on the River Paraguay in the west of the Department, and the Capital Asunción (some 380 kilometres away) can be reached in 6 hours via National Routes 1 and 4. The latter, a dirt road at present, is currently being upgraded to asphalt. When complete, the time required will be reduced, and passage will also be possible in bad weather. Ñeembucú Department contains a number of flood areas, on account of its low elevation and flat topography. The River Paraguay forms the western border of the Department and the River Parana the southern border (both of these adjoin neighbouring Argentina). They converge in the southwest of the Department and form the River Plate. Ñeembucú Department, lying at the point of convergence of these rivers, tends to suffer extensive inundation since the rivers swell during rainfall. This tendency to flood should be eased by a drainage improvement project, part of the Paraguayan government's Project for Rural Development and Environmental Improvement for Small-Scale Farmers in Southern Pilar (the DERMASUR). When the effects of this project start to be felt, greater improvements in agricultural productivity may be expected.

(3) Present situation of the area

Isla Umbú District is south of Pilar District, and its topography is extremely flat. The River Paraguay flows down the west of the area. In addition, the River Ñeembucú flows towards the River Paraguay in the north and the River Hondo in the south, turning the area into a vast wetland surrounded by rivers. The drainage improvement project mentioned above is currently being carried out for the River Hondo, while in future drainage improvement is also to be undertaken in the area in line with the DERMASUR. Large-scale farmers in the area use the majority of their farmland for extensive pasturing of beef cattle. Small-scale farmers use their meagre holdings of arable land to produce cotton and maize, as well as self-sufficiency crops such as cassava and poroto.

(4) Details of the project

a) Bodies responsible for the project:

Overall responsibility: Department of General Planning, MAG

Implementing body: organization for the efficient use of land ("public mediation agency") centred in the Ministry of Agriculture and Livestock

b) Purpose of the project

(a) Outline of the project

Given the flat topography of this area and the fact that rivers with abundant water volumes flow nearby, this area will be ideal for cultivating paddy rice if the state of its drainage can be improved. Thus, cultivating paddy rice according to the following procedures in this area will contribute to the acquisition of foreign currency, improved incomes for small-scale farmers, and the economic growth of the region.

If mechanized paddy rice cultivation is undertaken without land consolidation, revenues are poor. Thus, we will lease consolidated land from large-scale farmers who use it as natural grassland or pasture land (specifically, segments of 200 hectares each are envisaged) and will loan them out to comités of small-scale farmers who express a wish to farm them (about 10 farmers envisaged). For this purpose, a public mediation agency will be formed around the Ministry of Agriculture and Livestock and a project for the efficient use of farmland will be carried out.

The public mediation agency will make advance payments of compensation equivalent to 5 years' of land rent in order to effect long-term stable land lease from large landowners, and will guarantee land rights. This land will then be developed to facilitate the cultivation of paddy rice, before being loaned out to growers' organizations of small-scale farmers. The latter will be able to loan farm management funds and machinery from the public mediation agency, to which they will make annual repayments of funds and land rent. Contract terms will be set at 5 years, with renewal possible through agreement between landowner and tenant, coordinated by the public mediation agency.

In addition, small-scale farmers will use small trucks to travel to the fields from their own homes.

(b) Profile of the project

① Designation of efficient land use areas

Areas that have access to national routes or trunk farm roads, and in which extensive land use is practiced, will be designated as areas for efficient land use, taking account of soil, hydrology, and other natural conditions.

② Adjustment of land rights and land use

Landowners who agree to lease their land, the public mediation agency, and growers' organizations wishing to farm the land will together in selecting land for efficient land use, carrying out surveys for boundary demarcation, adjusting land rights, and drawing up land lease contracts.

③ Paddy field development

The land leased from large-scale farmers will be developed to facilitate the cultivation of paddy rice, as shown in Figure 8.3.6.1. Meanwhile, since the water requirement during the irrigation season will probably not be met by natural

resources alone, a reservoir for irrigation (envisaged at around 5 x 5 x 3 metres) will be dug near the development site, pumping facilities will be installed, and water will be thus supplied for irrigation when needed. At the same time, since at present there is no farm road allowing access for machinery or the transportation of harvested produce even if paddy rice is cultivated, an access road running from the fields to national highways (or roads for drainage channel management) will be laid.

④ Construction of facilities

Paddy rice is already being cultivated in Pilar District. However, there are no facilities for dry or otherwise processing the rice, and all of the produce is transported to Misiones Department. Since this is inefficient, drying facilities will be built and fees for use levied from the farmers.

⑤ Guarantee of land rights

As well as making advance payments of compensation equivalent to 5 years' land rent, appropriate procedures will be followed on completion of the contract terms.

⑥ Loans of farm management funds, levies of fees for use, and fund management

Since small-scale farmers are short of farm management funds, such funds will be loaned whenever necessary during the land lease period. The farm management funds will be repaid along with fees for land use, and these funds will be managed.

⑦ Farm management support

Agricultural machinery will be loaned and support given (including farm management guidance, provision of market information, encouragement of the organization of farmers, etc.) to ensure smooth farm management.

(5) Benefits

a) Beneficiary farmers: 100

b) Beneficiary area: 2,000 hectares

(6) Production plan (average per farmer)

Current			Planned		
Agricultural/livestock produce	Area (ha)	Production volume (t)	Agricultural/livestock produce	Area (ha)	Production volume (t)
			Rice (paddy rice)	20.0	96.0
Cattle (2 cows)	1.2	1.3kl	*Cattle (2 cows)	1.2	1.3kl
Cotton	1.3	1.3	*Cotton	1.3	1.3
Maize	0.7	0.6	*Maize	0.6	0.5
Poroto	0.2	0.1	*Poroto	0.2	0.1
Farm produce for home consumption, etc.	1.9		Farm produce for home consumption, etc.	2.0	
			Fallow land	20.0	
Total	5.3		Total	25.3	

Note 1: * shows farm produce to be produced for sale using existing cultivation technology.

Note 2: Details of the production plan are shown in CUADRO A 8.3.6.6.

(7) Farm management plan

Consumption destination and typical farm practice	No. of cultivating farmers	Farmer'd income (Gs 1,000)
For export outside MERCOSUR Rice (paddy rice) + farm produce for home consumption, etc.	100	18,300

Note 1: Items marked * in (6) have been included in "farm produce for home consumption, etc.".
Note 2: Farmer's income shows the total of agricultural and non-agricultural incomes.
Note 3: For details of the farm management plan, see CUADRO A 8.3.6.7.

(8) Total project costs (for details, see CUADRO A 8.3.6.9)
Gs 15,936 million

(9) Project duration: 6 years

(10) Points of note and proposals

① In view of its nature as an affiliation of competent bodies, the public mediation agency should be a mutually collaborative organization that carries out its work fairly and clearly on the basis of collective responsibility.

② The project will be based on the project for the efficient use of farmland (Zone 1; see Figure 8.3.1.1).

③ With a view to supporting small-scale farmers and the development of agriculture in Paraguay, farmers leasing out land shall not set unreasonable land rents. They will need to adopt a cooperative attitude of agreeing to renew contracts as far as possible.

④ Farmers renting land shall manage the farmland well in order to facilitate land conservation and continuous agricultural production.

⑤ In future, a legal framework will need to be set up for the smooth implementation of efficient farmland use. Contract procedures will need to be simplified, tax incentives offered to farmers leasing land, and steps taken to prolong tenancy periods.

⑥ Since this Study has not included any examination of physical conditions (e.g. the soil permeation coefficient), a detailed study will be required when designing drainage channels.

Figure 8.3.6.1 Concept diagram of the paddy field development project