CHAPTER 8 THE ENVIRONMENT ORIENTED AGRICULTURE PROMOTION PLAN

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8.1 THE OUTLINE OF THE PLAN

(1) The Purpose

The Plan will be implemented using the various strategies to activate the regional economy, promoting the environmental conservation though the introduction of adequate measure for the solution of poverty problem. In this plan, the improvement of the living standard will be attained through the introduction of alternative farming practice adequate for each topographical condition.

(2) Strategy for the Improvement

In this plan, it will be made to do the plan to settle the specific problems for each region, using the strategy to introduce the adequate farming practice, analyzing the land erosion, adequate crop and the possibility of the introduction of alternative agriculture. The strategies will be applicated in this plan are as follows;

1. For the cultivated land justified adequate for cultivation, the increase of productivity and improvement of familial economy will be planned, through the application of measure for the soil degradation, such as erosion control works, agricultural practice adequate for the introduction of sustainable agriculture and incentive for the use of organic materials.
2. For the increase of the productivity on the adequate land, the introduction of the sustainable agriculture will be recommended that enable to do continuous development
3. The agricultural practice and erosion control work will be applicated widely, through the extension of technology and installation of model farm, on where shows the importance of these works for the rural farmer.
4. In the land with low potentiality area, the introduction of alternative farming practice will be planned, in order to improve the rural farmer's economy.
5. In the land with the possibility of the introduction of alternative farming, the introduction of alternative farming practice from the traditional farming (Example, intensive farming) or the agricultural practice related with utilization of the natural resources. Through the introduction of theses strategies, the improvement of the living standard in the rural area will be planned.
6. The agroecological center will be installed, in order to extend the knowledge of regional resources and to explore the resources in a adequate form and to give the opportunity to receive the environmental education for the rural resident.
7. In a land with steep sloop, the activities of the forestation will be planned and the environmental conservation will be promoted through the application of other strategies.
8. In the present coffee plantation, in order to promote the continuity of the coffee production, the production of friendly coffee with nature will be promoted of which enable to take opportunity to get more aggregated price of the product.
9. Moreover the implementation of these strategies, the environmental monitoring will be included also.

For the execution of the Plan, necessary actions for the classification of the land for the determination of crop and land erosion factor will be implemented. The objective land for the

plan is the coffee, cacao, annual crop and pasture.

(3) Classification

Taking into the consideration of the basic concept for the formulation of plan "Suitable land for suitable crop", the region were classified into three categories;

1. Suitable land for Agriculture (Classified as Suitable land)
2. Land require the mayor attention for the land conservation(land Sloop from 12 to 35 degree)
3. Land for Conservation (Land with the Sloop more than 35 degree)

1) Suitable land for Agriculture (Land classified as suitable until class 5)

The land suitability was determined into 5 class, basing on the information of Sloop, altitude and soil characteristic. For the each class, necessaries measure was considerate for the improvement and conservation. The measure will be applied for the coffee; cacao, annual crop and pasture are as follows;

Proposed Measure for each class of land

Class	Class characteristic	The coffee cacao area	Annual Crop
Clase1	Best condition	Use of Organic Materials	Use of Organic Materials Introduction of Sustainable Agriculture
Clase2		Use of Organic Materials Introduction of farming practice against erosion	Use of organic materials Introduction of Sustainable Agriculture Introduction of farming practice against erosion Introduction of alternative farming
Clase3	Medium land	Use of Organic Materials Introduction of farming practice against erosion Introduction of erosion control works	Use of Organic Materials Introduction of Sustainable Agriculture Introduction of farming practice against erosion Introduction of Alternative farming
Clase4		Use of Organic Materials Introduction of farming practice against erosion Introduction of erosion control works Introduction of alternative Farming	Use of Organic Materials Introduction of farming practice against erosion Introduction of erosion control works Introduction of Alternative Farming
Clase5	Minimum	Use of Organic Materials Introduction of farming practice against erosion Introduction of erosion control works Introduction of Alternative Farming	Use of Organic Materials Introduction of farming practice against erosion Introduction of erosion control works Introduction of Alternative Farming

The land classified into Class 1, 2 and 3 are that have the possibilities to improve the situation of farming economy of farmer with the increase of productivity's, on where the introduction of strengthening of the production system is recommended, applicating the sustainable agriculture. The land classified into Class 4 and 5 are considered as a low potential area for the improvement of farming economy, because of the reason that require the ground amount of investments, because of the topographic and soil type character. Taking into account the return of the investment to the present farming practice, the feasibility of the return of new investments

very low in a present type of agriculture. In this sense it is not recommended to execute new investment. It s recommended to introduce the other alternative of the farming (Exm.Production of friendly coffee and wood, etc.)

2) Land Require the Mayor Attention for the Land Conservation (Land Sloop from 12 to 35 degree)

From the point of environmental conservation in a Study area, there are cultivated lands that require the mayor attention on where the subsistence type of agriculture is prevailing. Thesce area have an importance paper in a conservation of the basin, especially for the natural disaster. These areas require the mayor attention for the conservation of the natural resources.

In these areas, the farming practice is not adequate to maintain the agricultural activities in a form appropriate. To introduce the measure which enable to increase the productivity's is very difficult, because of the various factors, such as topographies, soil , et. For these reasons, the introduction of alternative farming practice is recommended in order to increase the farming economy. These strategies are the introduction of friendly coffee production that bring the aggregated price in the product, the introduction of alternative farming that not developed in the region, in order to increase the farming economy. To stabilize the farming economy, followings strategies will be applicated;

Crop	Measure
Coffee and Cacao (51,218 ha)	• Recommendation of the production of Ecologically Friendly coffee • Farming Alternative (Vegetable production with irrigation system) • Incentive for the use of existing natural resources • Reforestation for the soil conservation
Annual Crop (22,109 ha)	• Alternative Farming • Promotion of Utilization of Natural Resources • Inceptive for the reforestation for the land conservation
Pasture (2,490 ha)	• Incentive of Reforestation for the Land conservation • Recommendation of Silvipastroril System

3) Land for Conservation (Land with the Sloop more than 35 degree)

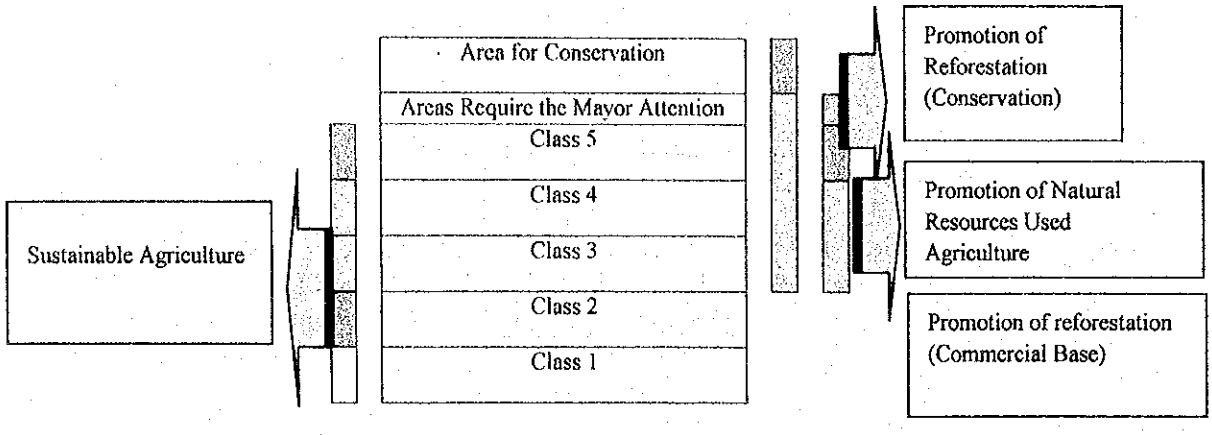
These areas require he measures for the conservation, otherwise the agricultural activities are prevailed. The measure recommended is the reforestation, looking forward to continue the present activities.

Land required the Conservation

Crop	Measure
Coffee	• Maintenance of present situation • Incentive the reforestation for the conservation • Use of Natural Resources
Annual crop	• Reforestation for the Conservation • Introduction of measure to explore he natural resources • Change to Silvipastril
Other area	• Maintenance of present Situation

4) Demarcation of the Region

The strategies will be applicated are as followings.

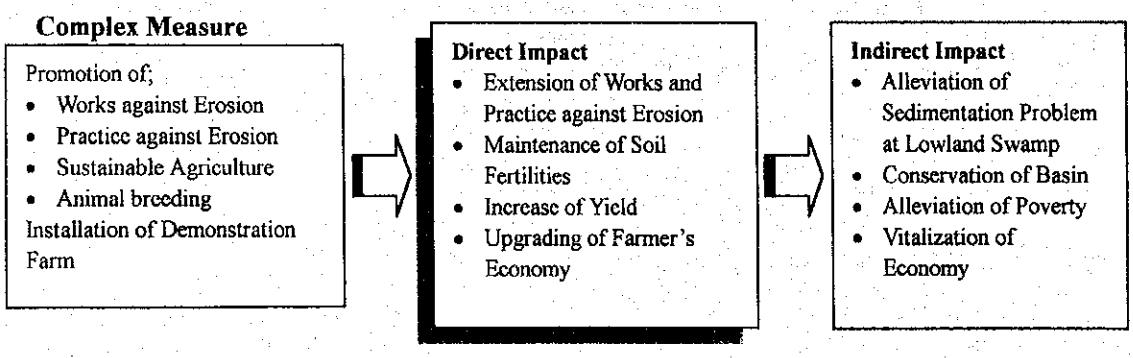


The plan	Objective Areas
Promotion of Sustainable Agriculture	• Land adequate for the agricultural activities • Land required the continuities of the Activities, otherwise classified as no Adequate
Promotion of Alternative Farming, using potentiality of Natural Resources	• Land with difficulty to continue the agricultural production
Promotion of Forest Resources	• Land for Agriculture in a low Adequability • Land declassified as Agricultural Land • Area require the Mayor Attention of Conservation • Area for conservation

8.2 PROMOTION OF SUSTAINABLE

This strategy will be implemented principally for the land classified as a suitable land for agricultural activities where require the specific measure for the improvement of the degradation of soil fertilities, in a sense of the introduction of stable and sustainable agriculture. As for the measure for the improvement of soil fertilities, works and practice against erosion will be implemented, moreover the introduction of sustainable agriculture. In order to obtain the mayor results, in an extended form, the demonstration farm will be installed, on where shows the adequate practice and metrology against erosion in a farm level.

Moreover in these measures, promotion of animal breeding will be introduced, in order to facilitate the production of organic material, parerally to improve the farmer's economy. The materials like as estrercol and residual will be used for the organic materials production.



With these measures introduced for the works and practices against Erosion, the fertilities of the soil will be improved and productivity's will be increased. Through this measure, the improvement of farmers economy will be accomplished.

With respect to the coffee plantation, the productiveness will be improved from 8Qq/ha to minimum double productivity's, with the promotion of organic materials use and introduction of Erosion control works and practice, together with the diversification of the production system.
For other crop, the strategies of the improvement of soil fertilities will be implemented to improve the farmer's economy.

The Erosion control works will be applicated for the area with high risk of erosion and economically feasible area of the investments. The Farming practice against erosion will be introduced for the low risk of erosion. The Sustainable agriculture and animal breeding promotion will be implemented for the whole area of production activities.
The objective products are the coffee, cacao and corn. For other crop, the measure will be executed gradually.

8.2.1 Erosion Control Works (Terrazzo and others)

(1) Alternatives

The works will be implemented in a moderately risky area of erosion. The proposed alternatives are as follows;

1. Terrace
2. Reception Canal
3. Deviation Canal
4. Lawned Canal

These works will be implemented, considering the topographic factor for each farm for avoids the erosion. The credit line will be allocated in order to promote the installation of necessaries works. The objective crop for this measure is the coffee, cacao and annual crop.

In a land for annual crop, he credit line designated for the lawned canal, natural fence and plantation of tree will be promoted. For the coffee and cacao plantation area, the credit line will be designated for the introduction of works against erosion.

(2) Objective Area for the Implementation

The area designated for this plan are the annual crop land classified as a Class 3, 4 and 5 with Sloop between 3 to 12 degree and the coffee plantation area with land classification 3 to 5.

Objective Areas for the Erosion Control Works

Crop	Class	Condition	Area (ha)
Annual Crop	Class 3	Land Sloop 6-12 degrees	3,692
	Class 3	Land Sloop 3-6 degree	3,852
	Class 4	Land Sloop 6-12 degree	983
	Class 4	Land Sloop 3-6 degree	5,144
	Class 5	Land Sloop 6-12 degree	7,385
Subtotal			21,056
Coffee	Class 3	Sloop 6-12 degree/Altitude800m>	5,066
	Class 4	Sloop 6-12 degree/Altitude800m>	1,144
	Class 5	Sloop 6-12 degree/Altitude800m>	376
Subtotal			6,586
Cacao	Class 3	Sloop 6-12 degree	2
	Class 4	Sloop 6-12 degree	67
	Class 5	Sloop 6-12 degree	905
Subtotal			974
Total			28,616

Objective areas are shown in the Fig 8.2.1.

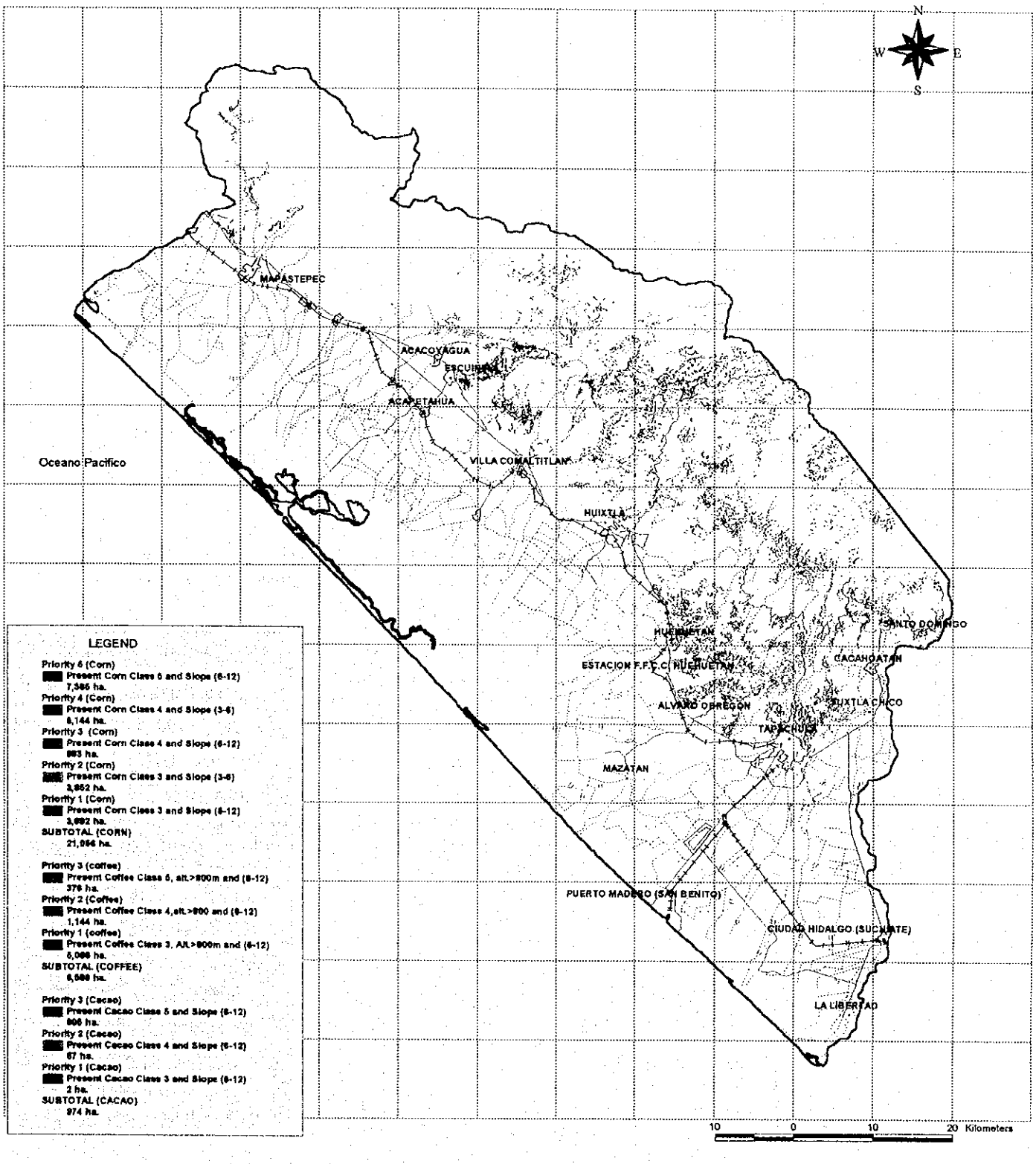


Fig. 8.2.1 Objective Areas for the Introduction of Erosion Control Works

8.2.2 Promotion of Farming Practice against Erosion

In this plan, the farming practice against the erosion will be introduced, through the creation of credit line for the investment of erosion control practice in the land of coffee and corn. En the case of coffee plantation, the line of credit will be limited for only the farm located higher than 400m.

(1) Alternatives for Crops

1) Coffee

Taking into account that the coffee plantation is prevailing in the steep land, the use of farming practice against erosion is very important. Following practice will be promoted.

1. Cultivation in Counter
2. Introduction of Shedding Tree
3. Pasture cutting
4. Establishment of Vegetation Fence

The recommendation of these farming practice will be done for the land classified as class 2. The cost for the replenishment of coffee tree and erosion control works will be financed.
The introduction of promotion of the shedding tree use/reforestation wee proposed to prevent the erosion, not only the use of shedding function.

Regarding to the shedding tree, the reforestation with useful tree as Inga tree with coffee plants will be recommended, in order to improve the economy of the coffee plantation. Dowering the implementation of this plan, the reforestation cost will be financed..
One of the practice aplicated in a coffee plantation, is the cut down of the pasture for the cultivation of coffee that substitutes by the use of herbicide. In order to reduce the use of herbicide, the cost for the cutting down of the pasture will be financed.
Also, the plan will be financed for the plantation of tree with objective to promote the utilization of vegetation fence.

2) Annual Crop

The land cultivated for the annual crop are very sensible for the erosion, more than coffee plantation, requiring the mayor attention. During the implementation of the plan, existing farming practice against erosion will be promoted.

1. Rotation
2. Use of Product Residual
3. Contour Plantation Practice
4. Minimum Tillage
5. Introduction of Cover Crop
6. Establishment of Vegetable Fence
7. Citrus Cultivation

The introduction of these farming practice will be required for whole area. The details of the plan are as follows;

The rotation of crop does not implicate the development of the maize, and also the minor cultivation, of witch interface the increase of soil quality. Considering the introduction of new varieties require the additional cost, will b financed for the implementation of these practice.

The use of the harvested residual is the practice of cultivation on where cover by the residual for the soil surface protection. Considering the importance of this practice for the erosion control, the required cost will be financed.

One of the practices proposed is the establishment of counter plantation for the erosion control, according to the contour. For the promotion of this practice, the cost for the contour construction hat cover the machinaries and labor cost will be financed
The minimum tillage practice is one of the high feasible agricultural practices developed and very important in an erosion control, otherwise the first years productivity will be reduced. For the introduction of this practice require the labor force and basic equipment, the annual cost will be financed until the productivity will recover or stabilize. Also the necessary cost for the introduction of covering crop will be financed.

Considering the Institute likes as INIFAP and IMPTA has studies regarding to this practice, in an implementation of these strategies, the cooperation of these institutions will be requested.
The use of vegetation fence will be proposed to establish in the interval of the farm in order to reduce the erosion. The cost for the establishment will be financed. Also, the plantation of citrus plant will be recommended.

(2) Objective Area for the Implementation of Alternative Farming Practice

The area implemented by this plan is the area for the coffee, cacao and annual cropland.

Objective Area for the Introduction of Farming Practice against Erosion

Crop	Class	Condition	Area (ha)
Coffee	Class 2	Sloop 3-6 degree/Altitude 400m>	437
	Class 3	Sloop 3-12 degree/Altitude 400m>	12,185
	Class 4	Sloop 3-12 degree/Altitude 400m>	2,652
	Class 5	Sloop 3-12 degree/Altitude 400m>	8,871
Subtotal			
Cacao	Class 2	Sloop 3-6 degree	-
	Class 3	Sloop 3-12 degree	257
	Class 4	Sloop 3-12 degree	769
	Class 5	Sloop 3-12 degree	905
Subtotal			
Annual Crop	Class 3	Sloop 3-12 degree	7,544
	Class 4	Sloop 6-12 degree	6,127
	Class 5	Sloop 6-12 degree	7,385
Subtotal			
Total			

The object area is as shown in figure 8.2.2.

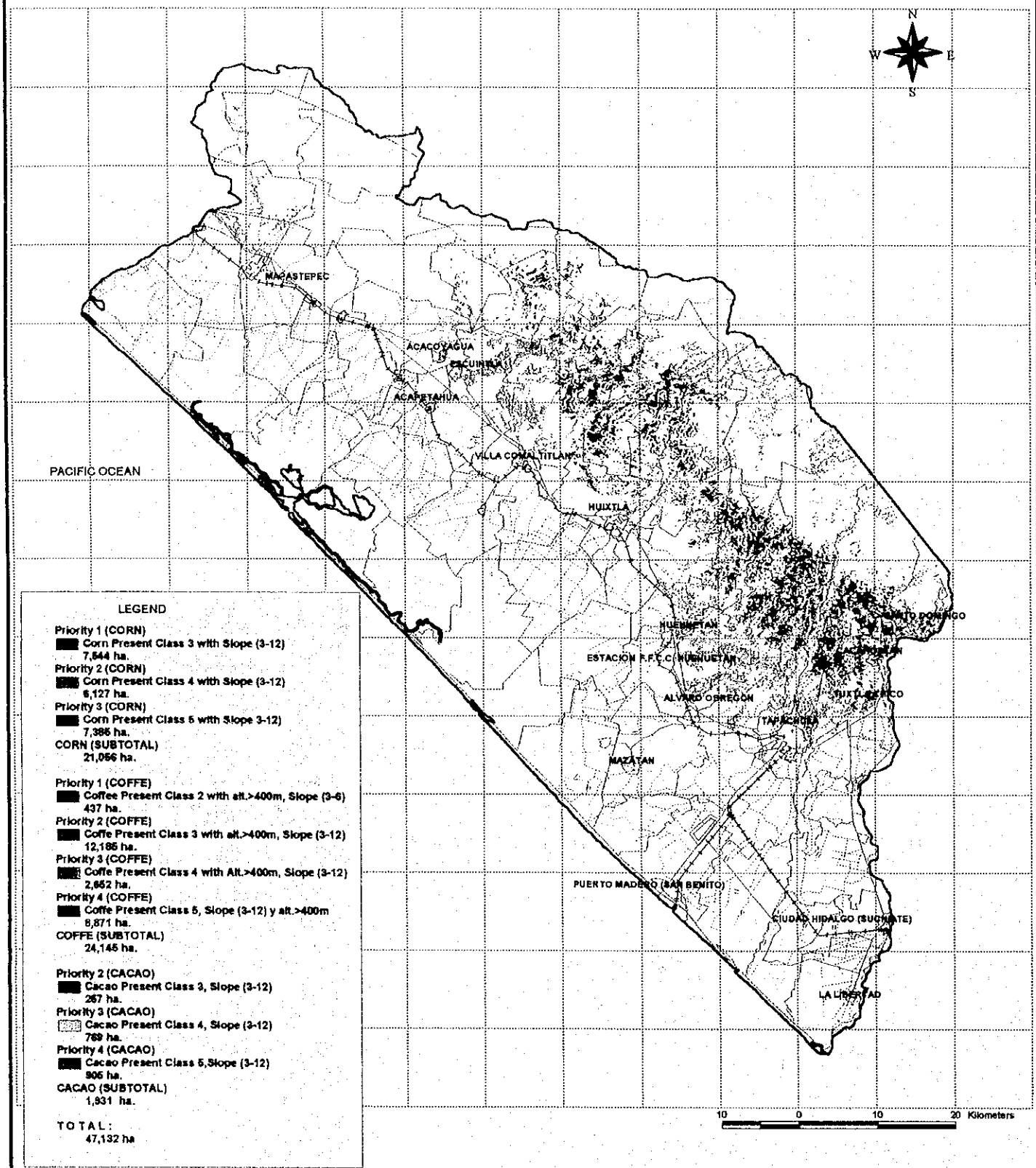


Fig. .8.2..2 Objective Area for the Introduction of Farming Practice against Erosion

8.2.3 Introduction of Sustainable Agriculture

The introduction of the sustainable agriculture is an important factor to enable the maintenance of soil fertility. The soil of the region is degrading because of the continuous use. In order to avoid the deterioration of the soil fertility, the use of organic material is necessary, moreover the introduction of leguminous plant. Followings practice will be promoted.

(1) Alternatives for the Introduction of Sustainable Agriculture

The basic concept for the introduction of sustainable agriculture is to improve the soil fertility deteriorated for the improvement of productivity, through the introduction of followings practice.

1. Introduction of Leguminous Plant
2. Green Fertilizer
3. Use of Organic Material

For the introduction of the leguminous plants, the promotion of the "El Frijol de Aono" called Nescafe and the mixture practice farming for the soil fertility improvement will be carried out. The green fertilizer consists of the consociated farming practice with the maize production and leguminous plant to strength the soil fertility. The leguminous plant will be used as organic materials incorporated to the soil.

The promotion of the organic materials consists in that the farm use the organic materials for the increment of organic materials.

In this plan, the credit line will be prepared to finance to the rural farmers, such as acquisition of machinaries and seed.

(2) Objectives Areas for the Implementation of the Sustainable Agriculture

The objectives area for this plan are the cultivated land for the annual crop with comparatively high potential area.

Objective Area for the Implementation of Sustainable Agriculture

Crop	Priority	Class	Condition	Area (ha)
Annual Crop	Priority 1	Class 1	The whole area	61,713
	Priority 2	Class 2	The whole area	20,164
	Priority 3	Class 3	Sloop 0-3 degree	29,990
Total				111,867

The object area is as shown in figure 8.2.3.

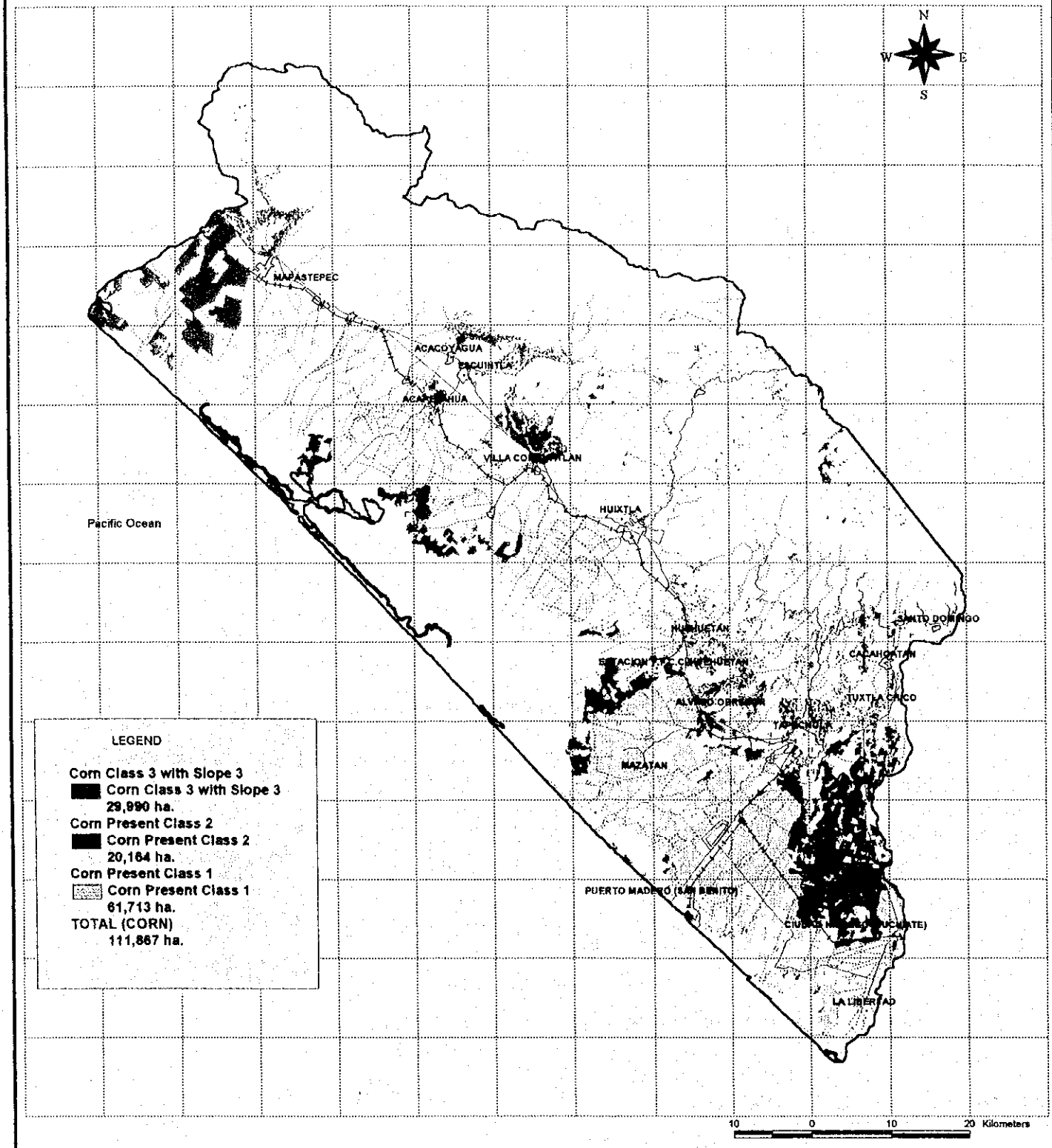


Fig. 8.2.3 Objective Area for the Introduction of the Sustainable Agriculture

8.2.4 Demonstration Farm for the Sustainable Agriculture

(1) Alternative for the Demonstration Farm

The installation of the demonstration farm that has an objective to demonstrate the sustainable agricultural system and the implementation practice of the farming practice against erosion, is an important to expand this knowledge in the risky zone. In case that the sustainable agriculture is not introduced, the rural society will be permanated in the same situation of poverty, with low productivity.

The installation of the demonstration farm will be carried out with the participation of local farmers. Adequate area for the demonstration farm is that facilitates the implementation of necessary farming practice. Otherwise that the main activities in the region are the coffee and maize, in the demonstration farm, only for the maize , will be applicated, because of he maize cultivation is more sensitive than coffee cultivation in erosion, requiring more attention.
The practices that will be applicated in the demonstration farm are as follows;

1. To install the receptor canal with outlet lawned with vegetation
2. To install the Vegetation Fence beside the receptor canal
3. As for the farming practice, to utilize the minimum tillage
4. With the adequate space, to install the vegetation fence
5. To plant tree

Using this practice in a farm level, the demonstration for the rural farmers will be carried out, together with the realization of investigation of farming practice against erosion.

Considering the characteristics of he demonstration farm, the necessary installation will be done by the public sectors investment. Moreover, in this installation, the necessaries agricultural equipment for the introduction of farming practice against the erosion wills de provided. The participation of the rural farmer consists of the provision of labor force and farm, moreover receiving the frequent visitor for the demonstration farm.

The demonstration farm will be installed at the site that have an easy accessibly o the site for the visitor.

(2) Selection of Model Area

The main function of the demonstration farm is he introduction of farming practice against erosion. The selection of the site for the establishment of demonstration farm will be satisfies the following requisite.

1. To exist the erosion area near the site
2. To exist the potentiality to increase the productivity from the soil characteristic
3. No exist other alternative to introduce
4. Easy accessibility for rural community
5. Easy accessibility for the vicinal community

8.2.5 Promotion of Animal Breeding for the Production of Organic Materials

(1) Alternative

The use of organic material is the important factor to maintain the soil fertility. In this plan, the production of organic material will be promoted trough utilizing the followings actions.

1 Promotion of small animal breeding
2. Promotion of the Organic Materials Production, using the product residuals

The recommended dimension for the small animal breeding are that the volume requires for farmers for the incorporation of organic materials in his field. In this plan, the adquision of one breeding animal as a first step and the construction of required installation will be financed.

Parent pig	One
Installation	10m2
Organic materials production facilities	One

For the promotion of the animal breeding that enable to produce the organic material, the acquisition cost and the construction cost will be financed.
The production of the organic materials will be implemented in the form together with the promotion of animal breeding. Moreover the residuals of the product will be used for the compost. The element will be used are as follows.

Organic Residual	Coffee, Maize, Pasture
Living Residual	Kitchen garbage
Animal shit	Animal shit urine

The organic materials will be produced mixing the before mentioned materials. Through the anaerobic procedure with the incorporation of phosphoric acids that enable to produce high quality organic materials.

As for the form to produce the organic compost, there are two types, excavated and molded with roof. Considering the characteristics of the climatic condition, will be recommended the type with roof for the production of organic compost.

(2) Application Are of the Plan

The area desired to implement of this plan are where is adequate to produce the crop. The objective area is shown in the table;

Crop	Objective Area	Estimated Number of Farmer
Coffee	33,452	2,884
Cacao	8,668	747
Annual Crop	132,923	11,459
Mango	20,685	1,783
Banana	15,518	1,338
African Palm	4,645	400
Total	215,891	18,611

(Note ; The estimated farmhouse number is farmhouse average area It computes from the ha).

The object area is the area that is shown in figure 8.2.5.

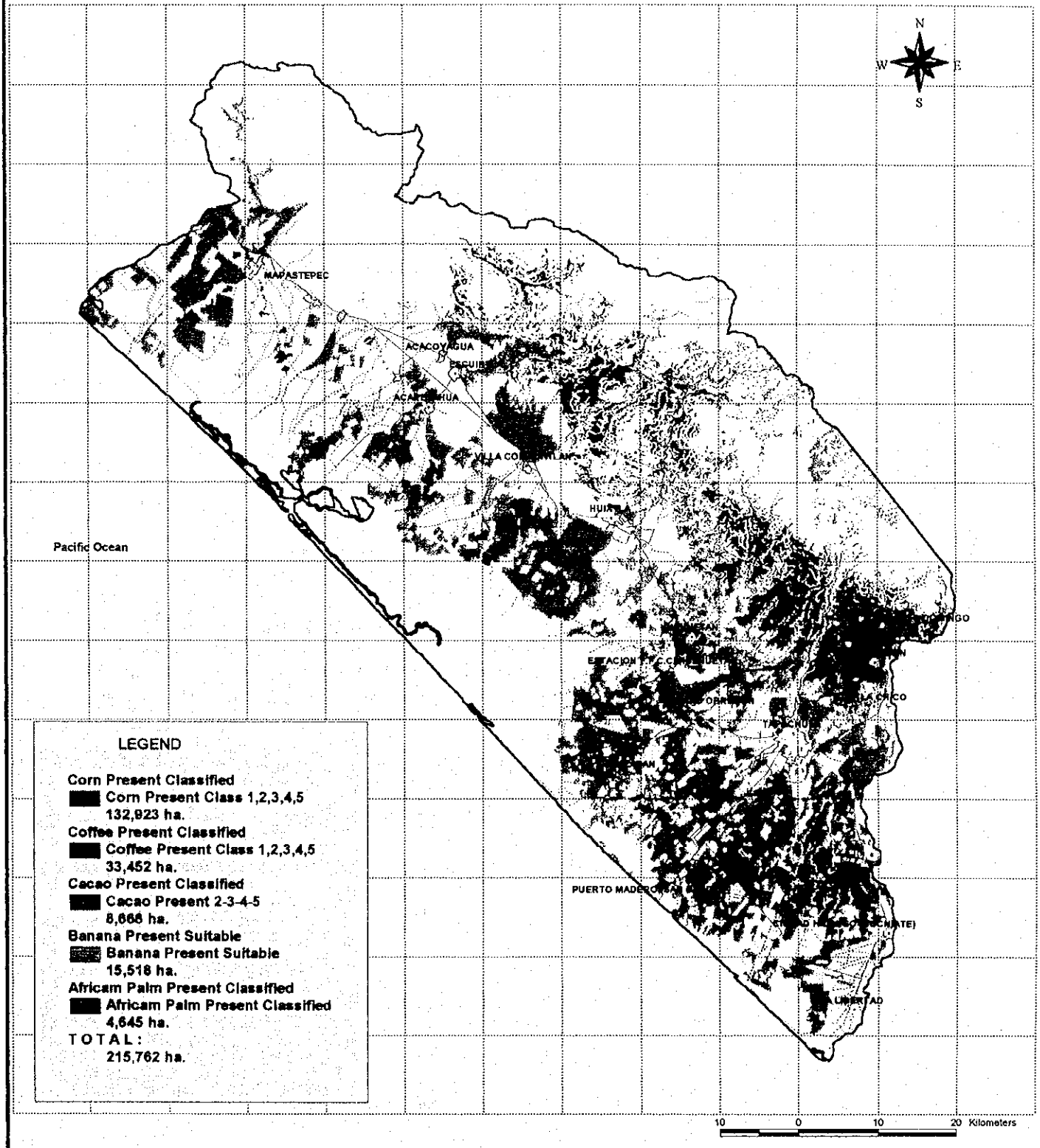


Fig. 8.2.4 Objective Area for the Promotion of Organic Compost

8.3 PROMOTION OF AGRICULTURAL PRACTICE UTILIZED NATURAL RESOURCES

This Plan tries to utilize the natural resources in form adequate for the activities of the rural farmers. This region is isolated geographically on where lives great number of persons in low income. The present situation of the farming practice is not adequate for the type of geography and soil characteristics, resulting the new investment in these regions are not feasible in a present farming. For the prevention as to continue e diminution of the cultivated area, the conversion of the present farming to alliterative farming is required, that enables to utilize the natural resources in a form adequate.

The Plan absolves the area that require the mayor attention and ecological preservation area. Proposed measures are as follows;

1. Multiplication of the fishery's resources utilizing the swamp area
2. Introduction of alternative farming in the part require the mayor attention
3. Utilization of natural conditions for the introduction of animal breeding
4. Promotion of Environmental Education and information for the rural resident

8.3.1 Swamp Area (Use of fishery's resources)

(1) Alternatives

The Plan has an objective to increase fishery's resources in the swamp area. In the Study area, the area of 26,000 ha mangular forest exist and 45,000 ha of swamp area,. In these. area the 90,000ha of reserved area exist. The industrial activities should be controlled in this area and no carry out the agricultural activities, resolving the problems. For this purpose, followings activities will be required.

1 Improvement of living standard trough the increase of fishery's resources
2 Introduction of alternative practice for the improvement
3 Improvement of rural economy, using the resources existing.

1) Improvement of living standard trough the Fish Nursery

In the swamp area, exist 4 system of lagoon, occupying 43,000 ha, without explored in an adequate form. With the increase of the number of fisherman, the degradation of fishery's resources was initiated, giving the importance of the maintenance of these resources. The lagoon system are as followings;

Lagoon System

Lagoon System	Name of Lake	Municipality	Area (ha)
Barrita de Pajon	Estero el Castano Estero San Nicolas Estero Salitral Estero Pampa Honda	Mapastepec	350
Chantuto ? Panzacola	Laguna Chantuto Laguna El Campon Laguna Teculapa Laguna Los Cerritos Laguna Panzacola	Mapastepec Acapetahua	3,550
Region del Hueyate	Estero Hueyate Estero Barra de San Jose Pampa La cantilena Pampa el Cabe	Huixtla Mazatán	38,850
Sistema del Sureste o Cabildos Pozuelos	Laguna el Cabildo Laguna Pampa del Morillo Barra de Cahuacan	Tapachula Suchiate	650
TOTAL			43,400

In this Plan, as a strategy for to maintain and to utilize the fishery's resources in theses lagoon system, the fish center and discharge facilities will be constructed. The objective species of the fish are as follows;

The general name	The scientific name
Camaron blanco, cafe, rojo, azul	*Penaeus vannamei, californiensis, brevirostris, stylirostris*
Lenguado	*Achirus mazatlanus*
Cuatro ojos	*Anableps dowi*
Bagre	*Arius coerulescens*
Pejelagarto	*Atractosteus tropicus*
Jurel	*Caranx hippos*
Mojarra criolla, camiche	*Cichlasoma macracanthum, trimaculatum*
Sambuco	*Dormitator latifrons*
Cabrilla	*Epinephelus punctata*
Guavina	*Gobiomorus maculatus*
Pejerrico	*Gobionellus microdon*
Popoyote	*Melaniris guatemalensis*
Gurrubata	*Menticirrhus elongatus*
Macarela	*Scomber japonicus*
Agujon	*Strongylura marina*

This plan will be established following installation.

1. Fish center
2. Discharge Facility

The Fish center will be established on where the accessibility is good.

2) Improvement of Living standard by the Introduction of Alternative Farming

Moreover the conservation of fishery's resources, as a measure for the reserved area, followings alternative faring will be promoted.

a Tropical Flower Cultivation

The installation required for the promotion of this action is that for the faring and for the commercialization. The nurse center will not be installed, because is recommended to buy from the market. The farmer will participate, cultivating individual, but commercializing in a collective form.

The plantation area will be selected on where exist the water resources. In a farm, the irrigation system will be installed and to use the organic compost. Marketing center will be installed in the objective to commercialize, and packing, wit followings installation.

i. Cleaning Space
ii. Packing Equipment
iii. Warehouse

3) Breeding of the Native Animals

The animals existing in a region are reptile as Lagarto Negro, Iguana, Casquito and mamifero. The resident commercializes the Iguan and Casquito for the local consume, resulting the decrease of the species. There are high risk of extinguish, if does no take the adequate measure. The important espies for the increase of number are as follows;

1 Iguana Verde(Iguana Iguana)
2 Casquito (Kinosterun cruentatum)

Considering the importance of the breeding of animals, the similar action is carrying out by the related institution with the participation of resident. The strategy utilized for the promotion is the construction of installation for the breeding, technical assistance and the participation of the resident is to breed. This program shows the significant impact for the rural resident. Otherwise, because of the lack of capital, the auctioneer not expanded. The strategy utilized in this plan is as follows;

1. Motivation of the rural resident for the activities and Social Study
2 Construction of the breeding Facilities
3. Technical assistance for the participant
4. Devolution of Animal (50% of breeding)

For the promotion of the activities, following facilities will be constructed.

1. Installation for Breeding
2. Installation of Orchard for the breeding

(2) Objective Area

The objective communities are shown in the table;

Communities will be benefited by the Fishery's resources improvement

Municipality	Community Name
Acapetahua, Huixtla, Mapastepec, Mazatán Vila Comaltitlan	Sanjose Aguajal, Axtlan, Brisa de Huayaste, Pampa Onda, Barrita de Pajon, Solo Dios, Benito Juarez, Vicente Guerrero, Barra San Simon, Pachtalito, Vadenia (11 villages)

Objectives communities for the Introduction of Alternative Agriculture

Municipality	Community
Acapetahua, Huixtla, Mapastepec, Vila Comaltitlan	Las Lauras, Las Murallas, Embarcadero rio Apri, Embarcadero las Garzas, Cahulotal, La Liliana (6 villages)

8.3.2 Area required the mayor attention (Introduction of Intensive Agriculture Utilized Irrigation System)

Near the 20%of the cultivated land are located in the steep land with more than 12 degree. The productive capacity of theses area are very low and enpovered because of geographic factor. For the improvement of the agricultural action in these areas, the change of the farming practice is necessary to covert the intensive type of agriculture, using the favorite natural condition. In this area, the introduction of intensive agriculture in a small scale with the irrigation system is recommended. As measure for the introduction of this plan, in a first as a public investment, and after by the credit line, increasing the private sectors interest. For the implementation of he action following action are required.

1 Use of Irrigation System in a small scale for the cultivation of vegetable
2 Hornamentary Plant in a small scale
3 Cultivation of Tropical Follower

(1) Alternatives

1) Utilization of Irrigation System in a Small Scale for the Cultivation of Vegetable

The plan has an objective to formulate the base for the cultivation of vegetables, through the small-scale irrigation using the existing small rivers. Because of the difficulty of the agricultural practice, the cultivation of vegetable will be recommended. The recommendable site is as follows;

i. Highland area on where is difficult to continue the existing farming practice
ii. The site with easy to take water
iii. The site comparatively flat
iv. The site with easy accessibility

As the measure for the introduction of this plan, specialized product for each community will be planned. The objective variety is as follows;

Objective Crop	Cucumber (Chamote) etc..

The intake works will be installed in a small river, using the reservoir system for the distribution of water resources. The intake works will be constructed in a collective or individual, depending on a topographic factor. The irrigation method that applycate is sprinkler type.

2) Ornamental Plant Cultivation

The Plan try to use the grate number of ornament plants for the activation of the region. The ornament plants resources in this region include the pteridofitas, palm, begonia, orquid etc. The price of these plants are expensive, otherwise the culture of these varieties are not developed. However, because the weather condition and the water resource situation are good condition to cultivate an ornament plant, by utilizing this good condition, they make attempt to avoid from farming practice in the past the main constituent of which was coffee and maize.
Because the cultivation in this region is a level of the cultivation in the yard, it is necessary for it to improve the level, which can become an industry activity.

As for this plan, it promotes the following activities in the purpose to promote ornamental plants cultivation in the region, which is judged to be a preservation objective area, and preservation required area.

a. Construction of the facilities for the Ornamental Plants
b. Technical Assistance for the Cultivation of Ornamental Plants

a. Construction of the facilities for the Ornamental Plants

As for the facilities required for the ornamental plants, the nursery facilities, the cultivation land, the facilities for the sale will be installed. To facilitate the production of the ornamental plants, the nusurly will be constructed for each community in order to provide for the farmer. The cultivation of plants will be carried out by the rural farmers, using theirs field. The commercialization will be made by collective form.

The dimension of the community nursery is the approximately 3 m2 for each participant, with the irrigation system. The water resources will be taken from the small river. The facilities of the nursery center are as follows;

i. Roof for the Plants
ii. Irrigation System
iii. Warehouse

The individual farmer will make the cultivation of the plants, after the stabilization of plant condition. Each farmer, taking into the consideration of feasibility to take water for irrigation will determine the proposed site of cultivation field. Furthermore, for the purpose of the production of organic compost, using the residual of harvest material and others, the installation of compost will be made.

The collective acopilation center will be constructed for each community, in the purpose of cleaning, packing and loading, containing the following facilities;

i. Cleaning place
ii. Packing house
iii. Warehouse and Deposit

b. Technical Assistance for the Cultivation

Because technical assistance is already accomplished in the base of the aid with the Triunfo environment protection team, this system will be utilized in this Plan. As for this plan, the strengthens of these institution will be planned.

(2) Objective Area

The objective area for this plan is that exists the difficulty of the maintenance of the present activities, and the conservation of these areas is very important for the conservation of the basin. The objective area is as follows;

Objective Area

Crop	Priority	Class	Condition	Area (ha)
Coffee	Priority 1	Not Adequate	Altitude>800m	27,552
Annual Crop	Priority 2	Not Adequate	Altitude>800m	15,548
	Priority 3	Class 5	Altitude>800m	1,500
	Priority 4	Clase4	Altitude>800m	728
The total				45,328

The object village is as the following.

Municipality	Communities
Acacoyagua	Las Golondrinas
Cacahuatán	2 villages such as El Progreso, El Platanar, Alpujarras, Guatimoc, Agua Caliente, Toquian y las Nubes
Escuintla	23 villages such as Rincon Veracruz, Llano Grande, Hoja Blanca, San Juan Panama, Nueva Morelia
Huixtla	Jose Ma. 11 villages such as Morelos y Pavon, Santa Rita Coronado, Nueva America, Brasil
Mapastepec	El Ayotal, Las Palmas
Bremen	The village of 68 of Villa Hermosa II, Pinabete (Pino-Abeto), Llano Grande, Niquivil, Francisco and so on
Tapachula	Chespal Nuevo, 26 37 villages such as de Octubre, El Naranjo, Manacal, Cantonsinai, Toquian Grande
Tuzantán	San Cristobal, Germania, Santa Fe, Buena Vista, El Paraiso, Lubeca
Santo Domingo	13 villages such as Cordova Matazanos, San Rafael, Eureka, El Desengaño, Talquian
183 villages	

(Note ; The object area is the village equal to or more than 800-m token amount, population from 100) to (1000).

An object area is shown in figure 8.3.1.

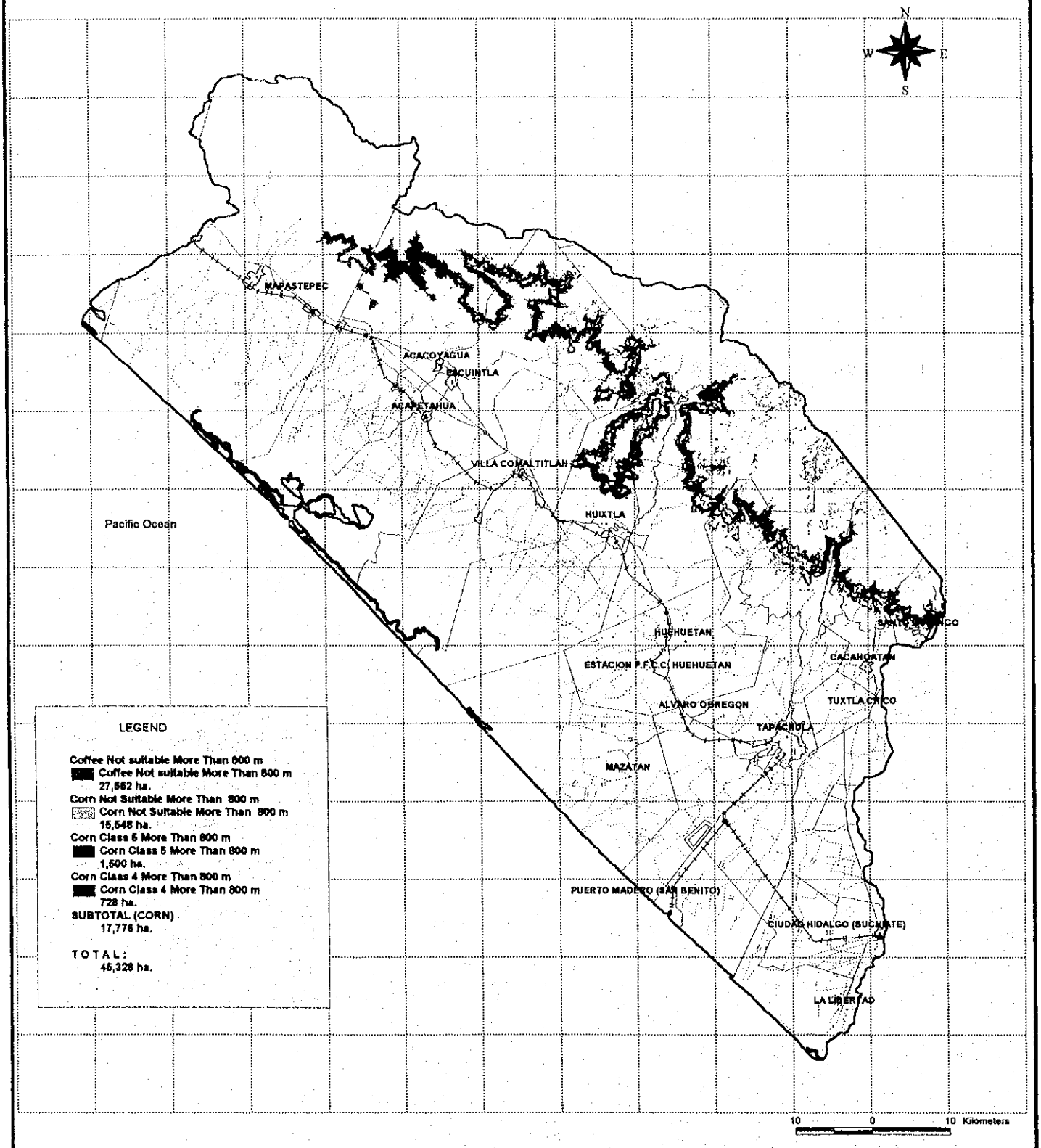


Fig. 8.3.1 Objective Areas for the Introduction of the Alternative Farming

8.3.3 Utilization of Natural Resources through the Promotion of Environmental Education

In spite of having rich natural resources, lacking the adequate strategies to develop the possibilities of the resources development for the improvement of the living standard of the inhabitants, the rural farmers remain in a situation of poverty. To promote an efficient utilization, is necessary to involve to the rural communities, moreover the sufficient and appropriate information of the natural resources in order to conserve the resources. To provide the knowledge about the natural resources to the resident of the region, is required to take following actions.

1. Environment education
2. Establishment of the agricultural environment center

The environmental education will be directed to the themes regarding to the environmental items and the natural resources, through the participation of the relative institutions that encourage of regional educational activities. The Ecological center will permit the exchange of opinions about the natural resources between the investigator and communities.

(1) Environment education

The implementation of the Environmental education will be carried out through entrusts type through the related institution. In this Plan, will be providing only species for the educational activities.

(2) Environment agriculture center

1) Alternative

The environment agriculture center does the following activity to give the knowledge of rich natural resources. The objectives of the Center are as follows;

1. Extension of Technology for the Sustainable Agriculture
2. Development Center for the Study of Natural Resources in the Soconusco Region
3. Space for the Environmental Education Activities
4. Conservation of Natural Resources in the Soconusco Region
5. Space for the exchange of opinions between investigator and rural resident

The extension of the sustainable agricultural practice will be made through the demonstration farms.

In a center following installations will be constructed.

a Demonstration farm for the Sustainable Agriculture (5ha)
b Botanic Park for the conservation of flora (1ha) and Green House
c. Irrigated field for the production
d. Edification for the Environmental Education
e. Cold cabin for the preservation of flora
f. Dormitories
g. Recreate center

a. Demonstration farm for the Sustainable Agriculture (5ha)

In a purpose of to demonstrate the sustainable agricultural farming for the rural farmers, through the cooperation of different institutions, the demonstration field will be established. This field has an objective to hear the opinions of the different kinds of investigator about to the sustainable agriculture, purposing to find the adequate alternatives in a sustainable agriculture and applicate the opinions in a field. For the field, the agricultural equipment and machinaries will be provided for the facile administration of the field. Also, the production facilities of the organic compost will be constructed.

b. Botanic Park for the Conservation of Flora (1ha) and Green House

For the demonstration of the conservation practice of the flora and to give knowledge to the rural resident, the botanic park will be installed. The flora of the Soconusco region is in rich in the diversity in a Mexico. However, until not, the studies for the flora in Soconusco region does not exist or not sufficient.

The vegetable resources to deal with display the orchid kind, the pteridophyte, the palm kind, the ivy kind which exists in the Soconusco area and so on in the collection and the distribution makes understand. It is well equipped with the irrigation facilities and the agricultural equipment that it is possible to do the management where the vegetable yard is enough to do.

c. Irrigated Field for the Production

In the purpose to introduce farming practice, which aimed to utilize resources, it establishes fields with the irrigation facilities. Here, it makes the place, which displays tropical flower and practice of vegetable cultivation as the means of the integrated agriculture, which used small-scale irrigation. Also, it sells and it allots this production one to the maintenance expense of the facilities.

In each, as 1 hectare, the source of water of irrigation provides small-scale reservoir and it, the field area taking water in the weight. It plans for the water pressure with watering irrigation which the pipe route conduction of waters from the source of water and it can be made of field to be able to be secured.

d. Edification for the Environmental Education

These facilities will be utilized, depending on the necessities of the each institution. In a purpose f the facile utilization of the facilities, the establishment of he administrative organization will be made.

It provides the following facilities with these facilities to be able to be able to do enough environment education.

i. The attendance room (About 2 50m, 4 rooms)
ii. The computer/audio room (About 2 50m)
iii. The data and book room (About 2 100m)
iv. The display room (The plant, the animal, the insect and so on)

At the computer/audio room, it builds a system for the nature in this area to be able to be visually seen. By providing a data bank by the plant, the animal, the insect which exists in this area and so on, the visited person makes be freely seen. It builds a data bank by utilizing and building the existence data of the environment preservation organization, the university, the

study organization and having provide a data from the facility use person and these data building goes. Moreover, it builds the system, as the GIS information in this area can be able to be easily read.

The data and book room decides to service a data about flora and fauna, a data about the sustainable agriculture and the data, which relates to area resources and so on as the data about this area.

It makes a display room the place, which displays the sample of flora and fauna about this area. The data in this one gets the cooperation of this facility utilization person, it collects at any time and goes.

e. Cold Cabin for the Preservation of Flora

It establishes a vegetable resource preservation ridge to preserve a valuable species and to develop an area. There is regarded as being in the vegetable resource investigation in this area vegetable resources which aren't yet known not sufficiently and it makes be managed by the study person who establishes the simple preservation facilities which preserve these vegetable resources and utilizes these facilities.

f. Dormitories

It establishes a staying ridge for this facility utilization person to be able to stay. The staying facility use person provides to the attendance person who relates to the environment education and the study person who studies in this area. It makes the scale of the staying facilities following.

i. The staying room ; 5 rooms
ii. The dining room
iii. The discourse room
iv. The kitchen

g. The Alternating Current Facilities

The general person makes the facilities, which were equipped with the pool and the soccer place to have an interest at these facilities. It collects a use fee and it manages these facilities in the maintenance.

8.3.4 The Resource Preservation by the Environment Monitoring Reinforcement

Otherwise the rich natural resources in this area, if does not take adequate measure, these resources will be extinct. With the adequate measure, moreover the implementation of the various measures, the implementation of the monitoring is a factor important.
Important resources in this area include upland part vegetation, low land part vegetation, water resources and land resources and so on. However, these resources have following problem and to carry forward the development, which was harmonized with the environment in the area, they must solve these problems.

i. Degradation of fertility of soil and impoverishment of the rural farmers by it lowers productivity's,
ii. Exit of activities due to the under income,
iii. Problems sedimentarios in the zones pantanosas and degradation of resources fishery,

iv. Degradation of resources forests and extinction of wild animals,
v. Deterioration of the rural conditions of life due to the deterioration of quality of water, and
vi. Pressures of development by the growth populations.

(1) Alternatives of Monitor

In the Soconusco region, various type of ecological diversity observes, due to its geographical change from coastal area o highland area. The conditions are differing from in each one of them. To be able to obtain a stable development harmonized with production and environmental factor, the monitoring actions are inevitable. In this program will be carried out the following actions:

i. Soil Use change
ii. Problems and erosive of the Upper Basins
iii. Sedimentation Problems in a Swamp Area
iv. Environmental aspect in he swamp area and Fishery's resources
v. Forestation Problems
vi. Contamination of Water
vii. Areas of Reservations

1) Soil Use Changes

To be able to attain a sustainable development harmonized with the development and conservation, is important to establish a system of monitoring to survey the changes of land use, in order to study the adequate use of land. Upon the potentiality of soils, is recommended to up dating in the base of the detailed information, with sufficient analysis, and is recommended to up dating the relative information about to the change of land use. The monitoring actions of the land use are the following:

a. Actualization of Use of Soil
b. Digitalización of the Changes
c. Evaluation of Potentialities where changes exist
d. Comparative studies with Use of Soil and Potential of the Soils
e. Publication of the Results

The methodology of monitoring (proposal) is the following manner:

The annual actualization of land use will be carried out through the additional studies of fields, utilizing the covers created with the system SIG, prepared by the Study as a base to elevate its degree of precision. As a form practice, is suggested that the data of the changes be collected to through of the information that they provide them interested. The data collected will be degitalized, according to the necessity. The SIG of the region will be utilized in the installations equipped with which counts the ECOSUR (Tapachula), updating the information with the participation of a job multidisciplinary.

For the digitalización of theme recollected, digitizing service will be requested the support to ECOSUR, but each one of the institutions will have that digitalizar its own one information that need.

With regard to the evaluation of the potential of each one of the uses agriculture will haven that to improve the maps carried out by the Equipment of Study, by means of the cooperation of the institutions of investigation, universities and of individual investigators. The maps modified and publication will be registered by its names and name of the responsible institutions,

therefore the forms of interpretation vary. They go depending on the point of view of each one of the investigators.

For the places where themselves occur a change of use of the soil, it will be carried out comparisons among the present situation and real with the present potential so that can serve of base of data to correct the Soils potential map. In case that be determined a badly use of soil in the lands identified, itself it will inform To the farmers to indicate them the adequate use of its lands.

These results will be summarized in the report and itself reporter to the public by means of the use of the SIG of it governed.

2) Erosive Problems in the High Basins

This activity will be realized through the monitoring of the erosion in the upper basins and of the conditions of the implementación of works and agricultural practices against the effects of erosion, evaluating annually the conditions of the works carried out. The actions of Monitor they are the following:

a. Elaboration of Map of Risk of Erosion
b. Digitalización of Works Implemented and its Actualization
c. Modification of Maps of Risk of Erosion
d. Publications

The map of risk of erosion of the Soils will improve in base of the map prepared by the Study, adding the information of change of the use of soil, and other works carried out, with the participation of the pertinent institutions.

At present does not count on itself information related to the works against its effects of erosion, and of the agricultural practices against the erosive effects. For which has the need to prepare this type of maps, since the degree of erosion, changes depending on the processing and the farming practices that they carry out. To have a greater one precision upon the data about the degree of erosion will be created the following maps theme:

a. Areas of the works carried out against the erosion for each cultivation
b. Areas of the farming practices implemented for each cultivation
c. Areas where the establishment of Agriculture is suggested Sustentable

In the base of the information digitized will be carried out the evaluation of the degree of erosion, to confirm the need of the works to implement the practices against the Erosion.
This evaluation will be related according to the different types of cultivation's, changes of the volume of sedimentación in them split lagunares, regarding with the activities of monitor upon the degree of sedimentación.

3) Problem of Sedimentación in them Split Drops of the Basins

The monitoring about the sedimentación will be carried out in the following way:

a. To carry out observations of sedimentación in the points of a river discharge observation
b. To install water level gages to collect data and to carry out the periodical sounding
c. Digitalizar the data

The recollection of data of sedimentation will be carried out with the cooperation of CNA, of a way systematic to be able to collect constantly.

Other activities are being carried out by the Reservation of the Biasfree "Crossroads", which will continue. For the realization of said activities will be supported with the equipment necessary to be able to carry out the efficient monitoring. The equipment required is the followings:

a. Equipment to carry out the river discharge observation and to collect the samples of Water
b. Equipment for the river discharge observation of Materials of Sedimentación
c. Ships for Observation
d. Equipment for Analysis and registrations

The installations of water level gage are importance to interpret the degree of sedimentación. Moreover of serving for the studies of sedimentación are useful for future studies of development. Considering the importance of the collection of data, will be established water level gage in the points of strategy, so much for the points of river mouth as in the bodies lagunares to register the changes of level of the water.

The places proposed of installation of limnígrafos are the following:

Places Proposed for the Installation of Limnígrafos

Rivers	
Systems Lagunares	Barrita of Pajón, Chantuto-Panzcola, Governed of the Hueyate, System of the Sureste or city Halls Pozelos

The studies of sounding of water depth, will be carried out periodically depending on the changes, that they register in level of the water. To increase the precision of them probe you will be established points of observation of levels of water. In the points where abrupt changes exist of sedimentación will be installed the mediator of sedimentación.

The equipment required for them probe you of water they are the following:

a. Sounding
b. GPS
c. Ships for the transfer
d. Computers and equipment

4) Medium Environment in them Split Lagunares and I Monitor of Activity Fishery

It will be carried out the monitoring, upon the fishery's resources and the Water qualities at different point entities in the zones lagunares.

The analysis simple of quality of water will be carried to tip by the institution, while the more complex will be carried out to through the private laboratories.
With relation upon monitoring of the resources of it fishes, will be carried out studies of capture in the places deteriorated, to determine the quantity of fish that has capacity of freeing the system.

The necessary equipment for these activities is the following:

a. Equipment for analysis simple of water
b. Equipment of collection of Samples
c. Cars
d. Equipment for Capture
e. Computers and processors of data

5) I monitor upon Resources Florísticos

In the Study Area, is found one of the regions diversified of resources florísticos inside Mexico. However, the information pertinent of this resource is not sufficient, more of not being known the degree of its exploration to be able to determine its potential. On the other hand, with the practices of burns they provoke fires that deteriorate each time more the resources of flora.

To promote the development of the resources florísticos, actions are required of monitoring to know their volume and to be able to determine the adequate dimensions of exploration, controlling also the fires. To through of these actions of monitor, is considered that is necessary to formulate a plan of conservation.

a. I monitor of Resources Florísticos

Currently, the information upon the resources of flora is not found ordered to carry out a procedure of monitoring. It is necessary to systemize the information necessary upon the resources florísticos according to the following steps:

a. Preparation of Base of Data for the Resources Florísticos
b. Preparation of Maps of Potentiality of Forest Development
c. Actualization of the Data
d. Evaluations of the Data Brought up to date

The basic map of the resources florísticos will be prepared, utilizing the map prepared by the Study, modifying and bringing up to date. These maps will be brought up to date with the field survey. If it is possible is recommendable to register the distribution of species of flowers.
The preparation of the studies of the potential one florístico, will develop based on which they have prepared by the Study. The species that have you considered inside the objective of these studies, not they refer only to the woody tree, but also engloban species of tree edible (fruits), such as the aguacate, small zapote, mamey, etc.

The cover that has about the information of the strata forests, served to correct the base of the original cover that was carried out in this job of investigation, that of any way served to have specific information as for the upon the species of tree, including private data to through of the collaboration of pertinent institutions.

The actualization of data is very important to confirm the present conditions of the resources florísticos. In the future upon implementing the reforestation, it is important to have information upon suppliers.

b. I monitor of Fires Forests

The monitoring about fire forests has an important paper to be able to develop the activities of reforestation and to exploit the resources floristcs. For to be able to establish a system of I monitor upon fires is recommended to carry out the following thing:

a. Preparations of Basic Maps for the control of Data
b. Actualization of Data
c. Analyze of Data

The elaboration of basic maps for its fires forests, will be prepared in base to the information existing:

8.4 MEASURES TO BE TAKEN FOR THE FORESTRY RESOURCES

The region has a high potential for development taking into account factors such as rainfall and temperature. However, development of forestry resources are not being carried out but register a continue deterioration. It is indispensable to take measures to promote the economical activation of the region by the meteorological conditions and others natural resources, but it have to be carefully carried out. First, form the meteorological and soil resources point of view, it is a region with high potential for development but topographically and considering meteorological effects, there are large areas that needs forest conservation measures.

Potentiality of the forest resources of the region is very high, especially in the parts with gentle slopes because of the rich rainfall and relatively high fertility of soils. In the other hand, places where slopes are very high, abundance of rainfall is not a potential factor, but it become in a negative element for erosion. Then, it is indispensable to increase the vegetal cover in order to prevent this phenomenon and playing more the role of conservation potential than a development potential.

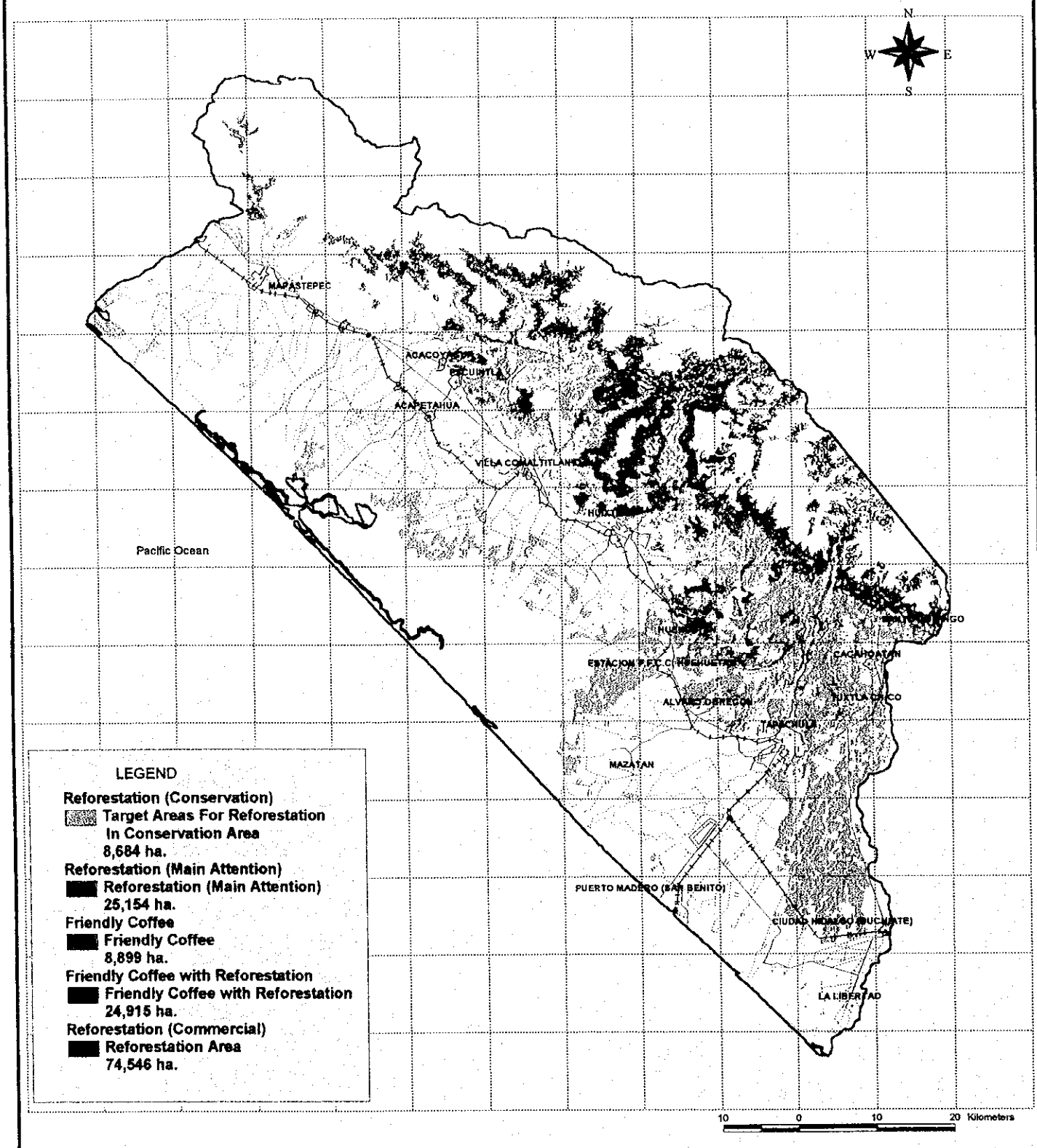
Taking into account above-mentioned factors, it is pretended to develop the Plan by adopting the following strategies.

1. Promotion of reforestation activities in areas with high development potential.
2. Promotion of reforestation activities in areas with need of conservation measures.
3. Promotion of reforestation activity in others activities such as (promotion of friendly coffee with nature)
4. Conservation of the forestry resources by the implementation of measures for preventing forest fire.

Reforestation shall be carried out by introduction of woods with high commercial value from the economical point of view. In the conservation areas, it is more important conservation of natural resources than the economical issues because reforestation shall introduce existing species and those who may supply some production. Others measures to be implemented shall be the gradual changes in the farming methods currently applied in the coffee plantation. An increase in the vegetal cover is expected by the implementation of these measures that shall become in a promotion to extend the reforestation activities.

Reforestation by a complex commercial and conservationist forestation shall be promoted in this plan by using efficiently the available natural resources and increasing the green areas.

Objective Areas are indicated in the Figure 8.4.1.



8.4.1 Objective Areas for Reforestation

8.4.1 Plan for the Promotion of Reforestation

This plan shall be used as substitute in the zones not suitable for agriculture in the Soconusco region as an alternative plan to activate the economy where the reforestation shall be promoted. These reforestation activities shall be implemented in the following areas:

1. In zones where the reforestation development potential is high and unsuitable for others cultivation.
2. In regions where the economical profitability of existing crops is low and there is the possibility to transform them in forest areas.

(1) Substitution Plan for Promotion of Reforestation

Reforestation shall be promoted by credit lines available for farmers and policies of official assistance such as supply of young plants, technical assistance and information of markets.

1. Establishment of young plants supplies system.
2. Technical Assistance
3. Facilitate information of markets
4. Establishment of credit programs for promotion of reforestation.

The current schema of young plants supply shall be utilized by which these plants are free distributed to small farmers and only large farmers shall be charged. However, the free distribution of young plants is difficult, therefore this system will be temporally utilized until the situation of farmers is stabilized.

Technical assistance includes farming methods jointly with information of markets and supply of uses permissions.

A detailed survey shall be necessarily elaborated for the establishment of credit programs for reforestation. This survey shall include profitability of the activity and has to take measures to avoid this kind of obstacles.

1) Establishment of a Young Plants Supply System

The same young plants distribution system shall be adopted which is carried out by nurseries as an extension of the current system, establishing as minimum one nursery for each municipality. The capacity of nursery shall be dimensioned according to the reforestation potential
Supply of young plants shall be implemented not only for commercial forestation, but also for the areas to be conserved and considered as critical. Besides, young plants shall be also required to establish cultivation of friendly coffee with environment.

Location of nurseries (young plants supply center) is set taking into account the installation of the young plants distribution place and shall be equipped with the following facilities;

1. Nursery (covered)
2. Facilities for production of soils for each young plants.
3. Irrigation facilities
4. Packing facilities
5. Logistic Machinery
6. Administration shelter

2) Technical Assistance

Supplying of young plants shall carry out technical assistance. Technology to be applied is as follows;

1. Recommendation of tree species to interested farmers
2. Tree plantation method, fertilization and forestry practices
3. Procedures to get the permission for clearing and selling of woods as well as the necessary documents required.
4. Measures against fire

Recommendation of suitable species shall be carried out based on the potentiality maps of each proposed place.

3) Supply Information of Markets

Taking into account that supply of information and markets on woods are a very important factor to motivate forestation, it is planned to supply the necessary information such as markets tendencies, permission forms etc., in order to facilitate farmers activities. These supplies shall be also done by the young plants supply center.

Supply of information such as type and tendency of markets shall be done taking into account that availability of markets information on woods represent a very important factor to motivate forestation activities and make easier farmers works. These supplies shall be also carried out by the young plant supply center.

4) Establishment of a Credit Program to Promote Reforestation.

Considering that investment in the forestation activities requires a long-term period of capital recovering it is difficult to promote without a government support in a subside form. Then, it is important to consider the return period of the investment, condition of credits with long term amortization periods and low interest rate in order to promote this activity in large scale.
It is important to bring special attention to the credits system in order to avoid lose of stimulation that may be created by them.

(2) Objective Areas and Recommended Species

Reforestation shall be implemented in existing agriculture fields where the current cultivation is not economically feasible anymore and where the gradual change is planned. It shall be implemented in the coffee plantation zones located in the mountain ranges already classified in four zones according to the growing factors of species. Then, partially shall be also promoted the introduction in grains cultivation zones. The areas to be proposed for each municipality are as follows;

Objectives Areas for Reforestation

Crops	Priority	Class	Condition	Areas(ha)
Coffee	Priority 1	Class 5	Altitude 800m<	9,916
	Priority 2	Class 4	Altitude 800m<	2,024
	Priority 3	Class 3	Altitude 800m<	8,185
Cacao		Unsuitable	Altitude 800m<	8,039
Short cycle crop	Priority 1	Class 5	Altitude 800m<	5,885
	Priority 2	Class 4	Altitude 800m<	5,399
	Priority 3	Class 3	Altitude 800m<	35,098
Total				74,546

Objective Areas of each municipality is as follows:

Objective areas for Reforestation (Altitude 800m<)

Municipality	Areas (km2)	Objective Areas (ha)
Acacoyagua	191.3	890
Acapetahua	358.3	2,428
Cacahuatán	173.9	3,303
Escuintla	206.2	4,694
Frontera Hidalgo	106.8	5,750
Huehuetán	313.0	10,920
Huixtla	385.0	2,706
Mapastepec	1,085.6	1,917
Mazatán	382.6	1,732

Municipality	Areas (km2)	Objective Areas (ha)
Metapa	101.8	1,382
Suchiate	303.0	4,162
Tapachula	857.0	15,907
Tuxtla Chico	64.6	7,842
Tuzantán	268.3	2,942
Unión Juárez	72.0	413
Villa Comaltitlan	606.1	5,764
Otras		
Total		74,546

It is expected to convert within a period of 20 years:

Objective species are basically the existing ones, however, a yearly valorization shall be done on more commercial species and integrate them to by the new nursery.

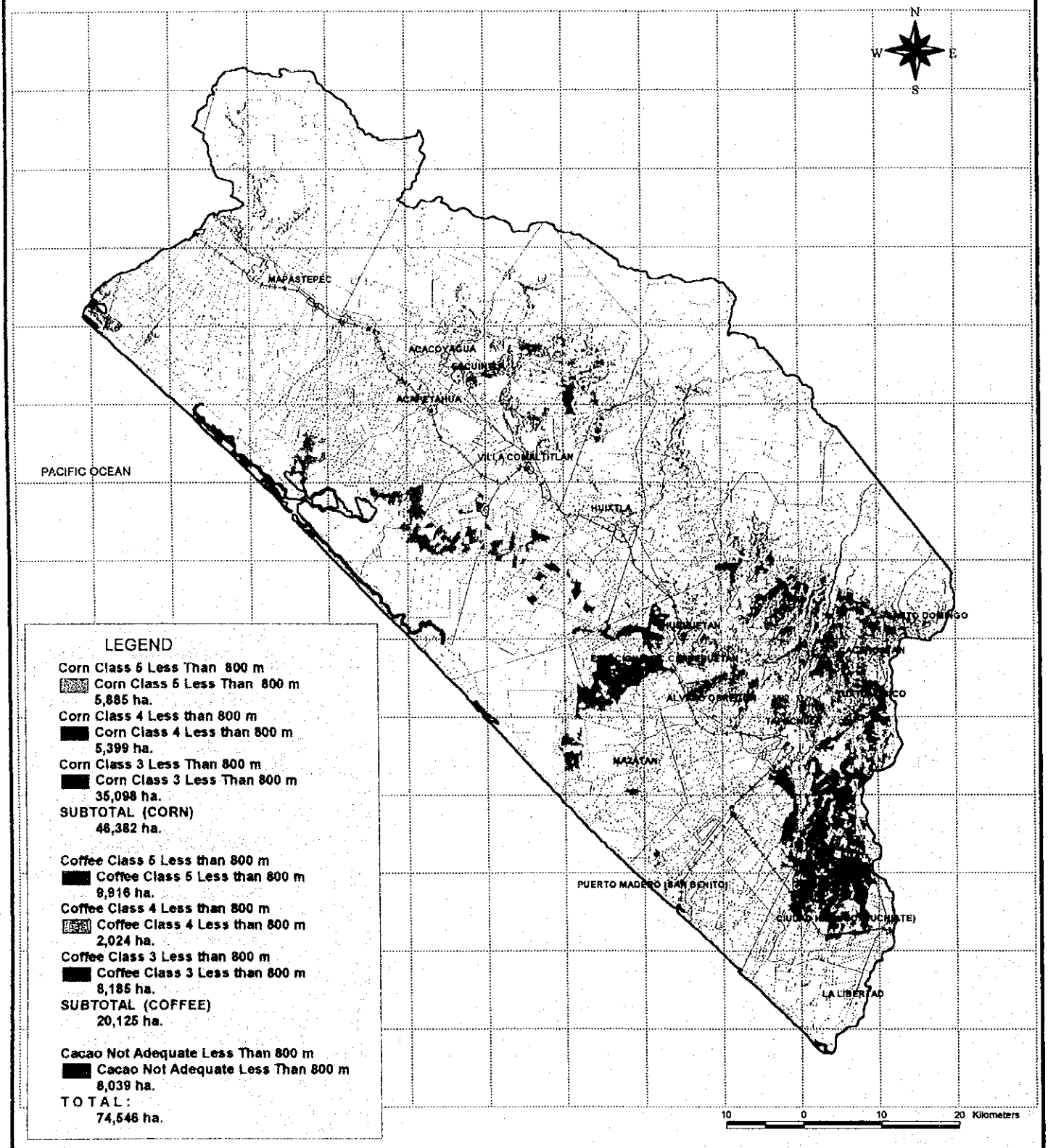


Fig. 8.4.2 Objective Area for Promotion of Reforestation

8.4.2 Reforestation in the Most Critical Areas

(1) Substitution Plan for Promotion of Reforestation

This substitution plan shall be implemented in zones judged as critical where development of conservation activities is need. Considering and placing first the needs of conservation in the zone young plants shall be distributed and technical assistance shall be provided by government budget and the farmer shall participate in sowing and farming of plants.
In this zone replanting of tree with reforestation purpose is not recommended. Then, species that may be collected without replanting shall be utilized as much as possible. The detail plan is as follows;

1) Establishment of a Young Plant Supply System

The young plant supply system shall use the same nursery used in the commercial trees reforestation program. The difference is that commercial wood species have different care than those introduced as green cover.

2) Establishment of the Young Plants Distribution System

An efficient system to promote reforestation activities shall be established in order to make difference of the activities of reforestation with commercial purpose. A young plant distribution system for the community shall be implemented considering the plantation methods in order to guarantee a periodical supply.

(2) Objective Areas

The areas proposed for this reforestation activity with conservation purpose are placed inside the areas classified as more critical and to be conserved.
The Areas for each Municipality are as follows;

Objective Areas for Conservation Purpose

Crop	Classification	Condition	Areas(ha)
Coffee	Unsuitable	Slope 12~35 degree	51,279
Cacao	Unsuitable	Slope 12~35 degree	584
Short Cycle Crop	Unsuitable	Slope 12~35 Degree	22,089
Pasture	Unsuitable	Slope 12~35grado	2,481
Total			76,433

Objective Areas for each municipality are as follows:

Objective Areas for Reforestation in Critical Areas

Municipality	Areas (km2)	Objective Areas (ha)
Acacoyagua	191.3	9,319
Acapetahua	358.3	64
Cacahuatán	173.9	4,146
Escuintla	206.2	12,136
Frontera Hidalgo	106.8	28
Huehuetán	313.0	2,415
Huixtla	385.0	6,171
Mapastepec	1,085.6	3,156
Mazatán	382.6	-

Municipality	Areas (km2)	Objective Areas (ha)
Metapa	101.8	13
Suchiate	303.0	-
Tapachula	857.0	12,830
Tuxtla Chico	64.6	463
Tuzantán	268.3	6,656
Unión Juárez	72.0	1,714
Villa Comaltitlan	606.1	3,486
Others		
Total		

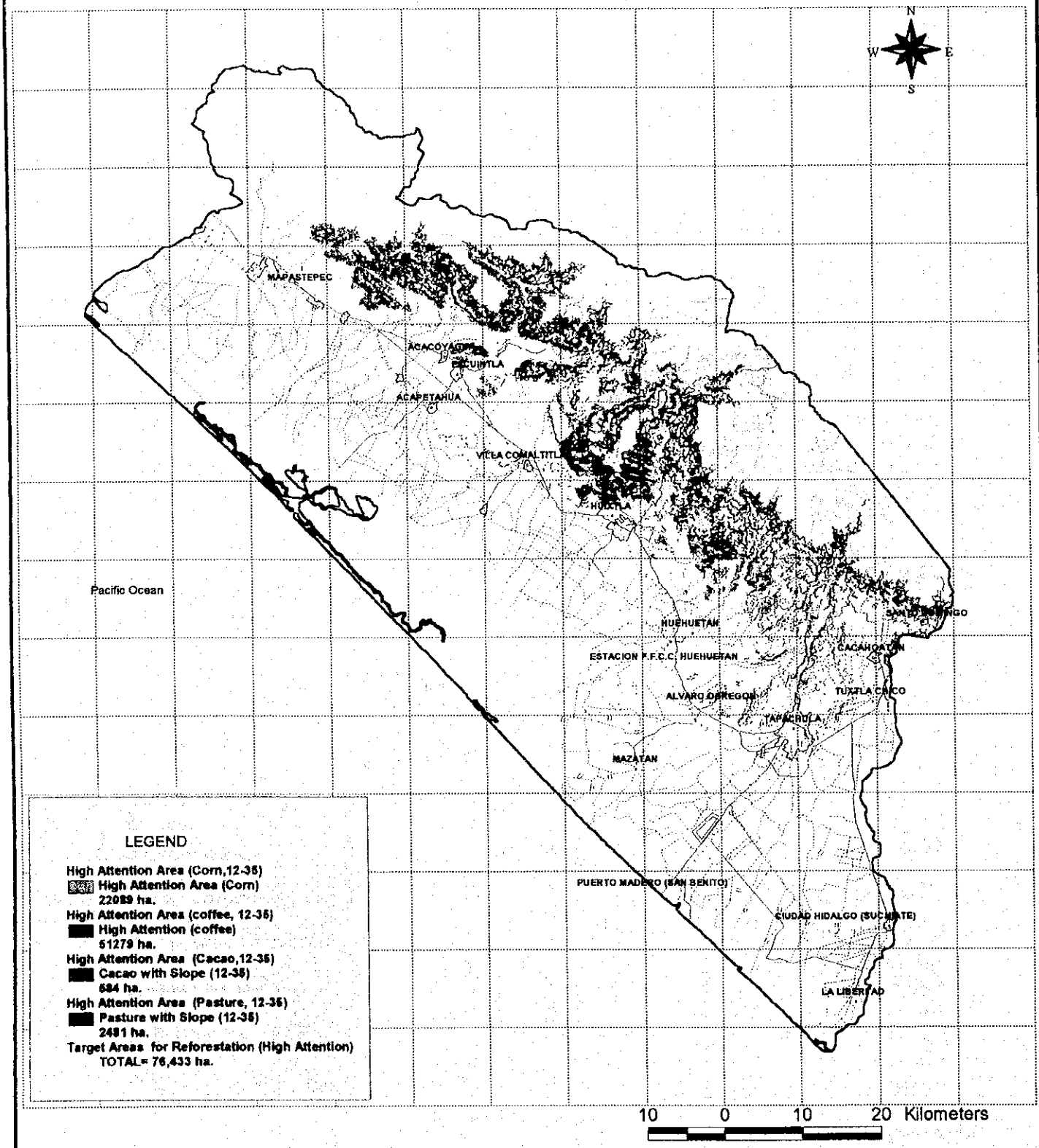


Fig. 8.4.3 Objective Area for Reforestation for Most Critical Area

8.4.3 Reforestation in Areas to be Conserved

(1) Reforestation Alternatives

Reforestation for conservation of areas with strong slopes (higher than 35 degrees) are going to be implanted in the needed zones. This activity is considered as a conservation action, then implementation cost of reforestation shall be subsided by the government and planting and caring of trees shall be carried out by participation of farmers.

Species to be introduced will have consumption value not timber value, such as aguacate, mamey, etc in order to make possible selling of fruits.

1) Distribution and Supply of Plants System

The young plant supply center shall utilize the same nursery of commercial trees for reforestation, and then the timber producing will have different treatment than others.

2) Reforestation

The government shall subside a part of the reforestation cost in order to promote this activity.

(2) Objective Areas

The areas with strong slopes are the objective areas for the reforestation for the conservation purpose.

Objective Areas of reforestation for Conservation Purpose

Crop	Class	Condition	Areas(ha)
Coffee	Unsuitable	Slope35grado>	3,060
Cacao	Unsuitable	Slope35grado>	50
Short Cycle	Unsuitable	Slope35grado>	5,405
Pasture	Unsuitable	Slope35grado>	169
Total			8,684

The objective Areas for each municipality are the followings;

Objective Areas of Reforestation for Conservation

Municipality	Areas (km2)	Objective Areas (ha)	Municipality	Areas (km2)	Objective Areas (ha)
Acacoyagua	191.3	847	Mazatán	382.6	-
Acapetahua	358.3	-	Metapa	101.8	7
Cacahuatán	173.9	923	Suchiate	303.0	-
Escuintla	206.2	1,159	Tapachula	857.0	1,720
Frontera Hidalgo	106.8	7	Tuxtla Chico	64.6	15
Huehuetán	313.0	90	Tuzantán	268.3	285
Huixtla	385.0	96	Unión Juárez	72.0	292
Mapastepec	1,085.6	564	Villa Comaltitlan	606.1	116
Mazatán	382.6	-	Total		8,684

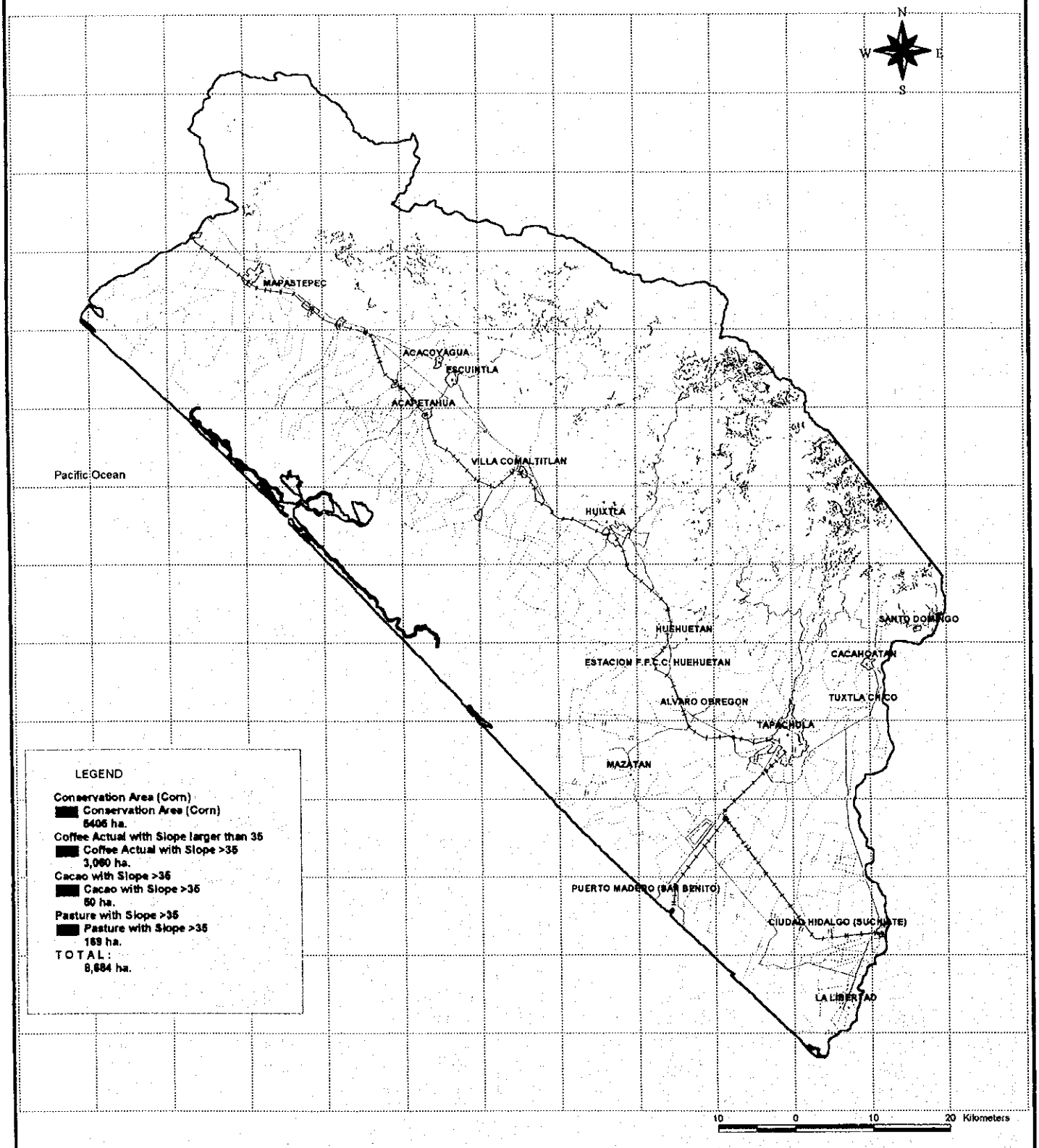


Fig. 8.4.4 Objective Area for Reforestation in Area to be Conserved

8.4.3 Increase of Forestry Resources by Promotion of Friendly Coffee in the Environmental Framework

(1) Alternatives

Cultivation of coffee is found in the region within an area of 82,650 ha. However, these plantations area placed in strong slope areas facing a low productivity. The main activity of the region is the cultivation of coffee that plays an important role to contribute in the diversification and to increase the vegetal cover in the mountain zones. However, currently, with the modernization pretext, native shadow trees have been cleared and replace by no-native species that create a tendency to the mono farming. Besides, it is important to mention that due the low profitability of coffee currently, many coffee farmers have abandoned this activity causing deterioration of their lands. This plan contents the promotion of friendly coffee with nature by developing activities for improvement of production and increase of the vegetal cover.

1) Methodology of Introduction

The present plan includes the promotion of the friendly coffee with the nature by promoting activities for the improvement of production and increase of vegetal cover. The following measures shall be taken to promote these activities.

1. Introduction of native shadows
2. Cooperation with authorized organism
3. Studies for the authorization
4. Creation of a commercialization network

2) Methodology of Introduction

Procedures to obtain certification, as "friendly coffee" is basic in order to promote the activities for the production of this type of coffee. Reforestation of consumption and shadow trees shall be promoted by this plan.

3) Others Methodologies

Necessary surveys shall be carried out in order get the certificates by the cooperation of the corresponding institutions in order to make easy issuing of the certificate.

(2) Objective Areas

Objective areas are those with possibility to produce a good quality of coffee in altitudes higher than 800 m.

The objective Areas to incentive the Friendly Coffee

Crops	Class	Condition	Areas(ha)
Coffee	Unsuitable	Altitude800m>, Slope12~35grado	24,915
Coffee	Class5	Altitude800m>	376
Coffee	Class 4	Altitude800m>	1,329
Coffee	Class 3	Altitude800m>	7,194
Total			33,814

The objective areas are demonstrated in the Fig. 8.5.5

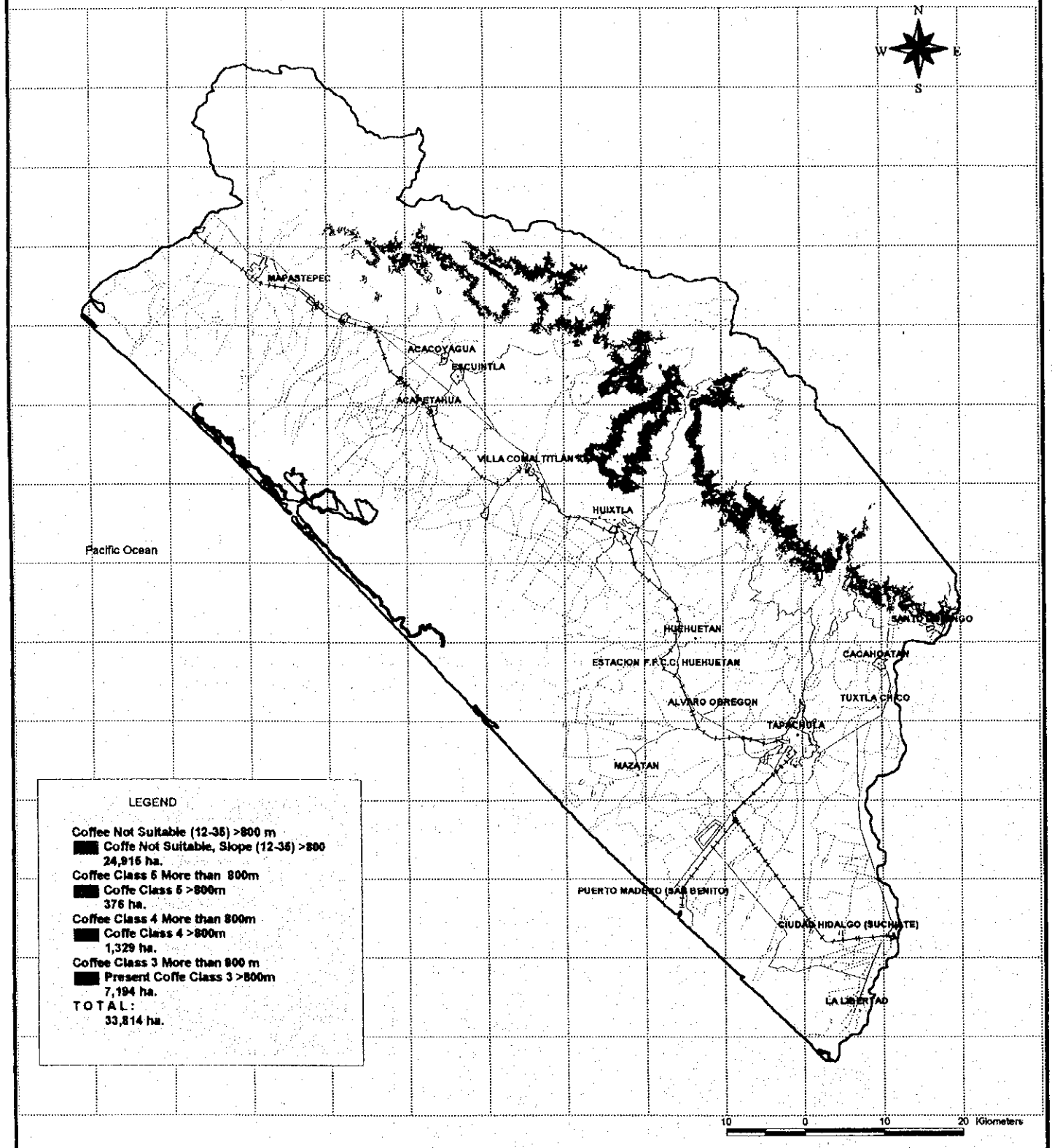


Fig. 8.4.5 Objective Area for Promotion of Friendly Coffee

8.5 IMPLEMENTATION PROGRAM AND COST ESTIMATE

8.5.1 Description of the Implementation Program

The Promotion Program of Ecological Agriculture has great importance in its implementation to be able to conserve the natural resources, degraded at the present time. For the implementation of the program, it is required to take the necessary actions for the financing and methodology of the operations of it.

Considering that the program is composed of different actions, it is necessary to establish the program of actions. The necessary measures to implement the program are the following:

1. To look for the Financial Funds
2. Determination of the details of the Program (Credit's chart of flow, Methodology and Implementation, Responsibilities of the Government)
3. Implementation of the program (Credits and Public Investments)
4. Implementation of Investments of Public Actions (Environmental education, Monitoring)
5. Implementation of semipublic Investments.

The program is carried out dividing in the following concepts:

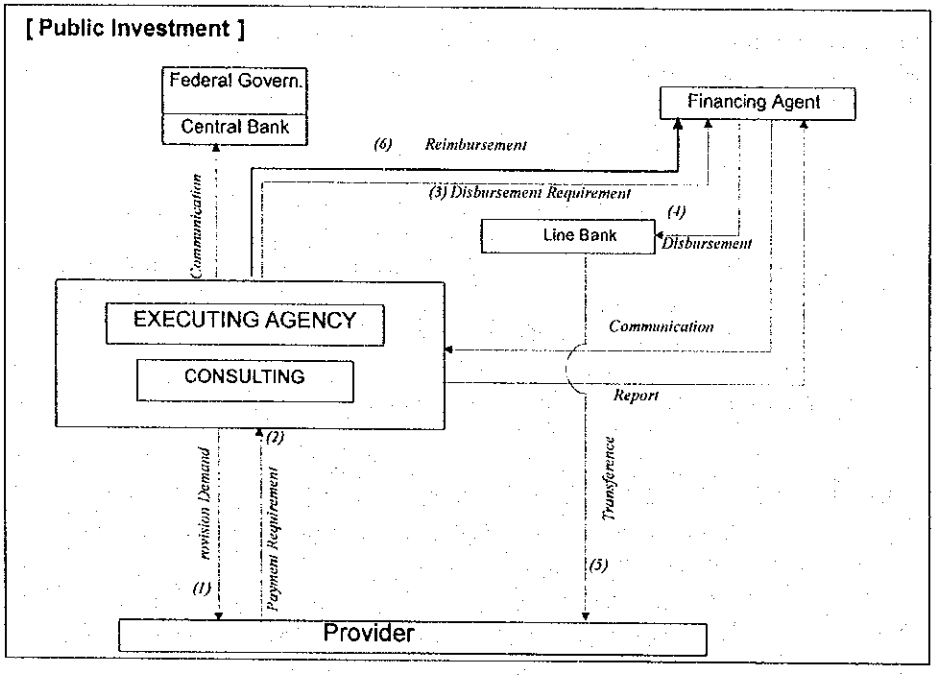
Classification	Plans
Public Portion	• Implementation of the Program and Administration • Incentive of Environmental Education (Environmental Education and construction of Ecological Center) • Environmental Monitoring
Semipublic	• Demonstration Field • Actions in marshy areas • Actions in sloppy areas • Reforestation for the conservation in Areas of Greater Attention. • Reforestation for the conservation in Areas that Should be Conserved • Supply Center of Planting
Credit	• Works on Erosions • Agronomic Practice against Erosion • Introduction of Sustainable Agriculture • Breeding of Animals for the production of Organic Matters • Reforestation • Incentive of Introduction of Amicable Coffee

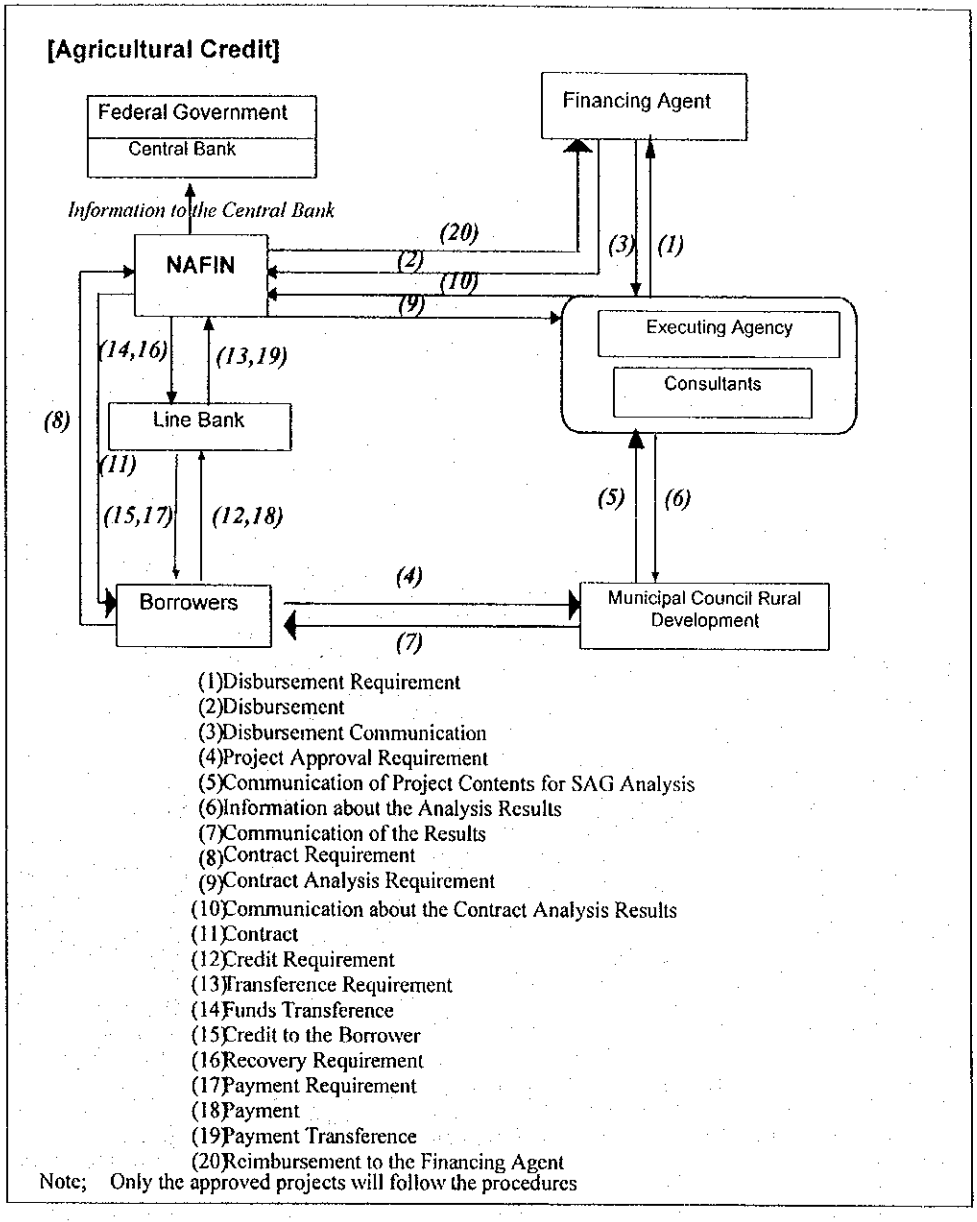
The implementation of the part of public investments will be executed through the tertiary manner, with bidding. The semipublic parts are implemented dividing them in works and operations. The works pertaining to semipublic investments are implemented in a tertiary manner or by farmers` force. The operations are done through the farmers. When the credit system is implemented, the government will take the necessary actions to obtain the positive results, not only to canalize a well-differentiated credit. The credit will be basically used on the set investments with a percentage of 90% of the cost. To implement the credit system, the government will take measures to obtain the resources of capital well favored and the implementations will be executed using consultants, by means of the organization chart that will be formulated.

For the implementation, an executor organization chart is setup formed by pertinent institution to this Program, using consultants. Besides this executor organization chart, a committee for

monitoring the actions will be formed. The role of the executor organization chart is to determine the details of the program, to select the suppliers, to implement the Program. To determine the details of the Program is recommendable to use consultants. The consultants will support the organization chart of execution to determine the details of the Programs, the monitoring actions, etc. The role of the committee is of monitoring the actions of the program.

The resources of the plan procured from foreign government shall be channeled as illustrated hereinafter.





8.5.2 Implementation Program

The implementation of the program will be started with the actions to look for financing, the formation of the execution organization chart and the monitoring, followed by the selection of the suppliers of service providers. By means of the consultants' assistance the details of the programs will be determined. To obtain financing resources and formations of the executor organization chart and the monitoring committee 2 years are programmed. After that, it is estimated a period of one year for the selection of consultants. The program will be started within 4 years.

The first year the details of the program will be determined, and the necessary documents to look for the providers of public and semipublic works will be prepared. In case of the agriculture and livestock's credit, the system of credit to obtain better result of agriculture and livestock's credits will be established, regularizing the system of technical assistance, etc. The

estimated period of implementation is of 6 years.

The chart is demonstrated below:

Implementation Chart

Activities	1	2	3	4	5	6	7	8	9	10
Searching of Finance Source										
Creation of Organization Chart of Execution and Steering Committee										
Selection of Consultant										
Determination of the Program Details										
Preparation of Documents for Public Works										
Implementation of Public Work										
Implementation of Actions										
Establishment of the Credit System										
Establishment of the Contents of the Semi-Public Investments										
Implementation of Semi-public investments										
Agriculture Credit										
Supervision of Semi-Public										
Supervision of Agriculture Credit										
Monitory										

Monitory Actions shall be carried out by the Committee and shall be formulated:

8.5.3 Cost Estimation

The costs required to implement the Program are US$ 267 millions of which US$ 99 millions shall be use to implement the program, and is formed by US$ 7 millions from public investment, 17 millions from semi-public investment and 74 millions of agriculture credit.

Estimate Cost

	Required Resources (US$1,000)	Program (US$1,000)
Promotion of Sustainable Agriculture	65,244	26,104
Public Investment	12	12
Semipublic Investment	0	0
Agriculture Credit	65,232	26,092
Promotion for the utilization of Regional Resources	25,583	12,187
Public Investment	2,347	2,347
Semipublic Investment	23,236	9,840
Agriculture Credit	0	0
Promotion for the utilization of Regional Resources	163,512	55,765
Public Investment	0	0
Semipublic Investment	7,657	7,657
Agriculture Credit	155,855	48,108
Subtotal	254,339	94,056
Studies	12,716	4,702
Program	267,055	98,758
Public Investment	15,075	7,061
Semi public Investment	30,893	17,497
Agriculture Credit	221,087	74,200

(1) Promotion of Sustainable Agriculture

The following amount is required to promote the Sustainable Agriculture

Plan	Objective Areas	Unit Cost (US$/Unit)	Required Resources (US$1,000)	% of Implementation	Estimated Cost (US$1,000)
Erosion control Works			6,020	40%	2,408
• Annual Crop	21,056 ha	250	5,264		
• Coffee	6,586 ha	100	659		
• Cacao	974 ha	100	97		
Farming Practice against erosion			21,582	40%	8,632
• Annual Crop	21,056 ha	220	4,632		
• Coffee	24,145 ha	650	15,694		
• Cacao	1,931 ha	650	1,255		
Sustainable Agriculture			24,610	40%	9,844
• Annual Crop	11,867 ha	220	24,610		
Animal Breeding	18,600 families	700	13020	40%	5,208
Demonstration Farm	10 site	1,150	12	100%	12
Total			65,244		26,104
Public Investment					12
Semi public Investment					0
Agricultural Credit					26,092

(2) Promotion for the Utilization of Natural Resources

For the implementation of the plan the following amount is required

Plan	Objective Areas	Unit Cost (US$/Unit)	Required Resources (US$1,000)	% of Implementation	Estimated Cost (US$1,000)
Measure for Swamp Area			910	100%	910
• Fish Center	1 site	250,000	250		
• Discharge Installation	4 sites	30,000	120		
• Tropical Flower	6 comun.	60,000	360		
• Sylvester Animal Breeding	6 comun.	30,000	180		
Measure for Steep Area			22,326	40%	8,930
• Introduction of Agriculture irrigated in a small scale	183 comun.	60,000	10,980		
• Introduction of Ornamental Plants	183 comun.	62,000	11,346		
Environmental Education			626	100%	626
• Environmental Education					
• Agroecological Center	1 comun.	626,000	626		
Environmental Monitoring			1,721	100%	1,721
• Land Use	1 set	300,000	300		
• Erosion	1 set	450,000	450		
• Works	1 set	100,000	100		
• Sedimentation	1 set	201,000	201		
• Swamp and Fisheries	1 set	130,000	130		
• Forest	1 set	120,000	120		
• Forest Fire	1 set	120,000	120		
• Reserve	1 set	300,000	300		
Total			25,583		12,187
Public Investment			2,347		2,347
Semi public Investment			23,236		9,840
Agricultural Credit			0		0

(3) Promotion of Reforestation

For the Implementation of this plan the following amount is required

Plan	Objective Areas	Unit Cost (US$/Unit)	Required Resources (US$1,000)	% of Implementation	Estimated Cost (US$1,000)
Reforestation	74,546 ha				
Reforestation in a Mayor Attention	76,433 ha				
Forestation en Areas deben de ser Conservados	8,684 ha				
Promotion of Friendly Coffees					
Reforestation			151,742		47,377
• Instalaciones de Viveros	53 sites	50,000	2,650	100%	2,650
• Crédito para Reforestation	74,546	2000	149,092	30%	44,727

Plan	Objective Areas	Unit Cost (US$/Unit)	Required Resources (US$1,000)	% of Implementation	Estimated Cost (US$1,000)
Reforestation en Arcas de Mayor Atención			380		380
• Establecimiento del Sistema de Distribución	76 sites	5,000	380	100%	380
Forestación en Areas que deben de ser Conservadas			4,427		4,427
• Establecimiento de Sistema de Distribución	17 sites	5,000	85	100%	85
• Reforestation	8,684 ha	500	4,342	100%	4,342
Promotion of Friendly Coffees			6,963		3,581
• Arboles de Sombra	33,814 ha	200	6,763	50%	3,381
• Vías de Comercialización	1 set	100,000	100	100%	100
• Certificación	1 set	100,000	100	100%	100
Total			163,512		55,765
Inversión Publica			0		0
Inversión Semipublica			7,657		7,657
Crédito Agrícola			155,855		48,108

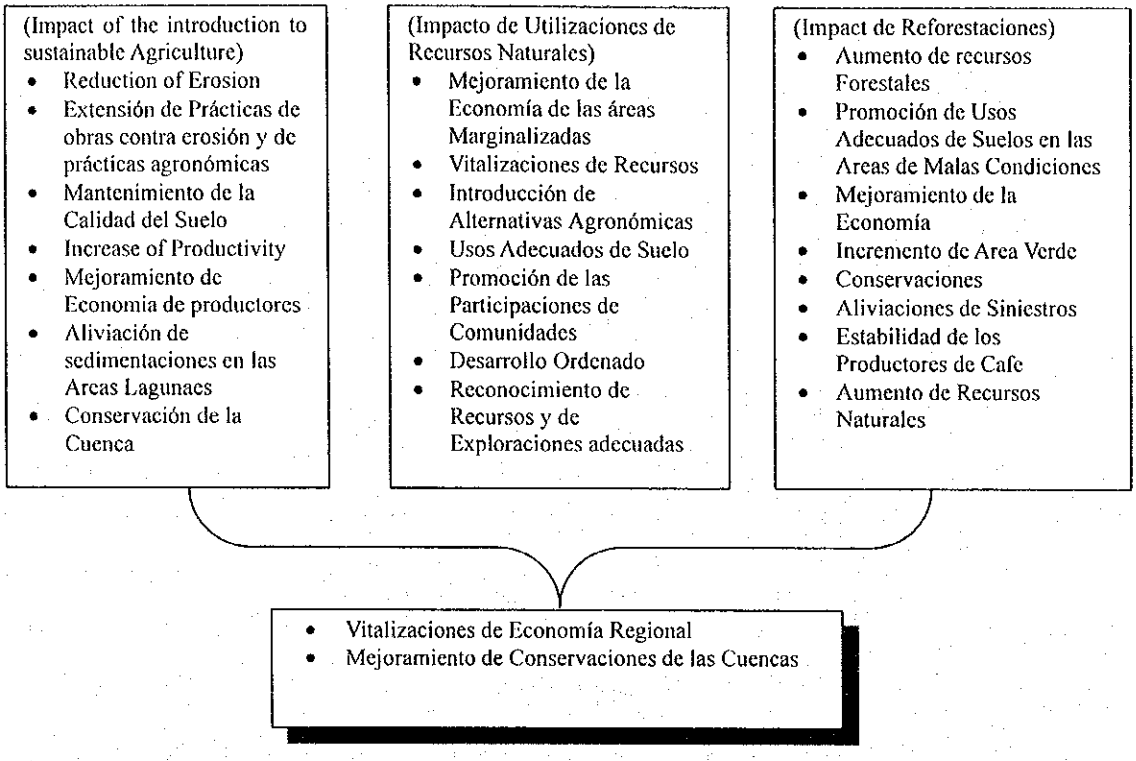
8.6 EVALUATION OF THE PROGRAM

The program has for objective to introduce changeable measures to improve the qualities of soil, especially the land used for coffee, cacao, and cultivated land of short cycles, that are the products of great importance for the region. Through this program the necessary measures with a specific surface of 410 thousand hectares will be introduced. Especially in the lands used in an inadequate manner, other alternatives will be introduced, such as reforestation, promoting the adequate uses for the lands' situations. The area classified as qualified reaches more than 25%, especially, it is noticeable in the case of coffee. In the following chart the distribution of the lands are indicated;

Distribution of Lands

Slope	Cultivated Areas	Class 1~2	Class 3~5	Unsuitable
Short Cycle Crops	157,846	81,922	50,984	24,940
Pastures	103,511	92,953	18,735	14,802
Coffee	89,644	4,393	29,045	56,207
Mango	20,784	16,565	4,115	104
Banana	16,837	14,934	589	1,313
Cacao	16,729	4,550	4,115	8,047
African palm	4,670	4,343	304	28
Total	410,021	219,660	107,888	105,440

For the implementation of the Program, when improving the situation of conservation of the basin, the economy improvement of the farmers will be reached by means of improvement of the soils' quality, finally reaching the improvement in the rural economy.



8.7 INITIAL ENVIRONMENTAL EVALUATION

The program will be implemented with the following activities

1. Measures against Erosion and Degradation of the soil's quality
2. Measures for the Marginal Areas
3. Implementation of Environmental Education
4. Commercial Reforestation and of Conservation

To formulate the plan, in spite that the considerations between economic development and environmental conservation were taken in consideration, the following attentions are inevitable to determine the details of the Program. The problem that could arise is discrepancies between plans and actions. To prevent this type of problem, the committee should do close monitoring the implantation of the program.

Items to be considered for the implementation of the Program

Planes	Point of Consideration
Works against erosion	• Not specified
Practice against Erosion	• Not specified
Sustainable Agriculture	• Not specified
Animal Husbandry for creation of Organic Matter	• Do not push farmers economy
Demonstration Fields	• Avoid misunderstanding between benefits and neighbors
Measures in Marsh areas	• Do not provoke ecological unbalance • To take care in the use of chemicals
Measures in strong slopes	• Do not contaminate water sources by using chemicals

Planes		Point of Consideration
Environmental Education	•	Not specified
Environmental Monitory	•	Not specified
Promotion of Reforestation	•	Do not promote clearing of existing trees
Reforestation in Critical Areas	•	Not specified
Reforestation in areas to be conserved	•	Not specified
Friendly Coffee	•	Not specified