Oldest group:

5) Red-yellow soils

The soils which are generally deep and have a red-yellow sub-soil, are mainly found in high elevation mountainous areas (more than 1,000 m.a.s.l) except on volcanos. The soils are further divided into 6 types on account of parent materials and degree of erosion and gravel contents.

Information about characteristics and location of each soil unit, as well as classification practices carried out by FAO/UNESCO can be found in Annex B.5.

(3) Soils Graphical Representation Unit

The unit for basic classification of soils is the soils series. However, for precision reasons, in the present study the complex and soils association is used as graphical representation unit. Concerning the general description of the graphical representation unit and the coverage surfaces used in the soils maps, they are summarized in the following Table. The soils distribution is shown in the "Soils Map".

Table SOIL MAP UNIT

SOIL GROUP	SUM	DOMINATE SOIL TYPE	ASSOCIATION SOIL TYP	AREA (ha)
	Cs	Coastal Sand (cs)	-	500
	Cc	Coastal Clayish (cc)	cs	2,450
	Cd	Coastal Medium Soil (cd)	g,ds	15,350
	G	Hydromorphic Soil (g)	cd	4,650
	Fl	Loamy Soil (fl)	fs,(g),(fo)	16,250
ALLUVIAL	Fo	Histic Alluvial Soil (fo)	-	1,150
SOIL		Gravel Bering Sandy		
	Fs	Alluvial Soil (fs)	fl	5,700
	Fr	Cooble Bering Alluvial Soil (fr)		
		+ Colluvial Soil (dt)	fl,fs	4,300
		Coastal Sandy Old Alluvial		
	Ds	Soil (ds)	g,cd	1,200
	Da	Alkaline Sandy Soil (da)	fl	850
	As	Coarse Andsols (as)	sg,bg	3,100
VOLCANIC	Sl	Loamy Scoria Soil (sl)	sg	3,850
ASH SOIL	Sg	Gravel Bering Scoria Soil (sg)	-	6,500
	Ps	Sandy Pumice Soil (ps)	vs	19,400
HEAVY	Hs	Sandy Vertisols (hs)	hs	7,450
CLAYISH	Hc	Very Fine Vertisols (hc)	hc	6,000
SOIL	Hg	Gravel Bering Vertisols (hg)	hg	1,400
	Bc	Volcanic Clayish Brown Soil (bc)	bg,br	1,300
	Bg	Gravel Bering Brown Soil (bg)	bc,br	7,200
	Br	Stone Brown Soil (br)	bc,bg	103,600
	Brg	‹gravel bering›	bc,bg,vg,vr	7,650
BROWN	Brs	‹sandy›	bsg,vg,vr	6,750
SOIL	V	Brown Soil	br,bc,vg,sl,sg	
		+ Volcanic Ash Soil Complex	as,ac,compl	15,500
	Ag	Gravel Bering Andsols (ag)	vg	2,450
	Vg	Stoney Lavas (vg)	vr,br	36,100
	Vr	Lithosols -intrusion- (vr)	vg,br	6,200
	Ld	Dark Red-yellow Soil (ld)	-	9,750
RED-	Lr	Reddish Brown Souil (lr)	lrg	6,300
YELLOW	Lrg	Stoney Reddish Brown Soil (lrg)	lr	9,800
SOIL	Ll	Stoney Bright Reddish Brown Soil (ll)	e	3,850
	Lc	Limestone Bering Reddish Soil (lm)		3,400
	E	Eroded Stoney Soil (e)	ll	1,950
			Total	321,900

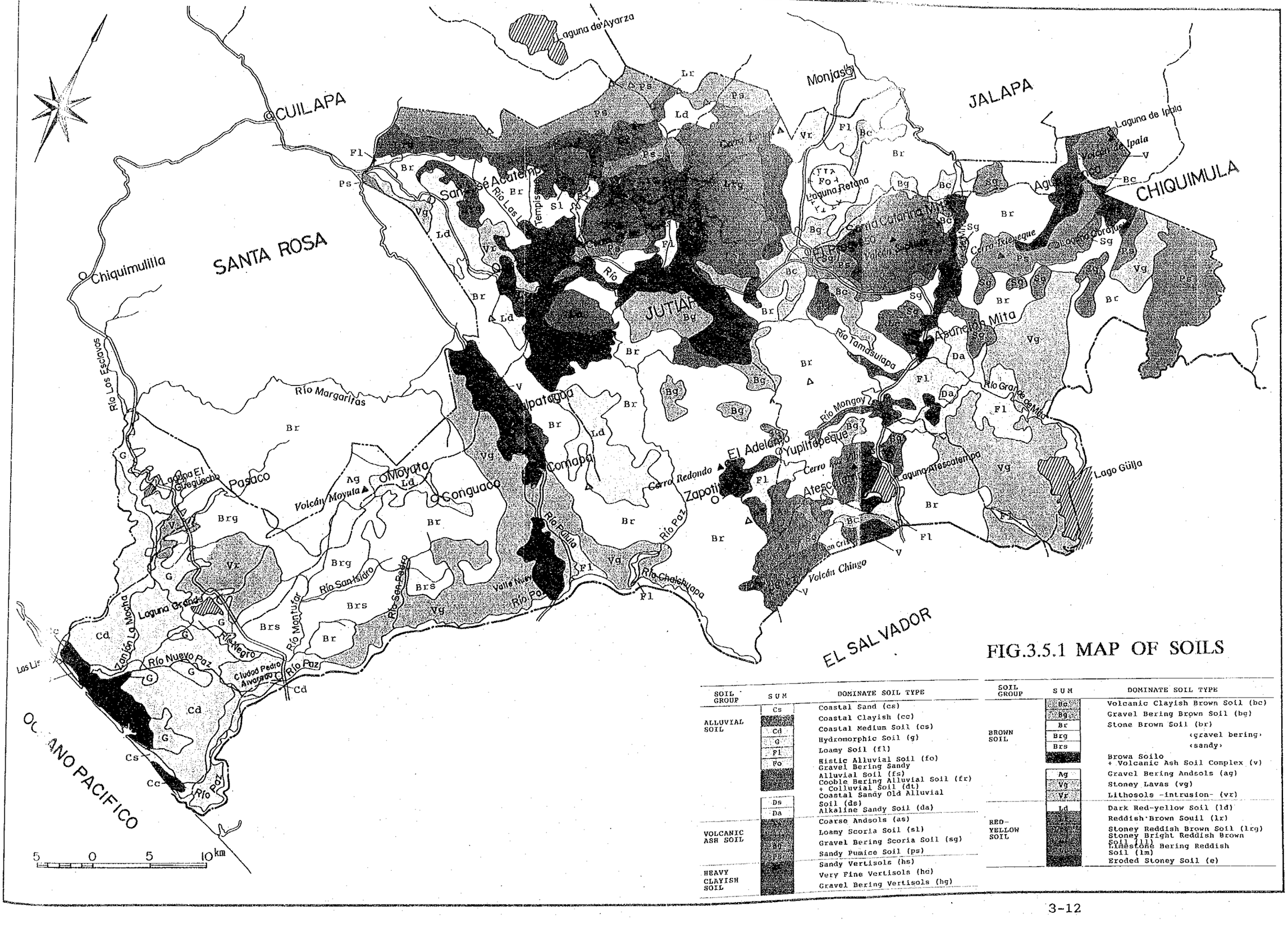


FIG.3.5.1 MAP OF SOILS

SOIL GROUP	SUM	DOMINATE SOIL TYPE
ALLUVIAL SOIL	Cs	Coastal Sand (cs)
	Cc	Coastal Clayish (cc)
	Cd	Coastal Medium Soil (cs)
	G	Hydromorphic Soil (g)
	Fl	Loamy Soil (fl)
	Fo	Histic Alluvial Soil (fo)
	Fr	Gravel Bering Sandy Alluvial Soil (fs)
	Dt	Cooble Bering Alluvial Soil (fr) + Colluvial Soil (dt)
	Ds	Coastal Sandy Old Alluvial Soil (ds)
	Da	Alkaline Sandy Soil (da)
VOLCANIC ASH SOIL	As	Coarse Andsols (as)
	Sl	Loamy Scoria Soil (sl)
	Sg	Gravel Bering Scoria Soil (sg)
	Ps	Sandy Pumice Soil (ps)
HEAVY CLAYISH SOIL	Hs	Sandy Vertisols (hs)
	Hc	Very Fine Vertisols (hc)
	Hg	Gravel Bering Vertisols (hg)

SOIL GROUP	SUM	DOMINATE SOIL TYPE
BROWN SOIL	Bc	Volcanic Clayish Brown Soil (bc)
	Bg	Gravel Bering Brown Soil (bg)
	Br	Stone Brown Soil (br)
	Brg	‹gravel bering›
	Brs	‹sandy›
	V	Browa Soilo + Volcanic Ash Soil Complex (v)
	Ag	Gravel Bering Andsols (ag)
	Vg	Stoney Lavas (vg)
	Vr	Lithosols -intrusion- (vr)
RED-YELLOW SOIL	Ld	Dark Red-yellow Soil (ld)
	Lr	Reddish-Brown Souil (lr)
	Lrg	Stoney Reddish Brown Soil (lrg)
	Lrs	Stoney Bright Reddish Brown Soil (lrs)
	Lm	Limestone Bering Reddish Soil (lm)
	E	Eroded Stoney Soil (e)

3.5.2 Classification of Capability of the Soil

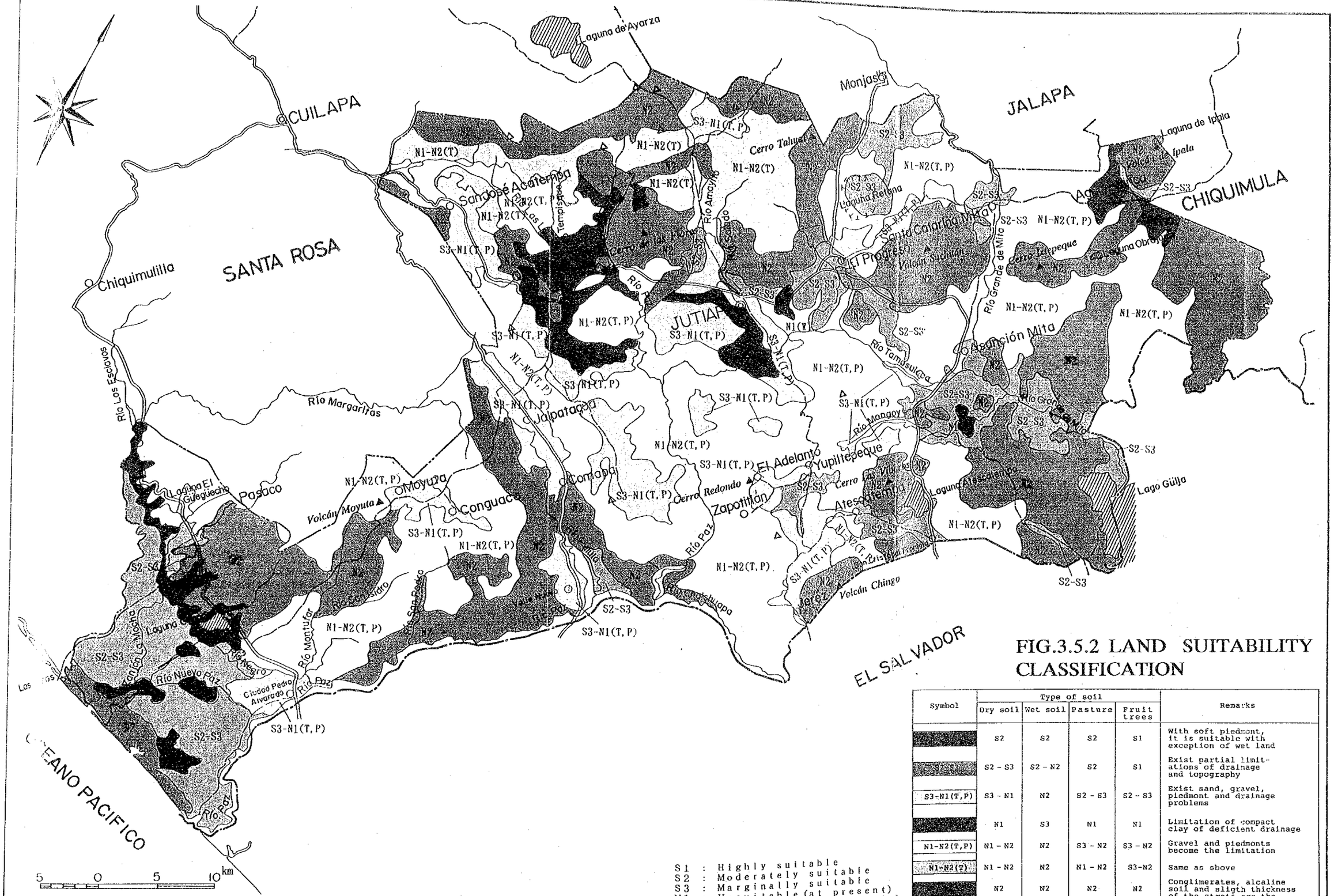
The productive capability of the soils have been evaluated according to the soils characteristics, topographical characteristics, etc., and it has been concluded that almost all soils in Jutiapa have restricting factors (stony, hard/highly clayish, steep piedmonts, poor drainage and lack of effective soil covers). In particular, the stony and steep lands, which occur extensively in the region, are not suitable for sowing.

The detailed description of the classification of the capability of the soils is found in Annex B.5. In the present study, this classification was made based on the "Bureau of Reclamation Manual (USBR, 1953) and "Framework for Land evaluation (FAO, 1976)".

From the classification made in the Table, it can appreciated that the lands suitable for temporal crops cultivation (excluding rice under irrigation) and fruits, reach a coverage of around 700 Km2, while the unproductive lands are estimated as 950 Km2.

Taking into account its use for agricultural, livestock, and forestal purposes, the lands in the department of Jutiapa are classified in 7 groups as shown below; and the location of the different land groups is shown in the map of "Classification of Capability of the Soil".

Symbol	type of soil				Remarks
	Dry soil	Wet soil	Pasture	Fruit trees	
S2	S2	S2	S2	S1	With soft piedmont, it is suitable with exception of wet land
S2-S3	S2 - S3	S2 - N2	S2	S1	Exist partial limit-ations of drainage and topography
S3-N1(T,P)	S3 - N1	N2	S2 - S3	S2 - S3	Exist sand, gravel, piedmont and drainage problems
N1(W)	N1	S3	N1	N1	Limitation of compact clay of deficient drainage
N1-N2(T,P)	N1 - N2	N2	S3 - N2	S3 - N2	Gravel and piedmonts become the limitation
N1-N2(T)	N1 - N2	N2	N1 - N2	S3-N2	Same as sbove
N2	N2	N2	N2	N2	Conglimerates, alcaline soil and sligth thickness of the strata are the main limitation



S1 : Highly suitable
S2 : Moderately suitable
S3 : Marginally suitable
N1 : Unsuitable (at present)
N2 : Unsuitable (permanently)
(FAO, 1976)

FIG.3.5.2 LAND SUITABILITY CLASSIFICATION

Symbol	Type of soil				Remarks
	Dry soil	Wet soil	Pasture	Fruit trees	
	S2	S2	S2	S1	With soft piedmont, it is suitable with exception of wet land
S2-S3	S2 - S3	S2 - N2	S2	S1	Exist partial limitations of drainage and topography
S3-N1(T,P)	S3 - N1	N2	S2 - S3	S2 - S3	Exist sand, gravel, piedmont and drainage problems
	N1	S3	N1	N1	Limitation of compact clay of deficient drainage
N1-N2(T,P)	N1 - N2	N2	S3 - N2	S3 - N2	Gravel and piedmonts become the limitation
N1-N2(T)	N1 - N2	N2	N1 - N2	S3-N2	Same as above
	N2	N2	N2	N2	Conglimerates, alcaline soil and sligth thickness of the strata are the main limitation

3.6 USE AND TENENCY OF THE LAND

3.6.1 Land Use

The land utilization in the department of Jutiapa, given its topographic characteristics, takes place in mountainous zones which are entwined in a complex way, with a significant undulation which goes from 0 m.a.s.l. at the coastal plains to 2,014 m (top of the Cerro Xecom). The places where important agricultural land extensions can be found are in the municipalities with relatively flat lands, like Asunción Mita, Quesada, Jalpatagua, El Progreso (Retana lake), Agua Blanca and Atescatempa. The lowlands which cover the coast of the Pacific Ocean , to the south of the CA No.2 and the department, are mainly used as pastures. The surroundings of the Moyuta, Chingo volcanos and the mountainous zone of José Acatempa, are considered as lands suitable for coffee growing, also new crops are cultivated on the hill sides with altitudes of 1,000 - 1,300 m.a.s.l. covering from the center to the south of the department.

In the mountainous zone with altitudes of 300 to 1,200 m.a.s.l., which covers most of the department, the joint use of agricultural lands with pastures is becoming popular. In the mountainous part, to the east of the Jutiapa and Quesada, there were natural pine forests, but with the deforestation practice, they became agricultural lands and pastures. On the coast of the Pacific Ocean near the sea, mangroves can be found. As a consequence of deforestation on the hill sides due to the felling of trees for firewood, as a construction material or for the development of agricultural lands in rough surfaces, many pits and erosion of the superficial soil cover took place.

The map of land utilization prepared in 1979 is the most recent information concerning the use of the land in Jutiapa. In this sense, in order to know the most recent situation, an analysis of the land utilization was made using the data obtained by remote sensors in 1987 (August), 1988 (December) and 1992 (March). The information related with this analysis is shown in Annex B.4.

Taking into account the mentioned analysis, the land surface is classified as follows:

Land Utilization	Km^2	%
Agricultural lands	1,212.0	37.7
Dry-soil agriculture	503.8	15.7
Wet-soil agriculture	13.2	0.4
Pastures	660.0	20.5
Fruit trees and coffee	35.0	1.1
Forests	145.0	4.5
Bushes and w/o use	1,840.0	57.2
Other uses*	22.0	0.7
Total	3,219.0	100.0

* Include urban zone, roads, lakes, rivers, etc.

3.6.2 Land Tenency

The number of farms by size according to the extension of the land has not been investigated in the department of Jutiapa after the Agricultural and Livestock National Census of 979. According to such census, the microfarms (less than 0.7 ha) and subfamiliars (0.7 - 7 ha) represent 85% of the total number of farms. On the other hand, the medium multifamiliar (45 - 900 ha) and big multifamiliar (more than 900 ha) represent 2.4% in number but have more than 48% of the total surface which corresponds to almost half of it. According to the classification by municipality, the sectors with the greatest concentration of medium and big multifamiliar farms are: Asunción Mita, Moyuta and Pasaco where the livestock and coffee activities predominate, making it possible to assume the existence of big farms conducting livestock activities.

LAND TENENCY BY SIZE IN JUTIAPA

Size	No. of Farms	(%)	Surface (Ha)	(%)
Microfarms	3,209	(11.2)	1,079	(0.6)
Subfamiliars	21,024	(73.6)	41,692	(21.8)
Familiars	3,657	(12.8)	56,783	(29.6)
Multifamiliar Medium	666	(2.3)	74.648	(39.0)
Multifamiliar Big	11	(0.1)	17,139	(9.0)
	28,567	(100.0)	191,341	(100.0)

Source: Agricultural and Livestock National Census, 1979

The Government of Guatemala created in 1979 the lands Bank at the National Institute of Agrarian Transformation (INTA) with the purpose of correct the disequilibrium in land tenency and promote the creation of proprietary farmers, but these activities were paralyzed as land acquisition did not prosper due to the lack of financial resources.

When observing the forms of land tenency in 1979, the two thirds of the farms in Jutiapa are private property. The proportion of rented land is higher in the municipalities of Moyuta and Jalpatagua.

FORM OF LAND TENENCY IN JUTIAPA

Form	No. of Farms	(%)	Surface (Ha)	(%)
Simple tenency				
Owned	19,413	67.9	14,424	87.8
Rented	2,286	8.0	4,489	2.4
Undefined	1,075	3.8	1,732	0.9
Mix tenency				
Owned/ Rented	5,911	18.2	14,424	7.5
Undefined	602	2.1	2,764	1.4
Total	28,567	100.0	191,341	100.0

Source: Agricultural and Livestock National Census, 1979

3.7 AGRICULTURAL EXPLOITATION

3.7.1 Production

Due to the scarcity of irrigation facilities , most of the agriculture in the department of Jutiapa depends on the rainfall. Concerning the distribution of rainfall, 95% of the annual rainfall is concentrated between May to October during the rainy season, while in the dry season, November to April, few rainfall is observed. As a consequence, most of the crops are carried out during the rainy season and in the dry season, cultivation is carried out only in those places where irrigation facilities exist.

Among the main agricultural products with big production volumes and extensive cultivation surface the following can be mentioned: grains like coffee, vegetables (tomato, onion, etc.) and fruit trees (mango, jocote, etc.). Within these products, corn and kidney beans, which are staple food for the population, are cultivated not only on the plains but even at the rough hilly

sides; specially in hilly and mountainous zones, these products plays a vital role in the feeding of the population there.

During the dry season, in a portion of the zones with irrigation facilities, besides cultivating tomato, onion, and chile which have a high profitability, corn and kidney beans are also produced. Through the establishment of more irrigation facilities, production during the dry season will be increased and it will be also possible to control the water flows during the rainy season, with a substantial increment on the yield and expansion of the crops.

(1) Basic Grains

Most of the basic grains within the department is represented by corn and according to INDECA (National Institute of Agricultural Commercialization), the cultivated area is 60 thousand hectares , with a production of around 100 thousand tons. The average yield of the department is about 1.7 to 2.6 t/ha which is slightly above the national average of 1.7 to 2.1 t/ha, showing that this department is suitable for this crop.

The period of the highest cultivation is during the rainy season, but in places where irrigation facilities exist, this cultivation is carried out also during the dry season.

The behavior of the kidney beans production os closely related with the apparition of the mosaic disease, oscillating between 10,000 and 20,000 tons per year.

The average yield of the department is 0.8 t/ha, which is slightly above the national average of 0.7 t/ha, which is evidence that the department is suitable for this crop.

Sorghum is used as human and cattle food. As it is more resistant to drought effects than corn, it is cultivated in places with few rainfall. The cultivated area in the department is around 10 thousand hectares, with an average yield of 1.2 to 1.6 t/ha.

The department can be mentioned as a main zone for rice production. The production zones almost coincide with the distribution of lands with i\deficient drainage with sticky clayish soils. The cultivated area varies remarkably depending on the years, but in the department an average of 2 thousand hectares are cultivated with an average yield of 2.0 to 2.5 t/ha, lower than the national average of 2.5 to 3.0 t/ha. The cultivation is carried out only during the rainy season and not at all during the dry season.

(2) Coffee

Among the coffee cultivated zones, the following ones can be mentioned: the localities of Atescatempa, western Jerez

(around the Chingo volcano), the municipality of Moyuta where the Moyuta and San José Acatempa volcanoes are located. The cultivated area is around 2.1 thousand hectares, but new cultivations are being carried out in the mountainous zones at the southeast of the department. The average yield is 1.0 t/ha, above the national average of 0.7 t/ha.

(3) Vegetables

As vegetables produced at a big scale in the department the following ones can be mentioned: tomato and onion. Both products have a cultivated surface of around 1 thousand hectares. They are cultivated around recovered lands from the Retana lake, in the lands under irrigation of Asunción Mita and other places. Even though it is cultivated in the rainy season, most of the vegetables are cultivated during the dry season using the irrigation facilities.

Beside vegetables above mentioned, small parcels of chile, potatoes, etc. are cultivated.

Among the fruit trees, citrics, melon, mango, jocote, etc., but big-scale cultivation of fruits is not observed.

3.7.2 Cultivation System

The drops depend on the rainfalls, that is why cultivation is carried out mainly during the rainy season, between the May to October. Cultivation during the rainy season consists of basic grains, under the form of single-crop cultivation and joint cultivation. The joint cultivation is more common in Jutiapa, with the exception of rice.

During the dry season, single-crops like onions, tomatoes, and grains are able to be cultivated in those zones where irrigation facilities exist.

Cultivation during the dry season is made independently from cultivation of the rainy season.

The cultivation techniques are detailed in the "Agricultural and Livestock Technical Recommendations for the departments of Jutiapa and Jalapa, 1990" elaborated by the Institute of Agricultural Sciences and Technology (ICTA) according to the characteristics of the department; there, techniques related with seeds, fertilizers, pest control, etc., are detailed.

Concerning seeds of basic grains, ICTA produce the genetic seed, which is cultivated by the farmers, producers of certified seed.

The certified seed is sold at the markets to the farmers in general. The inspection of the certified seeds is made by the engineer of DIGESA in charge of such activity. Concerning

vegetables, most of the seeds are imported.

The most common disease in the region is the mosaic transmitted by the white fly, being tomato and kidney bean the most affected ones by this disease.

3.7.3 Agricultural Administration

The average scale of the agricultural production of the department os 0.3 ha in the case of the microfarms, 2.0 ha in the case of the subfamiliar farms. slightly less than the national average of 0.4 ha and 2.1 ha respectively.

There are agricultural farms which due to the lack of irrigation, in the dry season, can not make any cultivation. That is the reason why these persons offer their services as agricultural workers to other medium and big scale farms or take other jobs as journeymen or handicraft workers. The average area of agricultural production by familiar farm is 15.5 ha corresponding to a scale which allows to absorb the available household labor force. On the other hand, the medium scale multifamiliar farms have 112 ha and the big scale multifamiliars have 1,555 ha, forcing them to hire agricultural workers. The estimated quantity of persons for rural household i 5 members.

When analyzing the production cost of the crops and due to the fact that, in general, the agricultural production is small for the small scale farmers, the productivity of the lands is low and restricted the inputs invested, being this the reason why there is a trend towards extensive cultivation with a low production cost. On the other hand, the medium and big scale farmers use improved seeds, complemented by an adequate agricultural technology; that is why the proportion od the costs of inputs (seeds, fuel, fertilizers, agro-chemicals, etc.) within the production cost is between 40 - 50%, contributing in this way to the expansion of the agricultural production. For this reason, a widening gap between the small and medium scale farmers is being observed leading to a polarization due to the scale of the agricultural production.

The agricultural credits of the National Bank of Agricultural and Livestock Development (BANDESA) present very rigorous conditions to the small scale farmers as conditions for the financing, credit quota, financing procedures, time until granting, etc., and it is not possible to use these resources for the agricultural production. Because resources of BANDESA are scarce, there is a tendency to give more importance to the repayment capacity; it is noted that the credits for agricultural promotion is helping to widen the class gap among the farmers.

Small agricultural machines, seeds, fertilizers, agro-chemicals, etc. which are agricultural inputs, can be obtained in the markets of Jutiapa, El Progreso and Asunción Mita.

3.7.4 Classification of Agricultural Exploitation Groups

Groups of agricultural exploitation of the municipalities are established by using as a reference the type of production system and condition of agricultural exploitation and the production infrastructure of each municipality.

Through the combination of the indexes and groups, it is possible to make the following classification:

Group A1-III: Jutiapa, Jalpatagua, Comapa and Conguaco

It is the group of intensive activity, only in cultivation of basic grains and the income strata of the farmers is low.

The municipalities belonging to this group can be classified in two sub-groups according to the quality of the production infrastructure, with the initial (A) when it is good and (C) when it is deficient.

A1-III-A:	Jutiapa, Jalpatagua
A1-III-C:	Comapa, Conguaco

Group A2-II/III: Agua Blanca, Zapotitlán, El Adelanto

As well as the group above, production of basic grains is developed intensively, but the income strata of the farmers is fairly high. In general, the conditions of the production infrastructure are low.

It is considered that this group is the one with the greatest possibility of increasing their scale of production by improving the production infrastructure and diversifying their crops.

Group B/C-I/II: El Progreso, Santa Catarina Mita, Moyuta, Pasaco, Jerez, Atescatempa, Yupiltepeque, San José Acatempa

It has an agricultural scheme of joint exploitation of basic agriculture based on the production of grains complemented by other sectors; it is a group with an income strata of farmers is above the average.

It is considered that the production infrastructure is in level ranging from medium to superior.

It is a group with possibilities of conforming an area with agricultural potentiality within the department by improving the livestock practices, improving the production infrastructure, and strengthening the agricultural public sector.

Group D-I: Asunción Mita, Quesada

Its agriculture is based on a single production sector of grains and the technological level of agricultural production and income level of the farmers are high. However, it is a group where the intensive use of the land and crops diversification are underdeveloped compared with other groups.

The production infrastructure is above the average.

It is the group considered as capable of efficiently promote the improving of the agriculture, intensifying the use of the land and adopting the joint agricultural exploitation.

3.8 LIVESTOCK PRODUCTION

3.8.1 Generalities

According to information given by the Bank of Guatemala, the department of Jutiapa has around 170 thousand heads of bovine cattle and 50 thousand heads of swine; both correspond to 8% of the total number of the country; this would mean that livestock activities is an important sector in the department.

The survey conducted in 1990 by the general Ministerial Department of General Services, show that in the Region IV, the raising of bovine cattle in extensive pastures is predominant on the coastal plains and the highland, while small-size cattle represented by swine and poultry are raised in the mountainous zones.

The farmers raise cattle, in a small scale and with traditional technologies; also, due to the inferiority in the varieties of breed, rearing method, cattle type, cattle feed, etc., the difference in yield and production is very big compared with the big-scale production.

3.8.2 Varieties and Productivity of the Cattle

(1) Bovine

The bovine cattle is exploited for its milk and meat, and the half-breed varieties are the basic one used in the area; these varieties usually come from breeding the "criollo" as a traditional breed with that of the Brahma, Gyr, etc. and it is also bred with the Holstein, Jersey, Brown Swiss, etc.

Of the bovine cattle raised by the small \-scale farmers in the mountains, most are product of breeding the "criollo" with the Brahma, but there is no systemized breeding.

According to the results obtained by the field studies on the production capacity, in general it is estimated that the period of milking is 8 months, birth rate is 60%, fertility rate is 60%, calves mortality rate is 5 to 10% and milk production of cows is 500 to 800 liters annually.

(2) Pigs

Pigs usually belong to the variety product of breeding traditional breeds (criollo) with the Duroc, Hampshire and Yorkshire varieties. As well as in the case of cows, the consanguineous breeding is advanced and even though the productivity is not even, it is estimated that they give birth twice a year with 7 to 8 piglets each time, a mortality rate above 30%, 45 to 60 day for weaning, 8 to 10 months for fattening period with a weight of 50 to 80 kg per head. However, in the traditional varieties, the fattening period is 12 to 15 months with a weight around 60 kg per head.

(3) Poultry

At the commercial poultry farms around Jutiapa city, foreign hybrid varieties of poultry are raised, modern technology is used where balanced feed is provided and adequate equipment is applied; on the other hand, at the house hold level, traditional varieties are the more common. It is observed that the traditional varieties lay around 150 eggs per year. DIGESEPE is pushing an incubation and distribution project but due to quantity limitations, it is not so well extended.

(4) Other Cattle

Horses are exploited all over the region as an important transport animal; the mule, product of breeding a mare with a donkey, is a favored specie among local farmers. Some equines are raised to work in the fields and for riding.

Goats are exploited mainly among small-scale farmers; due to the breeding process among the traditional species, the varieties generated in this way are becoming less and less good,

at the meat level as well as for milk, being the milk production yield of 1 lt/day/head. The apiculture, even though not organized and advanced, is practiced in some specific zones.

As other type of poultry, ducks, guinea hens, turkeys, etc. can be mentioned.

(5) Pisciculture

Cultivation of the mojarra fish is carried out in some mountainous zones where the river streams are taken in order to store them in reservoirs. The exploitation of the mojarra is at a small scale and most of the production is used for self-consumption of the farmers.

3.8.3 Exploitation Techniques

(1) Bovines

Raising of bovines is traditional; small and medium scale farmers feed them with natural pastures. It is remarkable the food and water deficiencies during the dry season, bringing a decrease in productivity as a consequence.

Some medium scale livestock farmers cultivate green-cut pastures, but as they do not use cutters, the cut portion is excessive, which, beside being a waste, is not consumed by the cattle.

In the big corrals, having good conditions and water is supplied even during the dry season for irrigation of the pastures, a rotative grazing and an adequate administration of the pastures is carried out by using appropriate machinery.

Raising cattle in Jutiapa fulfills a double purpose, but most of the efforts are concentrated on milk production. The milking calves are exported to other departments, which means that no organized milking cattle is being carried out.

(2) Pigs and poultry

In some commercial farms, pigs and poultry are fed with concentrated feed. In many cases, pigs and poultry are left to roam freely around the houses of the farmers, so they can feed by eating corn and sorghum.

Among the small-scale farmers who lack knowledge of a rational exploitation, there is no vaccination taken place, and as a consequence, it is not uncommon for a whole pigs herd and poultry flock to disappear due to the swine fever and the New Castle disease.

(3) Other type of cattle

Equines, mules, and goats are raised around the houses of the farmers or on natural pastures of the mountainous zone.

(4) Pastures

The small-scale farmers feed their cattle only with natural pasture, while the medium-scale farmers sow napier as harvest pasture. On the other hand, as improved pastures can be mentioned: Guinea Pasture, Jaragua, Paragrass and Pangola.

The leguminous are not cultivated as pastures, with the exception of some trees, and the utilization of hay is exclusively done by the big-scale farmers.

There are few cases of crops cultivated for cattle fee. except yellow corn in the mountainous zones.

(5) Diseases

Livestock diseases from tropical zones and contagious diseases proliferate, disturbing the livestock and poultry productivity, even though there are not grave diseases like the african swine fever, etc.

(6) Commercialization of livestock products

The cattle market held more frequently is for pigs and it takes place in Jutiapa. Any cattle business is done through intermediaries. Due to the fact that quality is not asked for, neither their weight is measured, the producers are not interested in raising the quality of the cattle.

The cattle on good standing is transported to the markets in Guatemala city through the intermediaries.

3.9 IRRIGATION AND DRAINAGE

3.9.1 Background

The irrigation system in Guatemala is classified in three types: state-operated, privately-operated and mini-irrigation.

According to the "Master Plan of Irrigation and Drainage" of UNDP/DIRYA, the irrigation surfaces of all the country and of the department of Jutiapa are those detailed in the Table below. The state-operated irrigation units of the department of Jutiapa are 11% of all those in the country and is located in the third place after the departments of Zacapa and Jalapa. The fact that the state-operated irrigation os concentrated in the oriental regions is because it is the driest region in the country and water demand for irrigation is high.

	State-operated	Privately operated	Mini-irrigation	Total
Whole country (ha)	15,303	58,573	2,493	76,369
Jutiapa (ha)	10,645 (10.7%)	1,673 (2.9%)	27 (1.1%)	3,345 (4.4%)

3.9.2 Situation of the irrigation Facilities

(1) State-operated Irrigation Districts

According to the "Master Plan of Irrigation and Drainage", the state-operated irrigation in the district of Jutiapa covers the following 4 units in a potentially irrigable area of 1,645 ha.

1) Asunción Mita Unit

Water is distributed by gravity from the Ostúa river intake. The are actually irrigated is 560 ha (65%) against the potentially irrigable are of 850 ha. This is because of the filtrations in the canals and an inadequate water control. Also, this unit is included in the area of the Trifino Plan.

2) Atescatempa Unit

The irrigated area is divided in 120 ha by means of the Atescatempa river intake (gravity system) and 136 ha by means of pumping underground water. There are pumping facilities in 4 places, but in reality only one pump works. The area actually irrigated is 150 ha (58%) against the potentially irrigable are of 256 ha. The reason why the pumps are not working obey to the high cost of the fuel.

3) El Tempisque Unit

Water is distributed by gravity from the Pululá river and the area actually irrigated is 230 ha (52%) against the potentially irrigable area of 439 ha. It is remarkable the deterioration of the intake and the water control is very inefficient.

4) Santa Catarina Mita Unit

Groundwater is taken from the Ostúa river (pumping elevation: 20 m) by pumping with a targeted irrigable area of 100 ha, but at present only 50 ha are irrigated. The pumping station was installed in 1989 within the river stream, but due to its location which

is lower than the flood levels of 1982 and 1984, it is suffering some damages due to floods. Also, it faces difficulties for the operation and maintenance due to the high electrical energy fees.

(2) Privately-operated Units

The seven privately-operated irrigation units of the department of Jutiapa cover an area of 1,673 ha according to the "Master Plan of Irrigation and Drainage".

(3) Mini-irrigation Units

The mini-irrigation projects started in 1979 with financial support from the USAID. According to the data of DIGESA, within the department of Jutiapa 23 units have been planned and executed with a total benefitted area of 350 ha.

The total irrigated area (356.85 ha) amply differs with respect to the 27 ha of the "Master Plan of irrigation and Drainage". It is supposed that in the Master Plan the inoperative units were going to be eliminated.

(4) Irrigation Method

The irrigation methods employed in the area are by furrows, sprinkling and dripping. The dripping method is carried out in the mini-irrigation units, where underground water id used, with the objective of economizing irrigation water. Because in Jutiapa the wind is relatively strong, there is a special interest in substituting the sprinkler system (which consumes more water due to the strong wind) with the dripping system.

(5) Situation of Operation and Maintenance Activities

The operation and maintenance of the state-operated irrigation districts is made by DIGESA. According to the data of DIRYA, the cost of operation and maintenance of the state-operated irrigation districts is US$80/ha (1986).

Also, the coefficient of real collection of water fees is very low, around 15% as an average in the country, which constitutes one of the reasons for the bad condition of the operation and maintenance in the state-operated irrigation facilities.

In the privately-operated irrigation units, the operation and maintenance is better the bigger is the size of the farms as they have greater financial resources. Concerning operation and maintenance of the mini-irrigation projects, that is carried out by the beneficiaries (cooperatives) on a individual basis. In some cases, the operation and maintenance of the mini-irrigation units is carried out in a satisfactory way, while in others there are problems and the facilities are inoperative. As causes for

the the lack of efficiency of the facilities, besides the high cost of the facilities functioning, the aspect of not having asked the opinion of the local population during the execution stage of the projects can be mentioned.

3.9.3 Situation of the drainage facilities

Related to the drainage problem in Guatemala, the runoff drainage receives attention while the drainage due to high freatic level does not. Compared with the irrigation facilities, the equipment of the drainage facilities are underdeveloped. In Jutiapa, in the state-operated irrigation districts, there are not drainage facilities of importance, because there are no drainage problems due to the high evapotranspiration and filtration in the dry season. According to the "Master Plan of Irrigation and Drainage", the zones requiring drainage in Jutiapa cover an area of 2,265 ha.

3.9.4 Inventory of Planned Irrigation and Drainage Project

(1) Montúfar Irrigation and Drainage Project

It is the irrigation and drainage project with an area to be benefitted of around 4,000 ha in the lower basin of the Paz river elaborated by DIRYA. The area is divided in 2,400 ha with irrigation and 1,060 ha. with drainage.

(2) Alto Mongoy Irrigation Project

This project contemplates catchment of the waters from the Mongoy river and conduct them by gravity through pipelines to the benefitted farms with 100 ha.

(3) Rehabilitation of the State-operated Irrigation Units Project

It seeks to rehabilitate a total of 13 state-operated irrigation units in the country and the main components are: repair of the revetment of the canals, repair of the gates, etc. In Jutiapa two units have been contemplated: Atescatempa and El Tempisque.

3.10 SOCIAL INFRASTRUCTURE

3.10.1 Road System

The road network in the department of Jutiapa is like the one shown in Fig.3.10.1 and from the administrative and operational aspects, roads are classified as follows:

- Central American Highway
- National Highway
- Departmental Highway
- Farm road

According to the studies elaborated in 1987 by Ministerial General Department of Roads, the situation of the national roads network shows bad conditions in a 380 Km stretch which is equivalent to 50% of the total length of 760 Km, according to the Table below. However, at present a 14.4 Km stretch of the Central American Highway (CA) has been rehabilitate even though in the Table is included in the "unusable" category.

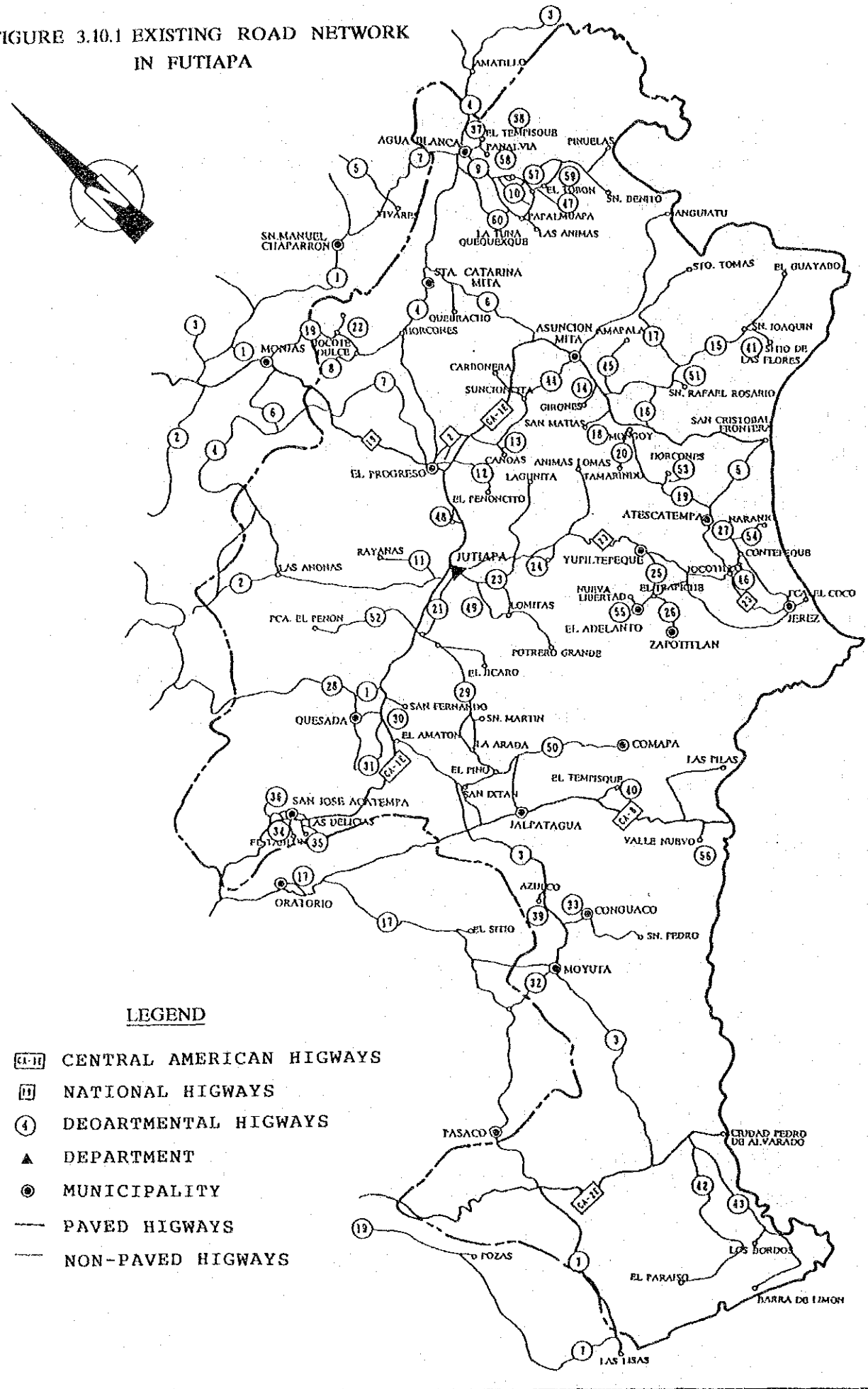
Summary of the National Roads Network, in Kms

	PAVED				EARTHFILL			
STATE	C.A.	NATIONAL	DEPTAL	TOTAL	NATIONAL	DEPTAL	TOTAL	TOTAL
GOOD	0.0	10.0	0.0	0.0	0.0	36.5	36.5	36.5
REGULAR	97.1	0.0	0.0	97.1	22.3	227.1	249.4	346.5
BAD	84.7	12.5	0.0	97.2	22.0	226.5	248.5	345.7
UNUSABLE	14.4	0.0	0.0	14.4	0.0	21.8	21.8	36.2
TOTAL	196.2	12.5	0.0	208.7	44.3	511.9	556.2	764.9

SOURCE: Department of Planning
Ministerial General Department of Roads, 1987

Also the farm roads are in bad shape, with road stretches of hard access and inconveniences during the rainy season. Specially underdeveloped is the arrangement of drainage works and river crossing.

FIGURE 3.10.1 EXISTING ROAD NETWORK IN FUTIAPA



LEGEND

- CA-1E CENTRAL AMERICAN HIGWAYS
- 19 NATIONAL HIGWAYS
- (4) DEOARTMENTAL HIGWAYS
- ▲ DEPARTMENT
- ◉ MUNICIPALITY
- —— PAVED HIGWAYS
- —— NON-PAVED HIGWAYS

3.10.2 Transport and Communications System

The main means of transport in Jutiapa are the buses and taxis. the municipality of Jutiapa is connected with all the other municipalities by a bus network. Also, the main means of transport to main municipalities and out of the department is the bus services rendered by private firms. There is a railway which connects the municipality of Agua Blanca and El Salvador through the department of Zacapa, but at present it is not functioning.

The number of telephone machines installed in Jutiapa is 1,521 units corresponding to one unit for each 40 families. However, the services are concentrated in the municipalities of Jutiapa, Asunción Mita and El Progreso which represent the 95% of the whole units. About the four municipalities which do not have a telephone network, they use radiotelephonic communications.

3.10.3 Electrical Energy

The electrical energy supply system is provided by the national Institute of Electrification (INDE) which provides the energy to the 17 municipalities of the department. It is estimated that the coverage rate of the domiciliary service in general is around 36%. Even though the electrical energy fee varies according to consumption, for an average family the fee structure is as follows:

Energy Consumption (kWh)	Fee
0 - 7	2.7000 Q uniform
7 - 63	0.2700 Q/kWh
63 - 80	0.2556 Q/kWh
80 - 150	0.2484 Q/kWH
Over 150	0.2582 Q/kWH

3.10.4 Water Supply and Sewage System

The water supply system is divided in water supply to the urban zones which is in charge of the Institute for Municipal Promotion (INFOM), and water supply to the rural zones in charge of the Executing Unit of the Rural Aqueducts Program (UNEPAR). The rate of water services coverage is around 30% in the rural zones, being 40% at a departmental level. The rate of coverage in the rural zone, by municipality, is as shown below, being the municipalities of Comapa and Agua Blanca the most underdeveloped (see details in Annex B.9).

Rate of Coverage of Rural Water Service	Name of Municipality
More than 50%	Jalpatagua, Zapotitlán, Atescatempa
40 - 50%	El Progreso, Jerez, El Adelanto
30 - 40%	Quesada, Yupiltepeque, Asunción Mita
20 - 30%	S. Catarina M., Jutiapa, Conguaco, S. José Acatempa
10 - 20%	Moyuta, Pasaco
Less than 10%	Agua Blanca, Comapa

Most of the drinkable water comes from streams and underground water, which is distributed to the rural zones without treatment. The operation and maintenance is in charge of the municipalities; there are some problems of structural deterioration of the facilities, lack of water flow during the dry season, water contamination, etc. For this reason, is very high the rate of diseases caused by the water for domestic consumption and for a lack of hygienic conditions of the population in the zone. The normal fees paid for water consumption are detailed below, reflecting great differences according to the existence or not of pumps and supplying conditions.

Name of Municipality	Monthly Fee (Q)
Jutiapa	2.25
Comapa	8.00
Zapotitlán	1.00
Agua Blanca	5.50

There are sewage facilities in the urban zones of 16 municipalities, except Comapa, but there is no treatment for cloacal waters and black waters are discharged directly into the rivers, becoming one of the causes of water contamination. Because in the rural zones there is no sewage system, the Ministry of Public Health is promoting the use of a toilet and filtering wells for the black waters.

3.10.5 Public Health

In the following Table the situation of public health services is shown. From the 17 municipalities of the department, only 9 have hospital and health centers attended by physicians.

Facilities	Quant	Physicians	Dentists	Nurses
Hospital	1	17	0	10
Health Center	9	12	1	10
Health Center	49	0	0	0
Total	59	29	1	20

Source: Annuary 1987, Ministry of Health and Social Welfare

In the following Table, the most common diseases are detailed, being enteritis and diarrhetic diseases caused by water used by households, are the two most frequent. Due to this situation, it is vital to install facilities for a safe and stable supply of water for domestic consumption.

Facilities	Quant	Number of Patients	Rate by 1000 Habitants
1	Enteritis and diarrheatic diseases	14,788	50.47
2	Respiratory diseases Acute	11,735	40.05
3	Anemia	2,725	9.30
4	Desnutrition	2,666	9.09
5	Skin diseases	2,532	8.64

3.10.6 State of the Social Infrastructure by Municipality

When classifying the situation of the social infrastructure by municipality, this can be classified in five categories, shown in the following Table. The social infrastructure of Comap and Agua Blanca accuse a very bad situation and require a prompt arrangement. In both municipalities it is specially important to arrange the roads and facilities for water supply to the rural zones (see evaluation method in Annex B.9).

Category	Municipalities	Arrangement Level
A	Jutiapa, Asunción Mita	Avanzado
B	El Progreso, Atescatempa, Jalpatagua Quesada	Relativamente avanzado
C	Santa Catarina Mita, Yupiltepeque, Jerez, Conguaco, Moyuta, San José Acatempa	Medio
D	El Adelanto, Zapotitlán, Pasaco	Atrasado
E	Comapa, Agua Blanca	Especialmente atrasado

3.11 ENVIRONMENTAL SITUATION AND AGRICULTURAL SOIL CONSERVATION

3.11.1 Environmental Situation

(1) Natural Characteristics of the Department

The Department of Jutiapa has three physiographical provinces: a) Coastal plain along the Pacific; b) Recent volcanic piedmont; and c) Volcanic chain. The volcanic chain is part of the Sierra Madre, with many lakes, such as Guija lake, Atescatempa lake, and Retana lake.

In the Department, the climate is wet to the south and there is a warm and semi-arid zone to the northeast. The Department is basically characterized by the presence of dry forests and few rainfall from the environmental point of view. It becomes, in general terms, an area of flora and fauna of endemic species.

(2) Life Zones

The classification of the life zones was analyzed based on the proposal of the Forestal National Institute (INF), identifying the different bio-climatic conditions of the territory. In the Department six of the fourteen life zones of Guatemala are represented.

The most extensive life zone of the Department is the subtropical wet forest (template), and is identified by the symbol bh-S(t), covering a surface of 1,989 Km^2, located to the north of the Department. The natural vegetation is represented mainly by the encine, red pine, plantain, oak, and nance.

The subtropical wet forest (warm), identified by the symbol bh-S(c), is the second most extensive life zone, with an area of 1,022 Km^2, and it covers the volcanic piedmont to the south of

the Department. There are species such as chestnut, ant tree, blueberry, and laurel.

The subtropical very-wet forest (warm), identified by the symbol bmh-S(c) is located around Moyuta. Ecological indicators are the cohune nut, vegetables like concaste and the chaperno, the volador, the puntero, the palo blanco, and the mulato. The natural vegetation of these two life zones, bh-S(c) and bmh-S(c), is very modified due to the fact that they coincide with the main agricultural zone of the southern coast of the Department.

The subtropical dry forest, identified by the symbol, bs-S, covers a narrow strip on the littoral of the Pacific, and covers the oriental part of the Department towards Jutiapa and Santa Catalina Mita, occupying an area of 578 Km^2. The red and white mangroves, species characteristic of the mangroves, are some of the ecological indicators. Other species are the pochote, the Pacific walnut, the bottle brush, the botán, and the ceibo.

The tropical dry forest, identified by the symbol bs-T, is located around the Guija lake and occupies an area of 256 Km^2. The representative species are the palo de queso, talpajocote, Pithecolobium mangese, Myrospermun frutescens, and others. The vegetation of this life zones is very similar to the one of Motagua.

The subtropical very-wet forest (cold), identified by the symbol bmh-S(f), is a not so extensive area of only 11 Km^2, located in the Chingo volcano, between Guatemala and El Salvador. The natural vegetation of this life zones is represented by species like the liquidámbar, the fruto de paloma, the pimientillo, the marmalade tree and the myrtle.

Life Zones, according to Holdridge

Life Zone	Surface	Percentage
bh-S(t)	1,988.69 km^2	50.9%
bh-S(c)	1,022.12	26.1
bmh-S(c)	55.55	1.4
bs-S	577.72	14.8
bs-T	255.53	6.5
bmh-S(f)	11.11	0.3

Source: Classification of Life Zones of Guatemala, INAFOR, 1976.

(2) Biodiversity

The ecosystems of Guatemala combine the wild life of the neoartic region of North America with the neotropical region of South America. From the point of view of the biodiversity, Guatemala is one of the most important countries in Central America.

In the Department, the leguminous (leguminosae family) are common, followed by the species of Cyperaceae, Euphorbianceae, Solanaceae and Malvaceae. Along the Pacific coast, mangroves are located. They are characterized by being offsprings of five species of mangroves like: Rhizophora mangle, Clear Avicenia, Bicolor Avicenia, Laguncularia rocemosa and Conocarpus erectus. According to SEGEPLAN, there are 47Km^2 of such forests.

Comparing it with other regions of the country, the Department is relatively poor in species. The analysis of the flora of Guatemala indicates that the mountain wet forests of the highlands of the Department, are priority areas for the conservation of the biodiversity.

The mammals population has been b\very affected on the southern coast of the Department, basically by the deforestation on the piedmonts and coastal plains. Species like t howling monkey and spider monkey were completely exterminated at the beginning of this century. In general the mammals fauna of this Department is poor.

In the Department, the birds are distributed in four geographical areas corresponding to three life zones. They are the lowlands of the oriental Pacific (tropical life zone), the arid interior (subtropical life zone), the geographic area of the subtropics of the Pacific (subtropical life zone), and the highlands zones (mountain life zone).

The sweet water fish and estuaries of the Department belong to the ichthyological province of Chiapas-Nicaragua. The ichthyological fauna is poor, however the endemism is very high and there are native species. Among the species of interest: catfish, pepesca, mullet, sardine, caite, mojarra, saurel, and pululo.

The conservation of the biological diversity is important because: a) species are deposits of genes; b) allow improve the agricultural and forestal products; c) provide an opportunity for discoveries of industrial resources based on natural organisms; and d) preserve the environmental ecology.

Beside the economic value of the flora and fauna, there is the scientific importance, as well as its role of satisfying the cultural and landscape needs.

(4) Main Environmentall Problems

The main environmental problems in the Department are:

1) Deforestation

According to the results of the analysis of the satellite images of the Forestal Action Plan for Guatemala (PAFG), of the forestal coverage of the Department, only 145 Km^2 remain corresponding to 4.5% of the total surface of the Department of Jutiapa; it is one of the Departments with the lowest forestal surface.

In the Department, a high percentage of the forestal lands is being used for agricultural purposes. The deforestation is related to the scarce control of the forestal exploitation and fires, Also, the disappearance of the forest is associated with the population density, lands tenency, economic pressures and cultural patterns, besides overgrazing.

It is common the occurrence of forestal fires in the dry season, which are originated by the action of man when burning the agricultural waste and/or expanding the cultivation areas.

Also, the consumption of firewood is one of the main causes of deforestation. The energy source of the Department os the firewood in more than 90%, being used in 98.5% of the households in the rural areas and 68.7% in the urban areas (ASIES).

2) Erosion

In the Department of Jutiapa the following can be observed: the distribution of the volcanic piedmonts occur in an extensive way, volcanic soils predominate, rainfall varies sharply between the dry and rainy seasons, the intensity of the rain and the absence of vegetal cover, allow the easy erosion of the soils. The extension of 630 Km^2 corresponds to 20% of the total surface of the Department and is classified as areas with acute piedmonts and high fragility. The Department is one of the zones which is very prone to suffer from erosion.

The main reasons for the soils erosion are related to the following factors: a) deforestation; b) overgrazing; c) forestal fires; d) inadequate cultivation practices; and e) lack of soils conservation practices.

As a consequence, the erosion processes produce a lowering of the agricultural productivity, the sedimentation of the rivers by narrowing their section, and therefore, the occurrence of the variation in the flow of the rovers and/or floods.

3) Contamination

The contamination caused by the use of agrochemicals which shows in the soils, water, air and the food products. The contamination basically takes place by an inadequate use of the agrochemicals for cultivation and cattle. The contamination of the waters is a latent problem, which is caused, among other factors, by the use of fertilizers in the agricultural activities.

The lack of treatment of sewage waters us one of the most serious problems in the Department and the country. The contamination is due to the sewage waters which directly goes to the rivers, and the contaminated waters are used for the irrigation systems and human consumption.

The other problem is the scarcity of water, specially during the dry season. Many people of the rural area supply themselves from small ponds or reservoirs of dirty and contaminated waters, as they are shared with animals. Thus, there is a high risk of contamination and the proper conditions are given for the appearance of any type of disease. There is also the environmental contamination due to waste and trash thrown on the highways, ravines, and places near towns or villages.

(6) Policy, Organization, Environmental Law

The environmental sectorial plans try to match the economic development and the protection of the environment, in order to promote the stability and quality of the living conditions of the population. Based on these criteria, the management of the renewable natural resources will become one of the priority action areas for the Government.

Also, one of the objectives contemplated in the "Trifino Plan", as the first area of the project for "Development of Border Areas in Central America" in charge of the Technical Unit OEA-IICA, in which part od the Department is included, is the conservation of the environment.

The main laws and regulation related to the environment are as follows:

Law for the Protection and Improvement of the Environment -CONAMA- (Decree Number 68-86)

Law for Protected Areas and Regulations -CONAP- (decree Number 4-89)

Forestal Law -DIGEBOS- (Decree number 70-89)

The main governmental organizations dealing with the environment are the Environmental National Commission (CONAMA) and the National Council of Protected Areas (CONAP).

CONAMA directly depends of the Presidency of the Republic and its function is to advice and coordinate all the actions of the formulation and application of the national policy for the protection and improvement of the environment, making it possible through the corresponding State Ministries, General secretariat of the National Council for Economic Planning and decentralized, autonomous, semi-autonomous organizations, municipalities and the private sector of the country.

The CONAP is integrated by the representants of the following entities:

National Commission for the Environment	(CONAMA)
Ministerial Department of Forests and Wildlife	(DIGEBOS)
Guatemalan Institute of Tourism	(INGUAT)

(6) Protected Areas

By Decree Number 4-86, the Guatemalan System of Protected Areas (SIGAP) was created. In the Department, special protection is given to the Guija lake (extension of 44.2 Km^2 , only about 1/3 corresponds to Guatemala, altitude of 427 m.a.s.l); ecological reserves and natural monuments constituted by volcanic cones such as: Ipala (1,650 m.a.s.l), Amayo (1,544 m.a.s.l), Cerro Redondo (1,050 m.a.s.l), Culma (1,027 m.a.s.l), Chingo (1,775 m.a.s.l), Ixtepeque (1,292 m.a.s.l), Moyuta (1,662 m.a.s.l), Suchitán (2,042 m.a.s.l), Tahual (1,716 m.a.s.l), and Las Víboras (1,070 m.a.s.l).

3.11.2 Conservation of the Agricultural Soils

(1) Soil Fragility

The Department of Jutiapa is characterized by the presence of extensive volcanic piedmonts, the predominance of volcanic soils, notorious variations of rainfall between the dry and rainy seasons, the rain intensity, and the absence of a vegetal cover causes an easy erosion of the soils. The extension of more than 630 Km^2 corresponds to 20% of the total surface of the Department and is classified as areas of severe piedmont and high fragility. The Department os one of the zones extremely prone to suffer from erosion of the soils (SEGEPLAN-UNDP).

(2) Soils conservation Project

From 1986, DIGESA established the specific project of soils conservation, using the "Pago Social" (Social Payment) line of credit of BANDESA. The social payment consists in provide financial help the small-scale farmers in order to motivate them to implement soils conservation works in their lands, Since 1988, fiduciary funds provided by the International Agency of Development (IAD) have being used. Before this, the "Pago Social" was used for a similar project of the IAD, denominated "Diversification Project for the Small-scale Farmer".

All throughout the period from its beginning until 1991, the surface stabilized by the Project is around 11,290 ha, and the treated average annual surface is about 1,883 ha. The number of beneficiaries is 11,892 families with a total loans value of Q.2,116 thousand quetzales (DIGESA). The interest and participation of the farmers in this project is very remarkable. However, in 1991 the financial support of the "Pago Social" ended, being this the reason of a decrease in the treated surface in 1992. DIGESA continues this project with a small subsidy called "Food" with its own resources and own efforts of the farmers.

(3) Soils conservation practices

The main soils conservation practices are: furrows cultivation, crops rotation, live barriers, dead barriers, ditches at hill sides, terraces, etc. These practices are carried out along the contour lines. Within the projects of DIGESA, the ditches at hill sides together with live and dead barriers are the most common practices.

3.12 COMMERCIALIZATION OF THE AGRICULTURAL PRODUCTS

3.12.1 Actual Situation of the Main agricultural Products

The main agricultural products of the Department of Jutiapa are: basic grains (corn, kidney beans, sorghum, and rice), coffee, tomato and onion. As products of smaller scale: potato, chile, jocote, tobacco, maguey, and wheat. Below, the conditions of demand and supply, profitability, farmer prices, and wholesale prices of the main products are described.

(1) Supply and Demand

The Table B.11.3 of Annex B.11 shows the balance of basic grains (corn, kidney beans, sorghum, and rice) at a national level. From such Table, it can be said that there was a production deficit in 1991 of corn, kidney beans, and rice at a national level. The unsatisfied demand covers the areas of human and animal consumption, industrial use and seeds. Thus, in that year INDECA authorized commercial importation of these basic grains, in spite of the donations given by the United States.

With the lowering of the availability of supplies, the per capita consumption of corn and kidney beans of the Guatemala population has been decreasing in recent years. On the other hand, the per capita consumption of rice increased in 1991, even though its level is well below the ones of corn and kidney beans.

(2) Farmers and Wholesale Prices

In Table B.11.7 of Annex B.11 the farmers and wholesale price index of main agricultural products for the last decade (1982-1991) is shown. Rice reached in 1991 the highest price for the farmers within the seven products considered there.

Coffee growers enjoyed from a good profit till 1988 as a peak year, but their profits started falling due to the fall of prices in the international market.

Prices for tomato growers increased significantly in 1990 and 1991 after a listless performance during the period 1982-1989. It is assumed that the same phenomena occurred with the onion, judging by the wholesale prices.

The monthly evolution of prices (January 1990-May 1992) of farmers prices in the Department of Jutiapa is shown in Table B.11.8 of Annex B.11. Of the four basic grains, the kidney beans showed the widest fluctuation with an index of 3.25 between the maximum and minimum level, while the variation for the other three grains was much lower, with indexes below 2.0.

The producers price of coffee registered a big fall during the 26 months between January of 1990 and February of 1992, reflecting the movement of international prices. The average monthly price of February fell to 60% of the level of September of 1990.

Due to the lack of an stable market, the fluctuation of the prices of tomato and onion is notorious; these two vegetables showed a variation of prices between the maximum and minimum of more than 4 times (tomato: 5.5 times, onion: 4.4 times) in a year.

(3) Profitability

Based on the information of BANDESA, the most profitable crop per land unit is the tomato, followed by onion and rice. Profitability of grains like corn, kidney beans, and sorghum is low and its exploitation means a deficit in some municipalities, taking into account the cost of the household labor. In the Department of Jutiapa, is predominant the cultivation of associated grains like corn+kidney beans+sorghum, corn+kidney beans and corn+sorghum and in general terms, the profitability of the basic grains improves with this associated system.

3.12.2 Commercialization System

(1) Production uses

It is estimated that the post-harvest waste of basic grains reach between 4 and 5% of the production and in the case of the tomato and onion, as they are perishable products, the percentages are still higher, reaching levels of 15% and 10%, respectively. Of the remaining production, the percentage used for self-consumption by the farmers is: 12.4% of corn, 19.2% of kidney beans, 17.1% of sorghum (cattle feed), and 14.1% for rice; the proportion used for self-consumption of coffee, tomato, and onion is almost insignificant. Even though the quantity is small, one part of the production of basic grains is used for seeds.

(2) Channel and facilities for commercialization

1) Corn, kidney beans, and sorghum

The National Institute of agricultural Commercialization (INDECA) has assumed the responsibility of stimulating the production of these products by establishing a guaranteed price for each semester, and to implement this policy, buy-sale stations were established in Jutiapa, Jalpatagua, and Montúfar. These stations together with the regional silo of Jutiapa have a total storage capacity of 8,650 tons of rains. However, such institution has not worked quite efficiently and, as a consequence, stopped participating in the buying of basic grains since 1991. Even though it is said that INDECA offers to the farmers the use of its facilities for drying and/or storage of the harvest, at present that activity is not being carried out.

Because there is a lack of a commercialization or recollection center within the Department, the business of buy and sale of basic grains take place at the farms between the farmer and the intermediary and in most cases, the former has to accept the prices proposed by the latter.

2) Rice

In general, the rice growers sell the rice at their farms to the intermediaries and these, in turn, commercialize it to the processing firms located in the municipality of El Progreso. These rice processing firms are affiliated to an association, which has a big influence, not only on the commercialization process, but, in fact, fix the price for both farmers and consumers. To the rice mills of El Progreso, the rice produced in the main regions of

the country: El Petén, the Pacific coast, Izabal, etc. The processing capability of the rice mills in El Progreso, as a whole, reach 100 ton of grain per day and the operations are affected by seasonal reasons, being higher during the harvest time.

3) Coffee

Most of the coffee growers in Jutiapa do not have a peeler, that is why they sell their crops (mature coffee) to the mills where coffee is peeled and dried. Once coffee is processed, the parchment coffee is taken to the roasting firms or directly exported through intermediaries.

The mills for coffee processing are the property of cooperatives and private enterprises.

4) Tomato and onion

In the Department of Jutiapa a remarkable stability in the production of tomato and onion can be observed; it is estimated that 92% of the production of onions in the Department is produced between February and April and 80% of tomato production is concentrated between April and June.

These two products of Jutiapa are sent to two main markets: El Salvador and Guatemala City.

El Salvador is the main importing country of tomato and onion, representing almost the whole exports of the former and most of the latter (for the period 1987-1991, 99% of tomato exports and 92% of onion exports). In particular, in 1991, exports of onion to El Salvador increased dramatically, reaching levels ten times higher than those registered in the past four years and, in the same way, exports of tomato reached the highest historically peak. Also, it is worth to mention that with the process of pacification, exports to Nicaragua increased in 1991.

Transport workers from El salvador emigrate to Jutiapa to directly negotiate with the farmers, who buy vegetables for cultivation and they are who take care of recollecting and classifying those products at the farms for a better marketing appeal in El Salvador.

The commercialization channel for the domestic market is represented by the chain producers-intermediaries-wholesale traders (in the market located at the Terminal)-valley markets or retail traders.

In the municipality of Monjas, Jalapa, there is a processing plant for vegetables. This plant was built in 1984 in order to process tomato, chile, cucumber, etc., but its operation was paralyzed after some years.

3.13 INSTITUTIONAL SERVICES

3.13.1 Entities in Charge

The entities giving services for the agricultural and livestock and food development (production administration, extension, research, and technological transfer, agricultural credit, etc.) are: DIGESA, DIGESPRE, ICTA, DIGEBOS, INDECA, BANDESA, etc.

3.13.2 Extension Services

(1) Agricultural Sector

The technical assistance or extension is given by DIGESA. The Region IV office, located in the municipality of Jutiapa, is responsible of giving such services, in Jutipa as well as in the departments of Jalapa and Santa Rosa. DIGESA has its offices in all the municipalities of the Department, with a staff which varies between one and three technicians.

Besides offering the services above mentioned. DIGESA is in charge of giving services like the improvement of the living conditions of the habitants od the zones.

Apart from DIGESA, ICTA is in charge of giving technical assistance and technological extension. The soils conservation projects are in charge of DIGEBOS and DIGESA.

(2) Livestock Sector

DIGESEPE is the entity responsible of the technical assistance and technology extension to the small-scale farmers, and its regional office in the municipality of Jutiapa has a staff of veterinarians and other officers, who give the mentioned services. Also, in each municipality of the Department there is a branch of DIGESEPE where technicians give their services directly to the cattle raisers. The lack of equipment and vehicles is a limitation for a better achievement of the services.

In Asunción Mita a poultry raising project financed by Holland can be identified. This project has a main objective the incubation at the farm of DIGESEPE and distribute the hens to the small-scale farmers for the improvement of the nutrition system, but so far this project has not generated the expected benefits due to a lack of adequate capacitation to the farmers concerning poultry raising.

Within the Department, the diagnosis center for animal diseases are located in Acequia and Pedro de Alvarado. The latter is located in the border with El Salvador and is in charge of implementing the quarantine of the animals coming from El Salvador. Both centers were recently constructed, with enough personnel, but as in the case of DIGESEPE, the deficiency of the equipments for inspection and lack of vehicles prevent the realization of more adequate activities.

3.13.3 Research and Tests

The Institute of Agricultural Sciences and Technology (ICTA) is responsible for the researches and studies about agricultural and livestock technology and science. The regional office of ICTA in Jutiapa has an experimental farm of 10.8 ha, where tests, reproduction and distribution of seeds of basic grains take place.

ICTA makes researches and tests at farm level concerning basic grains (corn, kidney beans, and sorghum), livestock and regional economy. At the same time, is in charge of teaching and capacitation of the technicians of DIGESA and DIGESEPE.

On the other hand, ICTA has a close relationship with the international institutions such as CIMMYT, CIAT, etc.; its Region IV office (in Jutiapa) participates at present in the project of reproduction and distribution of the kidney beans of CIAT and is one of the participating organizations in the project "Self-sustained Agriculture, Forestal and Pastures Systems for Small-scale Farmers of the Dry Topics of Central America" executed by CATIE.

3.13.4 Agricultural Credit

In the field of agricultural credit, there are two types of objective for financing, from the point od view of the relationship between the economic activities and their collaterals. The former are financial investments intended to improve o increase the efficiency of the natural resources, introduce irrigation systems or construct plants for industrial processes; the latter are financial investments aimed to buying inputs like seeds, fertilizers, or implements and tools which can be amortized annually. The former \m from the beginning need to have a collateral. If is lands, very conservatively valued, do not offer any risk, but if it is the latter case, which may be more important, due to the need of its application in a project, while smaller the assets, smaller will be its value.; even more in the case of farmers who do not own lands.

BANDESA is a public institution responsible for the credit assistance to the farmers. BANDESA grant agricultural credits to the producers with two different funds: fiduciary and banking

funds. The resources for the fiduciary funds are provided by the IDB and USAID, who through a credit program, aimed to help the small and medium agricultural and livestock producer and cooperatives and other agricultural organizations who promote the development of the cooperativist movement in the rural area.

Until 1991, the rate of interest applied to the fiduciary funds was softer (10% annually) than the banking funds (21% annually), but from 1992 both funds have an equal interest 21%.

In the Department of Jutiapa there regional offices and agency of BANDESA in the municipality of Jutiapa, other agency in Asunción Mita, and two saving agencies in Jutiapa and Atescatempa. The total amount of the credit granted in Jutiapa for 1990 was Q.8,391,419, from which Q.5,498,670 (65.42%) was used for banking funds and Q.2,901,749 (34.58%) for fiduciary funds. However, the amount of available credit was bigger for fiduciary funds (56.88% of the total) than the banking funds. This contrast is explained by the difference of the unit amount of credit; each user of the banking funds received Q.5.903 as average credit, while the average credit granted to the users of the fiduciary funds was below such amount (Q.2,365).

Concerning the uses of credit granted by BANDESA in Jutiapa, around 36% is for cultivation of corn, followed by coffee, onion, tomato, and raising cattle and harvesting activities. The total area for agriculture covered by the credit of BANDESA was 10,107.8 ha., equivalent to the one fourth of the total cultivated area in the Department.

3.13.5 Farmers Organization

According to the information of the National Institute of Cooperatives (INACOP), the number of existing cooperatives in Jutiapa is 20, from which 16 are agricultural cooperatives. The rest of the cooperatives are: savings and loans (2), consumption of different articles (1), and production of bread and its derivates (1). Jutiapa is one of the departments where the cooperativism is underdeveloped. In the INACOP office in Juriapa there are only two technicians who are in charge of attending 20 cooperatives and promote the organization of new cooperatives.

The economic activity of the agricultural cooperatives is limited to the production of basic grains and vegetables, with the exception of the coffee cooperatives who own their own mill for processing (peeling and washing) and drying coffee.

CHAPTER 4

DEVELOPMENT OBJECTIVES

CHAPTER 4: DEVELOPMENT OBJECTIVES

4.1 DEVELOPMENT RESTRICTING FACTORS

The restrictions faced by the agricultural and livestock and rural sector of the Department of Jutiapa can be summarized as follows:

Agricultural and Livestock Production Restricting Factors

- Adverse physical conditions
  - . Lands (Distribution of unproductive soils, steep piedmonts)
  - . Water resources (Uneven seasonal distribution of rainfall, water scarcity in the dry season, remarkable variation of the water flow)
- Underdeveloped system of cultivation and agricultural and livestock exploitation and lack of conditions for the creation of new job sources.
- Structural deterioration and bad functioning if the existing agricultural and livestock facilities.
  - . Lack of an adequate organization for operation and maintenance of the facilities
  - . Lack of financial resources
- Inefficiency in institutional services
  - . Technical assistance and extension services
  - . Commercialization services
  - . Agricultural credit services

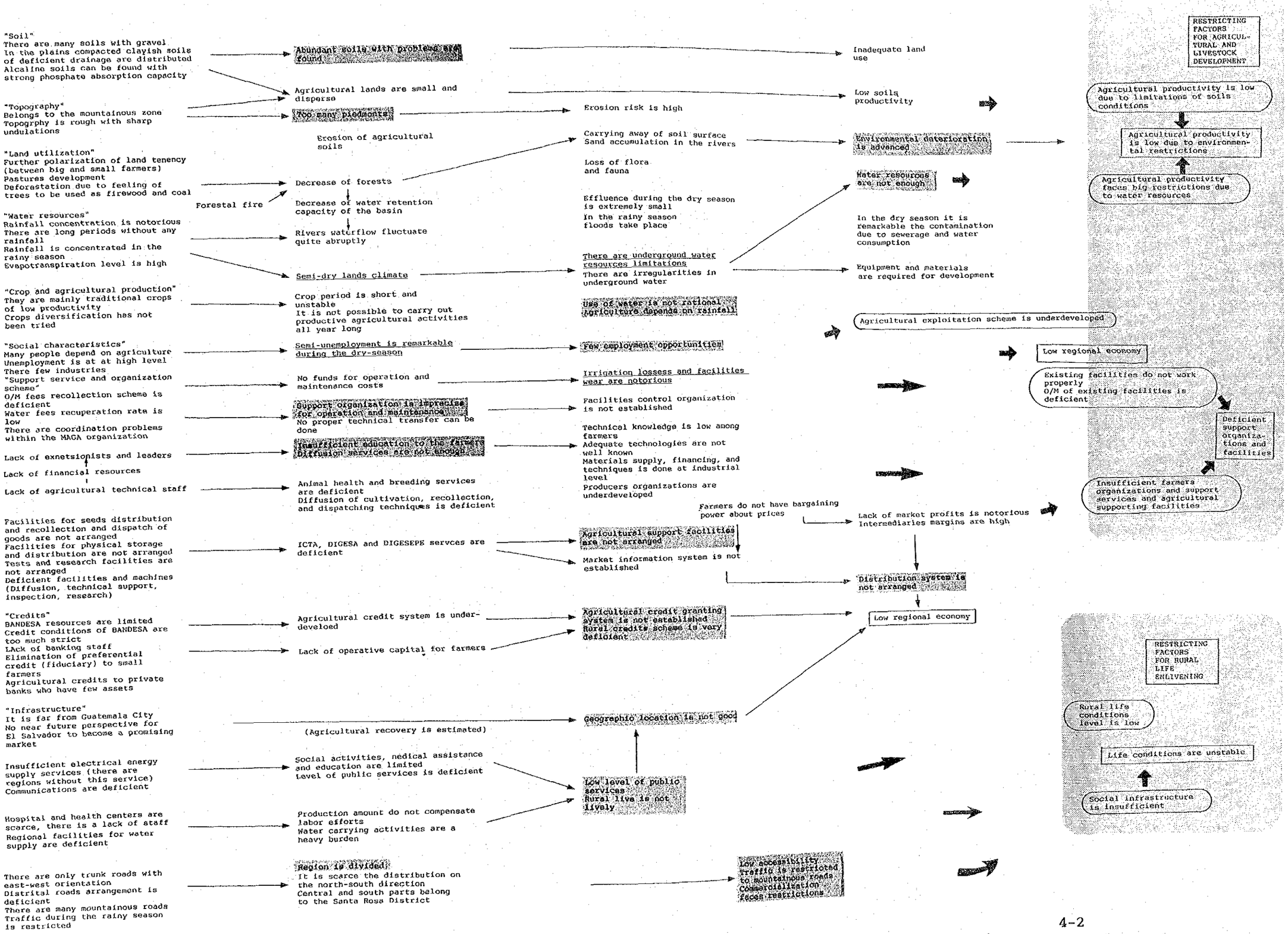
Life conditions

- Road access difficult (Road system is underdeveloped)
- Low coverage level of social services (electricity, social communications, health and drinkable water)

Such services are closely related one to each other.

In order to achieve a sustained development of the agricultural and livestock and rural sector is necessary yo alleviate and improve these restricting factors.

FIGURE 4.1.1 PROBLEMS OF RURAL AND AGRICULTURAL AND LIVESTOCK DEVELOPMENT AND RESTRICTING FACTORS OF DEVELOPMENT



4.2 DEVELOPMENT POTENTIALITY

Having in mind that: 1) agricultural lands are not being used according to their best potentiality; 2) there are enough water resources for agricultural purposes; 3) socioeconomic resources also can be exploited, it is possible to say that the Department of Jutiapa has a high potentiality for its development in the future, and through a better use of this possibility, the Department of Jutiapa can achieve that expected development.

4.2.1 Development Potentiality of the Land Resource

In these moments the areas suitable for agriculture in the dry lands are dedicated in practical terms for cultivation of grains and vegetables. However, land utilization efficiency level is quite low, due to the fact that only one crop is obtained per year and cultivation is made in an extensive way. Thus, even though there is no possibility of widening the agricultural surface in the dry lands, there is still a basic hope for a better utilization of the lands by introducing irrigation systems and facilities.

On the other hand, lands suitable for agriculture in dry lands are being used quite below their potential cultivation area; in this sense, the cultivation area can be extended.

The Department of Jutiapa has a total of 82,950 ha of lands suitable for agricultural purposes (37,900 ha for exploitation in wet lands, and 34,000 ha for pastures and fruit trees growing).

4.2.2 Development Potentiality of Water Resources

The flow of available water resources to be used for development purposes is estimated to be about 500 million m^3 per year, divided in 450 million m^3 of groundwater and 50 million m^3 underground water. Quantitatively, with this flow, it is possible to use the extension of suitable lands for agricultural and livestock development, but the concentration of groundwater in the rainy season becomes a limitation when using them for agricultural purposes.

4.2.3 Socioeconomic Potentiality

Evaluation of the potentiality of socioeconomic conditions of each municipality of the Department was made based on the parameters of location, accessibility, equipment of agricultural infrastructure, social services, institutional services, and planned programs and projects. The results of the evaluation area as follows:

SOCIOECONOMIC POTENTIALITY EVALUATION OF THE MUNICIPALITIES OF JUTIAPA

MUNICIPALITIES	EVALUATION PARAMETERS 1	2	3	4	5	6	INTEGRAL EVALUAT.
Jutiapa	a	a	a	c	a	a	A
El Progreso	a	a	a	c	a	c	A
Sta. C. Mita	b	b	b	a	a	a	A
Asunción Mita	a	a	a	a	a	a	A
Jerez	c	c	b	c	b	c	C
Agua Blanca	b	c	b	c	c	a	B
Atescatempa	c	b	a	a	b	a	A
Zapotitlán	c	c	c	c	c	c	C
El Adelanto	c	c	b	c	c	c	C
Yupiltepeque	c	b	b	c	b	c	C
S. J. Acatempa	c	a	c	c	c	c	C
Comapa	c	c	c	c	c	c	C
Conguaco	c	b	c	c	c	c	C
Moyuta	b	a	b	a	a	a	A
Quezada	c	a	a	c	c	a	B
Jalpatagua	b	a	b	a	a	c	A
Pasaco	c	a	a	a	c	c	B

Note: 1- Geographical location
2- Accessibility to Guatemala City and to the head municipality
3- Agricultural infrastructure
4- Social services
5- Institutional services
6- Programs and projects inventory

4.3 BASIC CONCEPTS FOR DEVELOPMENT

4.3.1 Governmental Policy for Agricultural and Livestock Development

Within the "Economic and Social Policy for the Period 1991-1996" the Government of Guatemala has established as one of its strategies, the development of the agricultural and livestock sector which is the foundation of the economy of the country, fixing as a goal the promotion of the agricultural and livestock sector and sustainable development through:

1) Improvement of the self-supply rate of food products,

2) Rational exploitation of renewable natural resources,

3) Rectification of production disequilibrium between small and large farmers

To obtain the expected results, the Agricultural and Livestock and Nutrition Public Sector has planned to develop five specific policies:

(1) Production development and exploitation of renewable natural resources

(2) Optimal land utilization

(3) Commercialization and export support

(4) Support of food-supply stabilization policies

(5) Strengthening and modernization of the Agricultural, Livestock, and Food Public Sector

4.3.2 Importance of the Development Strategy

Compared with other departments, the Department of Jutiapa has a low Departmental Gross Domestic Product level and its productive sector is concentrated on agricultural and livestock activities. Also, it faces many problems, like low income levels, high unemployment rate and massive emigration out of the Department. Public and private investments aimed towards an improvement of the productive and social infrastructure are underdeveloped. For those reasons, the Department is in a economically poor situation and is classified as a poor region.

The restrictive factors for the agricultural and livestock development can be summarized in the following three points: 1) low agricultural productivity, 2) lack of adequate arrangement of the infrastructures and institutional services, and 3) instability of the life foundations. In spite of these restrictive factors, the development potentiality is quite big and it is possible the sustained development of the agricultural

and livestock sector, because it is still low the level f rational utilization of natural resources like lands and water, besides the fact of being in a geographic position relatively favorable for transport development.

The elaboration of the present Master Plan for the Integrated Rural and Agricultural and Livestock Development Project will be based on development strategies and policies of the Central Government, mentioned before, and at the same time, the development objectives will be established, as a project clearly reflecting the restricting factors and potential for rural and agricultural and livestock development characterizing the Department of Jutiapa.

(1) Global Objectives

Global objectives of the Integrated Rural and Agricultural and Livestock Development Project are the following:

1) Optimal and rational exploitation of renewable natural resources

2) Equilibrate regional differences through improvement of the regional economy

3) Enlivening of the rural life

(2) Specific Objectives

Specific objectives are established in agreement with the global goals, as shown below:

1) Improvement of agricultural productivity through optimal exploitation of land and water resources

2) Securement of adequate food supply

3) Export promotion through diversification of agricultural products

4) Creation of new employment sources and capacitation of agricultural labor force

5) Farmers' income increase

6) Strengthening and modernization of institutional services for agricultural and livestock support

7) Equipment of the rural infrastructure

8) Enlivening of rural life

At the same time, to achieve the specific objectives mentioned above, corresponding strategies will be established in

accordance with each item (sectors) of development, like the lands utilization plan, agricultural exploitation plan, arrangement of agricultural and livestock infrastructure plan, etc. The relationship among the restricting factors for development, problems, development objectives and items, is shown in Fig. 4.3.1.

On the other hand, in the present Master Plan a special importance will be given to the development of small and medium scale, who have relatively low income levels and living in a underdeveloped living conditions. Concerning the plan for agroindustry and rural organization and institutional services, the role of women within the development process will be also considered.

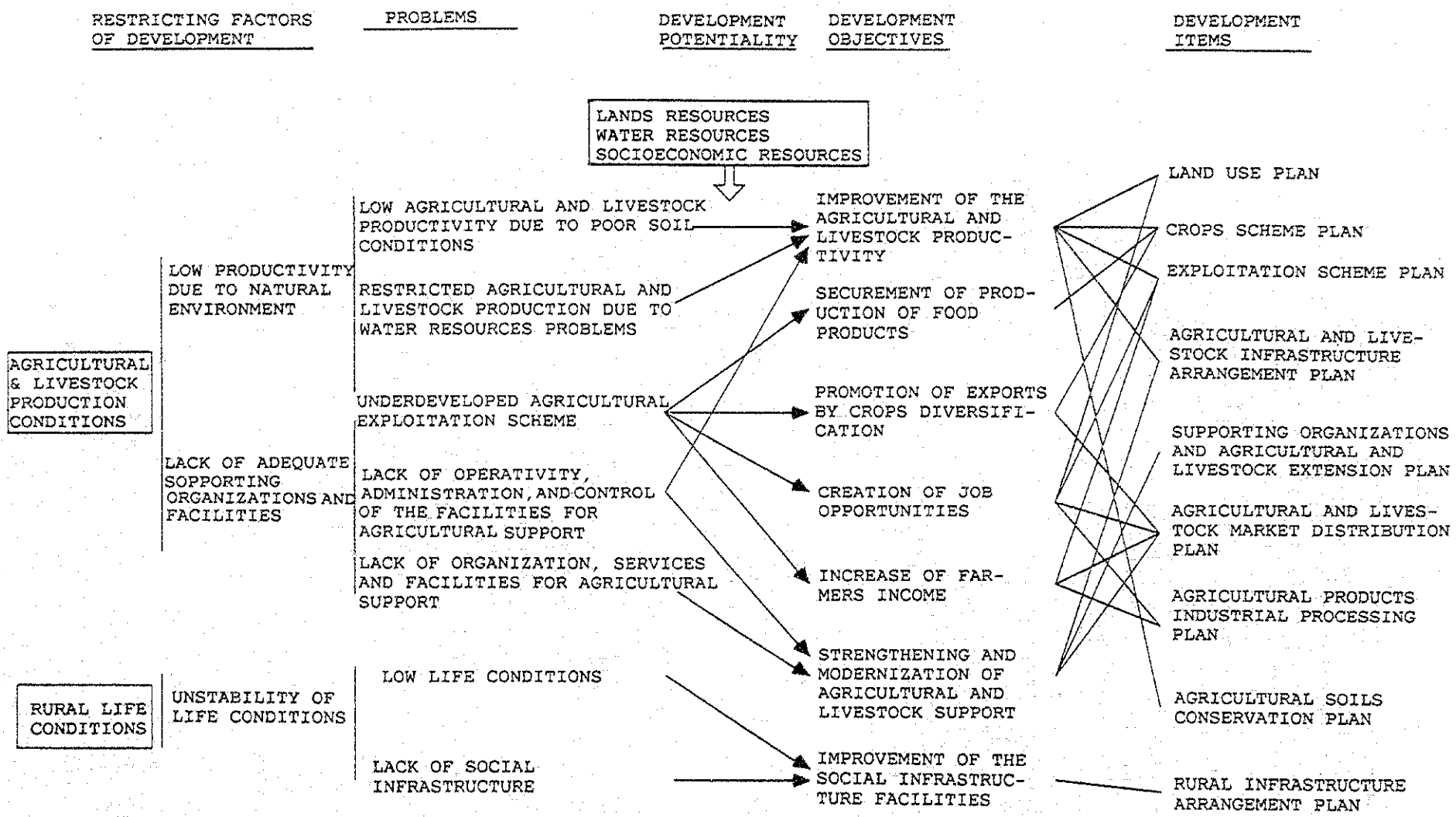


FIGURE 4.3.1 BASIC CONCEPTS OF DEVELOPMENT

4.3.3 Development by Stages

The Project Area for the present Integrated Development Project is a large region with a total surface of around 3,200 Km^2 covering the whole area of the Department of Jutiapa. On the other hand, the development components include multiple sectors related with the agricultural and livestock production and the living conditions in the rural zones.

For that reason, for the implementation of the present Project it is necessary that progress must be done in stages, starting from that component which is important and urgent in each sector or sub-region, because in order to achieve the expected results, it will take a long time.

The most evident cause of underdevelopment in the agricultural and livestock sector is that renewable natural resources like lands and water are not adequately exploited. As a consequence, production must be improved and diversified in the first place, besides improving the life conditions level and arranging the productive agricultural and livestock and social rural infrastructure making it possible an optimal exploitation of the resources.

In the present Integrated Development Project, short term development period is the first 5 years and long term development the next 15 years so to conclude the Project in 20 years. 1994 is established as the initial year for the Project.

1) Short term development plan (first 5 years)

   Goal: Development of the productive and social rural infrastructure as an important and urgent item

2) Long term development plan (next 15 years)

   Goal: Global reactivation of the departmental economy

For the development plans of each component, the basic development guidelines mentioned before will be considered.

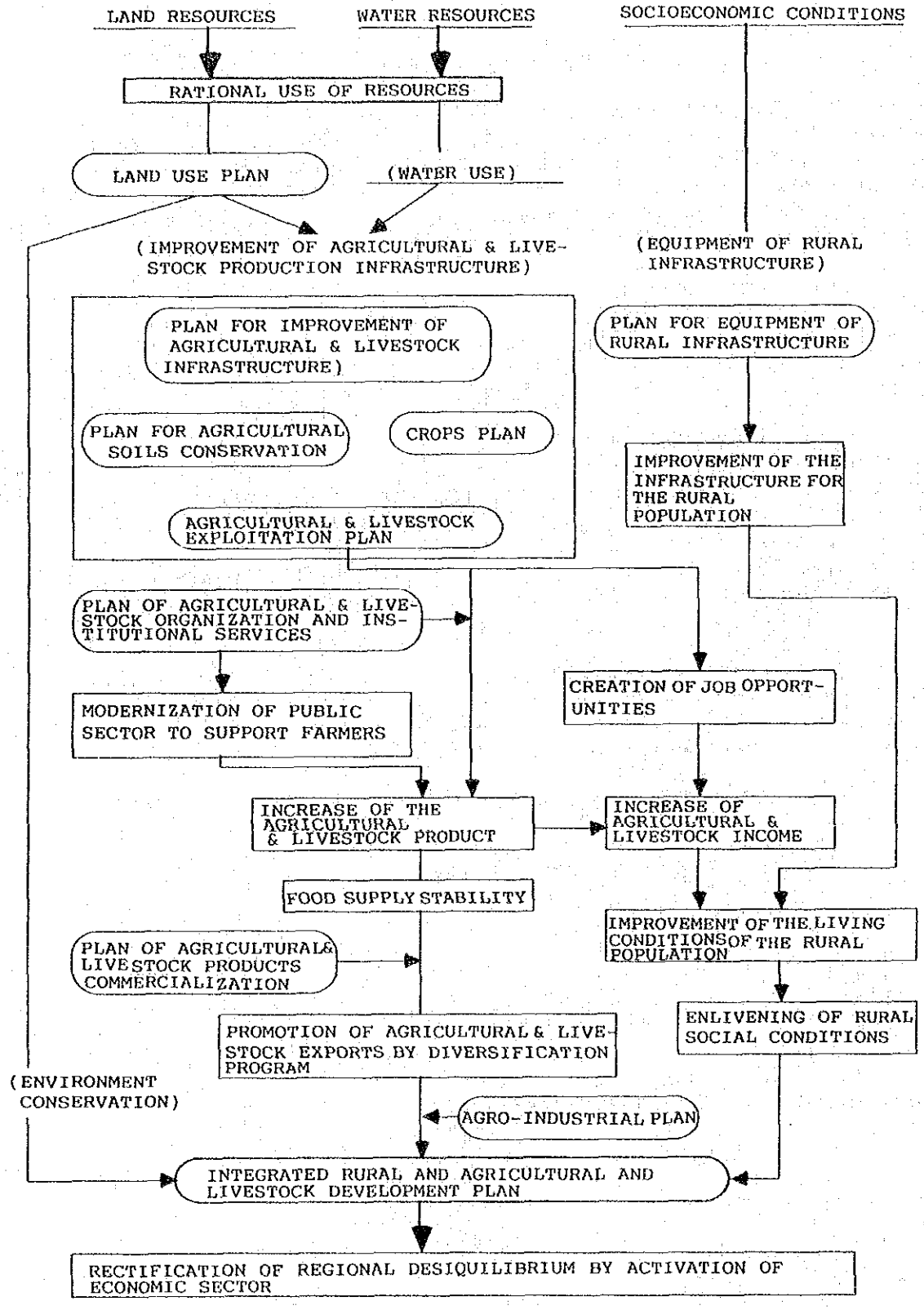


FIGURE 4.3.2 FLOW CHART OF PLANNING FOR INTEGRATED RURAL AND AGRICULTURAL AND LIVESTOCK DEVELOPMENT

4.4 RURAL AND AGRICULTURAL AND LIVESTOCK DEVELOPMENT STRATEGIES

The rural and agricultural and livestock development strategies are based on the development objectives mentioned in the previous chapter. These strategies are formulated for each component of the Study for the Master Plan in the following manner:

4.4.1 Agricultural and Livestock Development Plan

(1) Land utilization

1) In order to improve agricultural and livestock productivity, lands will be rationally exploited according to their productive capabilities.

2) Promote agricultural and livestock development in the lands suitable for agricultural and livestock purposes.

3) To pay more attention to soils conservation in those lands not suitable for agricultural cultivation and pastures.

4) Preservation of existing forestal lands.

5) Intensification in the utilization of the lands.

(2) Agricultural and Livestock Development

1) Agricultural development

a) Implement crops rotation according to the productive capability in the areas in order to generate a high added value.

b) Introduce agricultural products targeted for the markets outside the Department and for export.

c) Promote the shift from the present extensive agricultural practices to a labor intensive agricultural practices in order to make good use of the labor force of the small and medium farmers.

d) Exploit water resources in an efficient way so to intensify the land utilization.

e) Facilitate distribution of certified seeds together with giving extension services of the corresponding technology.

2) Livestock Development

a) Through livestock development which capitalize regional characteristics of the municipalities of the Department of Jutiapa, it is hoped that the income of small and medium farmers outside the agricultural sector will be increased.

b) Concentrate the activities in two aspects: development which has a target the national and international markets, and development targeted to the local market and self-consumption.

c) Promote development of sectors which facilitate the concentration of the labor force of small and medium farmers in order to make them compatible with the large farmers.

d) Facilitate extension activities of technology and capacitation for the small and medium farmers for making a rational and efficient use of raw material as cattle feed, instead of increasing the number cattle heads o number of poultry. Productivity will be increased through improvement of the production characteristics of each unit.

e) Introduce animals of excellent varieties and give extension services of the feeding technology and animal breeding.

(3) **Agricultural and Livestock Infrastructure**

1) Give a high priority to the development of the irrigation system by direct catchment from the rivers and water distribution by gravity.

2) Through the rehabilitation of existing facilities, expand the area under irrigation and increase irrigation efficiency.

3) Facilitate the development of embankments, ponds and underground waters according to the aero-climatic conditions of the area.

4) Improve the drainage of swampy zones.

5) Establish an efficient irrigation system.

6) Establish a more effective system for operation and maintenance of the water irrigation

facilities.

(4) **Conservation of Agricultural Soils**

1) Implement programs for soils conservation (eliminate the degradation and recover the productive capability of the soils in order to increase and keep the agricultural and livestock productivity).

2) Incorporate forests for their conservation and alleviate the deforesting process.

3) Prevent forestal fires to preserve forestal resources.

4) Decrease firewood consumption in order to slow down the deforestation process.

5) Reforest those areas owned by cooperatives where wood is used as firewood.

6) Practice capacitation and education concerning conservation of the environment.

(5) **Institutional Services for the Support of Farmers**

1) Review of the functions and responsibilities of public entities of the agricultural and livestock and nutrition sector.

2) Recommendation for the integration of entities in charge of irrigations services.

3) Strengthen institutions responsible for study and research on agricultural technologies.

4) Improve the educational and learning system of agricultural and livestock practices.

5) Establish a prevention system of diseases spread by plants and animals coming from foreign places.

6) Promote associations of agricultural and livestock producers in order to facilitate a good commercialization of their products.

(6) **Commercialization of agricultural products and promotion of agroindustrial activities**

1) Promote organization of producers cooperatives by which producers can actively participate in the commercialization stage of their products.

2) Incorporate facilities for gathering, storage, and distribution of perishable products.

3) Analyze the viability for development of the aero-industry, in particular, dehydratation of vegetables and processing of fruits.

4) Promote development of the aero-industry at small scale in order to activate the participation of women in the production cycle.

4.4.2 Rural Development Plan

In the present Project, the following items will be analyzed:

- Farm and rural roads
- Rural aqueduct

(1) Farm and rural roads

1) Rehabilitate existing roads.

2) Put more emphasis on transport of agricultural and livestock products.

3) Incorporate underdeveloped zones by means of a road system.

4) Coordinating the road system with the Agricultural and Livestock Development Plan.

5) Strengthen the sector in charge of operation and maintenance of farm and rural roads.

(2) Rural Aqueduct

1) Put more attention to less developed zones.

2) Put more emphasis on the development of underground waters.

3) Propose the most appropriate water distribution system for the benefitted areas.

4) Make the recommendations concerning the tariff system or water utilization fee and for the organization of operation and maintenance activities.

4.4.3 Integrated Rural Development Plan

1) Integrate the projects considered of high priority within each item of the plan in order to

multiply the benefits.

2) Promote an integrated rural development focused on the increase of the agricultural and livestock productivity.

3) Put more emphasis on the rectification of the sub-regional disequilibrium.