PART A: BACKGROUND OF THE MASTER PLAN

CHAPTER 1 INTRODUCTION

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The State of Chiapas, which is located to the west-southern part of the United Mexican States, is the 9th largest state in terms of territorial extension with approx. 74,000 km^2. Although representing close to 60% of the economically active population, the primary sector accounts for as small portion as 18% of the Gross Regional Products showing clearly its low productivity. Depending heavily on the primary sector, an income standard of the State remains inferior and Chiapas is considered as one of the least developed states in Mexico.

The agricultural sector plays an important role within the socio-economic structure of the State, but the sector has not attained anticipated development yet. Under the circumstances, the state government of Chiapas, in due understanding that if the agriculture sector should desire to give impetus to economic development of the State forging strategic agricultural policies is essential, has elaborated the Agriculture and Livestock Development Program 1995 – 2000; in this program, intensification of land use, reinforcement for farming of traditional crops and promote cultivation of non-traditional crops, orientation for conversion of land use in accordance with land suitability, farm production in harmony with ecological condition, strengthening of institutional supporting services to farmers are identified as strategies for agricultural development of the State.

The Study area, the region of Soconusco, lies in an extreme south part in Chiapas. The area covers an approximate extension of 6,000 km^2 and its population is estimated in 620,000 as of 1995. About 34% of the state land is used for crop production and the land occupied by livestock activity is around 36%. Agricultural production represented by truck crops (coffee, cacao, mango, etc.), grains (soybeans and maize) and beef cattle constitutes a mainstay of the economic activity in the region, but this sector confronts various serious problems: delay in renovation of aged plants and depressed farm-gate price (coffee, cacao, etc.), unstable output depending on rain-fed farming, etc. and, hence, transition of prevailing traditional farming practice into unconventional one that envisage, among others, shifting actual crops to other crops is anticipated. Social factor is also closely related with low productivity of the agricultural sector; about 60% of farmers in the region are ejido farmers who suffer from depressed farm productivity in limited lands which is almost half as extensive as those of private farmers.

Albeit this unfavorable situation, the region has foreseeable future being endowed with such comparative advantages as abundant water resources, wider range of opportunity for selection of crops owing to a variety of topography and climate, convenience in marketing of agro-products stemmed from relatively higher grade of development for traffic infrastructure (highway, port, etc.) and is eligible for accomplishment of higher agricultural productivity and consistent farm production, if an introduction of appropriate farming technologies and development of necessary infrastructure should come true.

Under the circumstances, for the purposes of forging development plan contributing to poverty alleviation attributable to enhancement of farm productivity as well as improvement of the quality of life among rural population, the Government of the United Mexican States had requested the Government of Japan the implementation of the Study on Integrated Agriculture, Livestock and Rural Development Project in the Soconusco Region, the State of Chiapas (hereinafter referred to as "the Study"), in December 1996. In response to this request, the Government of Japan had decided to conduct the Study through Japan International Cooperation Agency (JICA) and had sent a mission to carry out a preparatory study from September to

October and the mission concluded the Scope of Work (S/W) for the Study on October 2, 1997.

Based on this S/W, JICA dispatched the Study Team to Mexico to carry out the field work for three times from June, 1998 to July, 1999 for the purpose of carrying out the field survey, accumulating data and information which are necessary to formulate the Master Plan and Pre-feasibility Study. After each of the field work, work was carried in Japan and the Master Plan and Pre-feasibility Study formulated.

1.2 OBJECTIVES OF THE STUDY

The objectives of the Study are as follows:

(1) In view of effective accomplishment en enhancement of quality of life and increase in agricultural income among small farmers, to formulate a Master Plan for sustainable integrated agriculture, livestock and rural development project with focus laid on formulation of infrastructure development for agricultural production and grass-roots-assisted small-scale projects/programs that might serve supporting small farmers in embarking them with their own funds covering a total area of 5,996 km2 in the Soconusco Region, in the State of Chiapas, and to undertake evaluation of formulated projects/programs at pre-feasibility level.

(2) To conduct technology transfer to the Mexican counterpart personnel regarding study methodology and flow and concept on formulation of development plan for respective discipline.

1.3 THE STUDY AREA

The Study area covers the whole area of the Soconusco Region located in the south-western part of the country and at the international border with the Republic of Guatemala. The area has a territorial extension of 5,996 km^2 comprising a total of 16 municipalities.

1.4 MAJOR COMPONENTS OF THE STUDY

The Study is conducted in two phases viz., Phase I and Phase II and the major components of the Study are as follows.

(1) Phase I Study (June – December, 1998)

1) Field Works in Mexico (June – October 1998)
   - Explanation and exchange of opinion on the Inception report
   - Compilation of existing data and information, collection of additional data
   - Rural sociological survey
   - Field survey into topography, geology, hydrology, meteorology, socio-economical conditions, soil, land use, land tenure, agricultural production, cropping systems, cropping pattern, cultivated area, yield, agricultural, rural and social infrastructure, institutional support, farmers organization, marketing, environment and other relevant items such as WID.

- Preparation of draft specific maps using GIS
- Preparation of sub-contract for digitalization of draft specific maps
- Environmental screening and initial environmental examination
- Explanation and exchange of opinion on the Progress Report (I)

2) Home Office Works in Japan (October - December 1998)
- Analysis and compilation of the field work
- Formulation of the basic development concept
- Preparation of the outline of the Master Plan
- Selection of priority projects/programs for pre-feasibility study
- Preparation of the Interim Report

(2) Phase II Study (January – September 1999)

1) Field Works in Mexico (February – April 1999)
- Explanation and exchange of opinion on the Interim Report
- Detailed survey on pre-feasibility zone and projects/programs for agricultural and livestock development, agricultural and rural infrastructure development, infrastructure operation and maintenance, strengthening plan for institutional supporting services and rural organization and environmental conservation
- Input of GIS data
- Flood Survey (an addition)
- Preparation of the Progress Report (II)

2) Home Office Works in Japan (May – July 1999)
- Analysis and compilation of the field work
- Preparation of the Priority Project/Program Outline
- Finalization of the Master Plan
- Elaboration of potential maps for development
- Formulation of the priority projects/programs
- Preparation of the Draft Final Report
- Preparation of materials for the technology transfer seminar

3) Secondary Field Works in Mexico (July 1999)
- Explanation of the Draft Final Report
- Technology transfer seminar

4) Preparation of the Final Report (September 1999)
To prepare the Final Report, based on the comments from the Government of Mexico on the Draft Final Report.

1.5 MEMBERS OF THE STUDY TEAM AND COUNTERPART PERSONNEL

This Study has been carried out by the following specialists of the JICA's Study Team with different discipline in collaboration with Mexican counterpart personnel assigned to respective specialist.

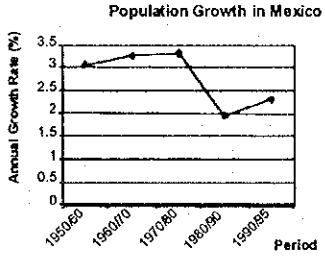
JICA STUDY TEAM		MEXICAN COUNTERPART	
Name	Discipline	Name	Organization
Satoru Kido	Team Leader	Francisco Ruiz Tovilla	SAG
Takao Sakamoto	Sub Team Leader / Agricultural & Rural Infrastructure	José Antonio Domínguez González	
Harunobu Inoue	Agriculture / Extension	Hernilo Cruz Fuentes Jorge Salazar Sanchez	SAGAR FIRCO
Yoshihiro Uchida	Rural Sociology / Produsers Organization	Juan Hernández Colloy	SAGAR
Toshikazu Nagamitsu	Livestock	Gilberto Yong Angel	SAG
Masayuki Honjo	Environment / Water Resources	Moisés Monjarrás Abarca Joaquín Castillejos Castillo Manuel Morales Román Gloria Espíritu Tlatempa	SERNyP SEMARNAP SERNyP SERNyP
Tamio Ota	Agricultural Economy /Project Evaluation	Reynold Castillejos Solís Jesús Gómez Hernandez	FIRA BANRURAL
Arturo Lamadrid I.	Marketing / Agroindustry	Guadalupe Bámaca Sandoval	SDE
Hiromi Osada	Structure Design / Cost Estimate		
Shinichiro Matsumoto	River / Sabo		
Katsuhito Yoshida	Geology		
Satoru Ohta	Interpreter		

CHAPTER 2 NATIONAL AND REGIONAL SOCIO-ECONOMIC BACKGROUND

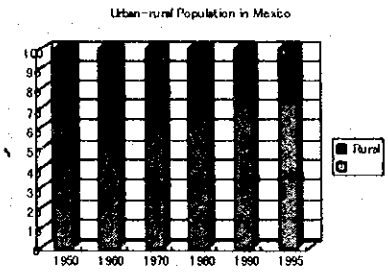
CHAPTER 2: NATIONAL AND REGIONAL SOCIO-ECONOMIC BACKGROUND

2.1 GENERAL FEATURES OF THE UNITED STATES OF MEXICO

The United Mexican States cover a land area of 1,964,381 km^2, which lies between latitudes of 32° 43′06″- 14° 32′27″N and longitudes of 86° 42′36″- 118° 27′24″W. The country is administratively divided into 32 federative entities (31 states and one Federal District).



According to the Population Census conducted in 1995, the country had a population of 91,158,290 that has been growing at a rate of 2.3% per annum since 1990. And, the proportion of the rural population in the same year was 26.5%, which was lowered by 2.2% in comparison with that in 1990 indicating a trend of continuous rural-urban migration.



The human development index (HDI) of Mexico calculated by UNDP as of 1993 was 0.845, ranking the country in the category of "high human development" being ranked as 48th in the world. Major social indicators of the country are: life expectancy at birth (72.6 years), birth rate (32.3/1,000 inhabitants), infant mortality rate (17.0 per 1,000 birth), general fertility, percent of people with living cost less than US$ 1 per day (14.9% at ppp), adult illiteracy rate (10.6%) and population with access to safe water (86.3%).

Recovering from the financial crisis taken place at the end of 1994 and subsequent setback of productive activity in 1995, the macroeconomic performance in Mexico has shown higher growth for the last two years; in particular, in 1997, the Gross Domestic Product (GDP) has grown by 7% in real terms, which was the highest rate for the last sixteen years. Nevertheless, Mexico's macroeconomic growth was decelerated in 1998, due to decline in price of petroleum at international market as well as dull performance of consumption and investment sectors and the growth rate of GDP was decreased to 4.8%.

The three leading sectors of the macro-economy of Mexico include Manufacturing, Community, Social & Personal Services and Transport, Warehouse and Communications and each of which contributed 20.7%, 20.4% and 19.9% to the formation of GDP in 1998. The annual growth rate of the GDP for the last 10 years (1988 – 1997) was 2.9% on average and the sector which showed the highest growth was Transportation, Warehouse & Communications with a growth rate of 4.1% on average, while the Agriculture, Livestock, Forestry and Fishing recorded the lowest growth with a growth rate of 1.7%. It is predicted that this trend of growth would be decelerated for the year of 1998 as a consequence of decline in price of petroleum at the international market.

Mexico's current account had been in deficit since 1988 due to enduring shortfall in factor services; the deficit in current account had expanded more than US$ 10,000 million for the period 1991- 1994, but since then it shrunk to less than US$ 10,000 million for the last three years owing to an increase in exports of both oil and non-oil products. Despite this favorable performance for the last three years, the decline in price of petroleum has upset the trade balance in deficit burgeoning, as a consequence, the deficit of the current balance more than US$ 15,000 million

once again. Since coming to effect of the North American Free Trade Agreement (NAFTA) in 1994, an upsurge of Mexico's international trade has been observed both in export and import sectors. In 1997, the amount of exports and imports was hiked by 213% and 168%, respectively in comparison with that in 1993. Recently, because of remarkable enlargement of exports for non-oil merchandises combined with sluggish behavior of oil price at international market, the share of oil in total exports has been depressed; in 1982, exports of oil and its derivatives represented 74% of total exports, but plummeted as small portion of 6% in 1998.

The public finance system of the federal government is highly dependent on revenue from oil exports accounting for more than one-quarter of the total revenue for the last two decades (in 1997, its share was 37%). Faced with expected decline in revenue from oil and its derivatives' exports (the decreased amount is roughly estimated to cover 0.7% of the GDP) , the government decided to curtail public budget three times for the fiscal year of 1998.

Other macro-economic indicators for the period of 1995-98 are mentioned below.

Item	1995	1996	1997	1998
Public revenue (% of GDP)	22.8	23.2	23.0	-
Public expenditure (% of GDP)	23.0	23.3	23.5	-
Total external debt (% of GDP)	59.2	49.8	38.2	-
Net international reserve (In billion of US$)	15.7	17.5	28.0	30.1
Exchange rare (Peso per dollar, end of year)	7.64	7.85	8.08	9.94
Consumer price index (Dic.-Dic.)	52.0	27.7	15.7	18.6
Open unemployment rate	6.2	5.5	3.8	3.2
Minimum wage (Peso/day)	16.7	22.5	28.0	33.0

Source : Banco de Mexico, Informe Annual 1998

2.2 FEDERAL GOVERNMENT'S POLICY ON DEVELOPMENT

2.2.1 National Development Plan 1995 - 2000

In Mexico, the mandatory term of the President is six years and the each president has legal obligation to elaborate national development plan to cover his term. The National Development Plan of the present administration of the President Ernest Zedillo to cover the term of 1995 – 2000 was elaborated in May 1995 with respect to five components: (1) Sovereignty to the end of the 20th century, (2) Aspiration by the nation of right and a country of law, (3) Democratic development, (4) Social development and (5) Economic Growth. Of these components, in so far as social development is concerned, the Plan proposed the following as strategies and action lines 1) To expand coverage and to improve the quality of the basic services, 2) To harmonize the growth with territorial distribution of population, 3) To facilitate equal regional development, 4) To give major attention to economically and socially handicapped people and 5) To boost an integrated policy for social development. Meanwhile, five major strategy lines relevant to the component of economic growth are: 1) To promote domestic saving as fundamental basis for financing national development and to rely on external resources to complement domestic resources 2) To establish conditions to secure stability of the economic activity, 3) To promote efficient use of resources for development, 4) To forge environmental policies for the sustainable economic development, and 5) To formulate relevant sector policies.

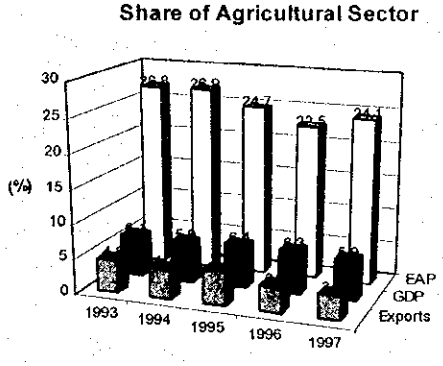
2.2.2 National Program for Financing Development 1997 - 2000

Following the National Development Plan mentioned before, the Government of Mexico had made public in June, 1997 the National Program for Financing Development (FONADE) 1997 – 2000, which has five principal objectives, namely: 1) To accomplish an annual growth of GDP higher than 5%, 1) To strengthen domestic financing sources, 3) To eliminate vulnerability of the economy facing with an inflow of foreign resources, 4) To maintain stable macroeconomic environment, and 5) To improve social welfare. In the PRONAFIDE, the strategic action of public finance is oriented to projects such as petroleum, energy, communications and hydraulic infrastructure development, which would promise future generation of tangible benefits to the public sector. Furthermore, the government intends to promote investment of infrastructure using public finance in conjunction with private finance.

2.3 SALIENT FEATURES OF THE AGRICULTURE SECTOR IN MEXICO

2.3.1 Role of the Agricultural Sector within Context of the National Economy

The National Census for Population and Housing carried out in 1995 had disclosed that close to 26% of the country's population live in rural area. In addition, the share of the agricultural sector in total economically active population reached to almost 22%. Albeit this socio-demographic importance, the sector contributes extremely less to formation of the GDP with participation of only 5.7% in 1998.



Furthermore, this contribution tends to shrink year by year with an expansion of other sectors such as manufacturing and services. The sector's participation in foreign trade is also in small portion covering only 5.8% in exports and 5.6% in imports, respectively for the year of 1997.

2.3.2 Structure of the Agricultural Sector

According to the 7th Agriculture and Livestock Census conducted in 1991, the arable land covers 31 millions has, accounting for 29% of the Mexican territory. The share of the irrigated land in total arable land is highly elevated in the states of the Northern Region, while it is reduced to below 10% in the states of the Southern and the Southeastern Regions. Likewise, close to 60% of the privately owned lands are concentrated in seven states located in the North and North-eastern Regions; in these states, the proportion of privately owned lands reaches to 78%, which is far superior to the national average of 65%. By contrast, three states located in the southern pacific coast have ejido lands more extensive than private lands (An average share of ejido land in these three states accounts for 62%).

Since the Mexican Revolution in 1917, the Mexican Governments have made major efforts for the implementation of agrarian reform program up to the constitutional reform in 1992 and, as a consequence, it is said that no "latifundista" exists by law in Mexico; the largest extension of land allowable to hold to independent farmer is limited to 300 ha (100 ha in case of irrigated land and

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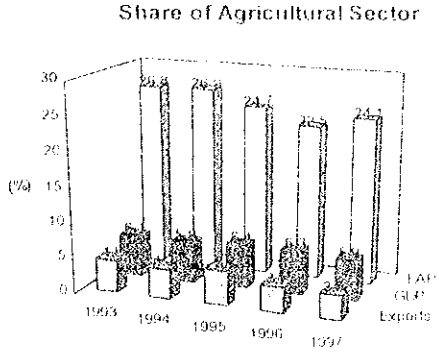

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150 ha in land is allotted to cotton cultivation).

2.3.3 Agricultural and Livestock Production

"Tortilla", made from maize, is a principal and indispensable staple diet of the Mexican people, and maize is the leading crop of the country accounting for almost half of the total cultivated area of the crops. Other important crops next to maize are beans (frijol), basic grains (wheat & sorghum) and permanent crops (Coffee and sugarcane) and the area covered by these six crops including maize represent about 86% of the total cultivated area (See Table). The table below summarizes the comparison of cultivated area of main crops between the average of 1980-89 and that of 1990-97.

Comparison of Cultivated Area

Crops	Annual Average Cultivated Area (10^3 x ha)		(b)/(a)	Crops	Annual Average Cultivated Area (10^3 x ha)		(b)/(a)
	1980-89 (a)	1990-97 (b)			1980-89 (a)	1990-97 (b)	
Maize	7,988	8,485	1.06	Soybean	372	145	0.39
Beans	2,068	2,218	1.07	Rice	196	96	0.49
Sorghum	1,909	1,667	0.87	Orange	154	194	1.26
Wheat	1,091	940	0.86	Mango	92	142	1.54

Source; Forth Annual Presdentiary Report1998.

As indicated by the above table, the cultivated area of Mexico's two staple food crops of maize and beans have expanded slightly, while other main annual crops (sorghum, wheat, soybean and rice) have decreased; in particular, cultivated area of soybean and rice has become less than half of that for the recent two decades. On the other hand, fruits such as orange and mango have raised their area significantly.

2.3.4 Trade of Agro-products

In early 1980's, Mexico's agricultural exports were represented by two products: coffee and cotton, which together accounted for nearly half of the country's agricultural exports in value terms in 1980 and close to 40% for the period 1980 - 89. Recently, diversification of exports has been in progress and the participation of the two products in total exports has declined to 19% for the period 1990-96. By contrast, tomato, melon, water melon and other vegetables and fruits have accomplished distinguished growth in their exports in these days. The export of beef also expanded significantly, by 230% for the period 1990-97 in comparison of the period between 1980-89.

Agricultural output in Mexico has been stagnated recently without having caught up with population growth, and the country confronts deficit in food supply, the fact of which is endorsed by an increase in import of foodstuff from US$ 1,650 million (an annual average for the period of 1980-89) to US$ 2,870 million (an annual average for the period of 1990-97). Agricultural products which showed the highest growth during 1980-97 are cotton seeds and fresh fruits attaining a rate of 1,720% and 1,200% in comparison of the annual average export between the periods of 1980-89 and 1990-97. Mexico has been a net importer of grains (maize, wheat, beans and sorghum) and oil seeds (soybeans, cotton and other seeds) and an import of these products has shown upward trend account for about 82% of the total imports in 1996. This trend is attributed to an absence of government's encouragement policies on their production.

2.4 NATIONAL POLICIES AND PLANS ON AGRICULTURAL AND RURAL DEVELOPMENT

2.4.1 Reform of Agricultural Policies

In line with the general macro-economic reform program undertaken by the federal government since 1988, the agriculture sector's policy reforms has been in progress and the major issues relevant to these reforms are explained below.

(1) Price Policies

Before 1990, farm-gate prices were guaranteed for 12 major crops: maize, beans, wheat, barley, rice, sorghum, soybeans, saffran, cottonseed, copra, sunflower and sesame. Recently, guaranteed prices were abolished and the Mexican government substituted the agreement prices for them with regard to maize, beans, sorghum, soybeans, wheat and rice, while no intervention of the public sector is made in marketing on the rest of crops. The government has participated in purchase of maize directly from producers, but this intervention was abolished as of March, 1999.

(2) International Trade Policies

The North American Free Trade Agreement (NAFTA) has altered agricultural trade policy in Mexico. Under NAFTA, 42 percent of tariff codes were liberalized with tariffs on foodstuffs and cotton to be phased out over the period of 15 to 20 years. The expected phase-outs are consistent with GATT agreements regarding reduced agricultural protection for developing countries.

(3) Property Rights and Markets for Land and Water

Steps have also been taken to improve property rights on land and water. In early 1992, Article 27 of the Constitution and the Agrarian Reform Laws were modified to give land ownership directly to residents of agrarian communities (ejidos and communal lands) and to allow them to develop new forms of economic association. The reform allows for transactions such as renting and selling ejido land, pledging land as collateral for loans, and contributing land to joint- ventures.

Policy changes in the irrigation subsector have coincided with the broader changes in economic policy. Thus irrigation policy has begun to encourage efficient water use through (a) reforms in the legal basis of land tenure; (b) reforms in the legal structure of water rights; (c) a major increase in irrigation water fees to make operations self-sufficient and pay for the upkeep of the irrigation infrastructure; (d) a transfer of irrigation districts to water users' organizations; (e) changes in economic policy to promote a shift away from basic grains production; and (f) more private sector participation in decisions and investment.

2.4.2 National Agricultural Development Program 1995 – 2000 and Alianza para el Campo

The National Agricultural Development Program 1995 – 2000 has set as its central objective of the agricultural policy an increase of net income of farmers together with an expansion and improvement of agricultural output to satisfy domestic demand of foodstuff and raw materials as well as to reduce imports. In this context, promotion for improvement of crops and livestock productivity in view of attaining more profitability and competitiveness is to be put into force through the program denominated as "*Alianza para el Campo* (Alliance for the Agriculture)".

Alianza para el Campo has four major objectives, namely: 1) To recover profitability of farming

activities, 2) To increase agricultural output higher rate than demographic growth of the nation, 3) To exterminate poverty and 4) To maintain the agricultural trade balance in surplus. It has been put into implementation since October, 1995 and a total of 4,800 million pesos of the public finance (both federal and states governments) to benefit about 6 million of farmers had been allocated for the years of 1996 and 1997 (It is projected to finance close to 3,604 million pesos in 1998, which is expanded by 190% in comparison with relevant budget of 1996). The program's finance is collected by three sectors (federal government, state governments and beneficiaries) and the proportion of coverage, which is variable by sub-program, is averaged out at 48.9% (beneficiaries), 33.7% (federal government) and 17.4% (state governments). On the other hand, for the fiscal year of 1998, the program's budget will be distributed by category of subprograms in the following manner: Crop production (34.9%), Livestock (18.7%), Rural development (18.9%), Plant protection and animal health (5.5%) and Others (11.8%).

2.4.3 PROCAMPO

The Government of Mexico has introduced a producer income support program (El Programa de Apoyos Directos al Campo - PROCAMPO) to compensate farmers for reduced protection implied by NAFTA and GATT and the anticipated elimination of producer price support, since the cropping cycle of autumn – winter for 94/95 and the program shall have a duration of 15 years until 2010. It is to replace price support with income support by providing fixed payments per hectare cultivated instead of guaranteed prices (The payment shall be fixed in real terms during the first ten years and shall be decreased gradually from the eleventh year onwards). Eligible farmers for this program are those who produce crops such as maize, beans, wheat, soybeans, sorghum, rice and cotton, barley and safflower seed. Under the definitive PROCAMPO program, guaranteed and agreement prices are to be eliminated. Instead, farmers will only receive PROCAMPO payments on the basis of historical area in hectare planted.

The number of beneficiaries for PROCAMPO was estimated to be 3.3 million at the beginning, but the number of farmers actually benefited by the program is declined to 2.9 million for the year of 1998. The payment per ha for the last three years is $ 484 for 1996, $ 556 for 1997 and $ 626 for 1998.

2.4.4 Decentralization of Federal Agencies

In line with the federal government's decentralization policy, responsibilities and resources of SAGAR are being transferred to organizations such as State Agricultural Council, Trust Fund for Distribution of Resources and Fundación PRODUCE. Through Agricultural Council, state governments elaborate agricultural development plans, targets for Alianza para el Campo, etc. Development programs are implemented by local governments through the Rural Development Districts. Under the decentralization scheme, the federal government defines general policies for development of the agricultural sector and establishes rules and criterion for budgetary allocation, while state governments undertake setting regional priorities, coordination for specific actions and organization of farmers for production and marketing. It is scheduled that about 85% of the operative functions of SAGAR will be placed under the supervision of state governments by 2000.

Within the framework of *Alianza para el Campo*, the National Water Commission (CNA) decentralized an implementation for Irrigation Districts Modernization Programs, Development of Irrigation System at Tertiary Level and Rational Use of Water Resources.

2.5 CHARACTERIZATION OF THE STATE OF CHIAPAS

2.5.1 Socioeconomic Development in the State of Chiapas

The State of Chiapas has a territorial extension of 75,634 km^2 and is the 8th largest state in Mexico accounting for 3.8% of the national land. Meanwhile, the state's population in 1995 was 3,584,786 (3.9% of the country's population), which had burgeoned at a rhythm of 3.7% per year for the period of 1980 - 95, too much higher than the national average of 2.1%.

There are 111 municipalities in Chiapas, which are divided into nine (9) economic regions: Centro, Altos, Fronteriza, Frailesca, Norte, Selva, Sierra, Soconusco and Istmo-Costa.

Regions	Area		Population			Municipalities		
	Km^2	%	No.	%	Annual Growth (90-95)	No.	%	Marginal index
Centro	12,629.1	16.7	855,041	23.9	3.39	22	19.8	0.284
Alto	3,770.4	5.0	434,905	12.1	2.31	16	14.4	1.433
Fronteriza	12,790.6	16.9	373,527	10.4	1.64	8	7.2	0.730
Frailesca	8,311.8	11.0	204,826	5.7	2.01	4	3.6	0.291
Norte	6,098.5	8.1	291,833	8.1	1.23	22	19.8	1.120
Selva	19,789.2	26.2	514,004	14.3	2.37	12	10.8	1.317
Sierra	2,126.5	2.8	153,755	4.3	0.76	8	7.2	1.049
Soconusco	5,475.5	7.2	622,044	17.4	1.27	16	14.4	0.371
Istmo-Costa	4,642.8	6.1	160,453	4.5	1.57	3	2.7	- 0.688
Total	75,634.4	100.0	3,584,786	100.0	1.97	111	100.0	

Source : Annual Report of Chiapas State197, INEGI

According to the data of the National Council for Population in 1990, Chiapas was classified as the state of the highest grade of marginalization among 32 federal entities in Mexico and more than one-third of the municipalities (38 of 111) were assessed as municipalities with "very high" grade of marginalization. In fact, according to the data of INEGI (Estadísticas Demográficas y Socioeconómicas de México, 1998) and the Presidency of the Republic (4° Informe de Gobierno, September 1998), the State of Chiapas is considered to lag behind the development, which may be explained in the following manner (See Table A.7 of the Annex A).

1) The contribution of the primary sector to the formation of the Gross Regional Product is very high (18.4% - 2.7 times as high as the national average), and almost half of the state's economic active population (EAP) is dependent on this sector. On the other hand, lagged industrialization in Chiapas depresses income level of the population; the state has the highest proportion (37.4%) of the population who get income inferior to the minimum wage.

2) With a higher indigenous population as well as higher percentage of students who do not attend school, the illiteracy rate (26.2%) remains the highest among the 32 federal states.

3) Greater portion of the local population are not in a position to enjoy ameliorated living life due to lower coverage rate of social infrastructure (residence without piped water supply system and drainage system are elevated to such high percentage as 33% and 43.7%, respectively) and because of under-development of public health system (one bed for every 2,368 inhabitants and one doctor for every 1,282 inhabitants).

In the light of the under-development as cited above, the state's public finance system is highly

dependent on transfer of resources from the federal government; in 1997, close to half (47%) of the gross income of the state government stemmed from this transfer ranking Chiapas in the first place in terms of budgetary dependence on transfer among 32 federative entities. In the same way, more budget per capita ($304 – 2.2 times more than the national average) was earmarked to Chiapas within context of the special program for poverty alleviation.

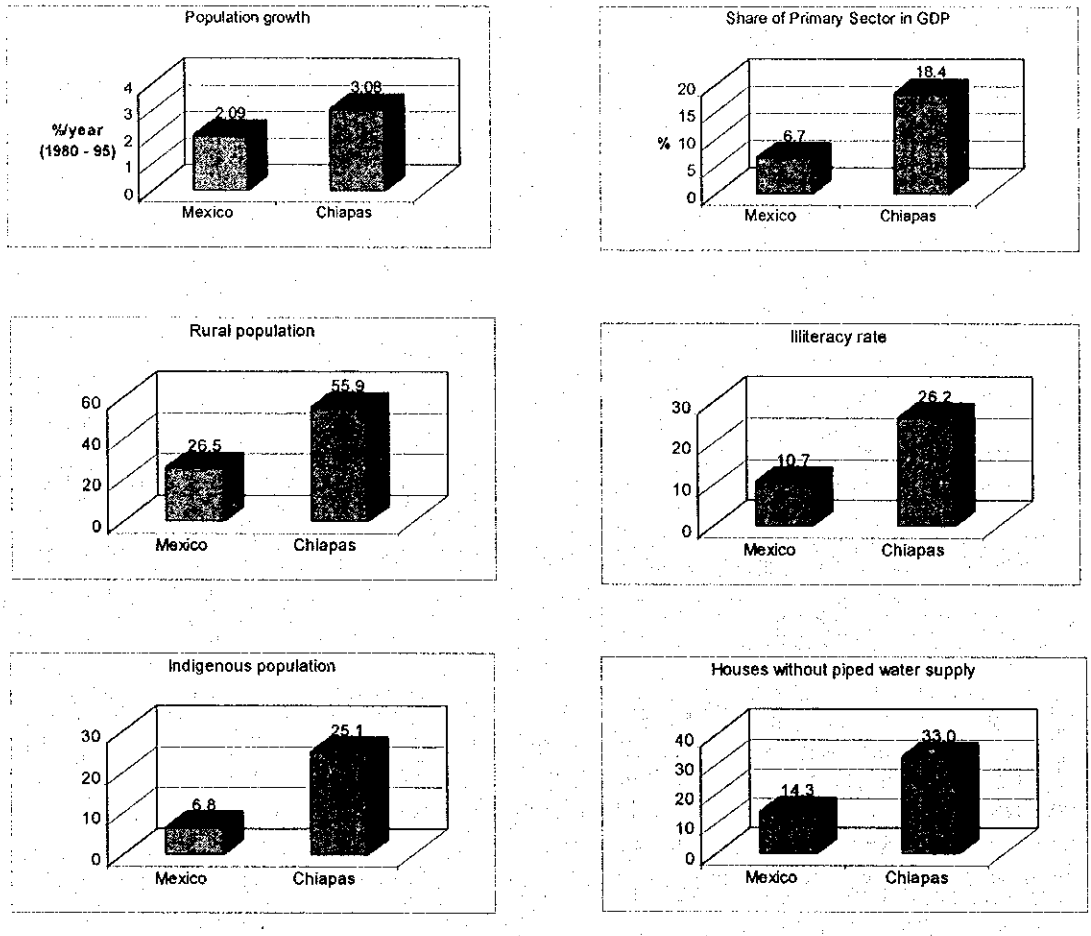


Fig. 2.5.1 Economic Indicator in Chiapas State

2.5.2 Agricultural Sector and Agricultural Development Plan

(1) Structure of the Agricultural Sector

The agriculture and Livestock sector (including forestry and fishery, too,) in the Chiapas State is the most important economic sector and accounts for 18.4% of the Gross Regional Product (GRP) of the State. In the agriculture and Livestock production, the agriculture sector accounts for 77% and the livestock sector account only for 19%. The Livestock sector is lowering from the 1980s and share in the sector is decreased 11% from the share of 1970s. Main characteristics of the agricultural and livestock sector are as follows. Because of the abundant rainfall in the state and the low conscious of the farmer for the introduction of improvement of farming practice, most of the farmers depend on the rain fed agriculture and the share of irrigated land is low, showing only 3% compared to the country's' average of 24%.

The farming practice follows the traditional practice with labor force and low input of improved seed and agricultural chemicals and also the mechanization level is subdeveloped. Especially, the rate of the mechanization in the State (when computing at the 1000-ha number of the machine use stands) shows only 1/4 of the national level. As for the yield for permanent cropping shows high productivity in the national level; the productivity of the annual crop shows low productivity.

There are many farmhouses that persist in the Maize cultivation only because of tradition in the Chiapas State and the cultivated area of Maize is prominent accounting for 65% of all the cultivated area. Also, when including the coffee that is the main production and Frijol, the share of occupation reaches equal to or more than 90%, too, and the delay of diversification of the agricultural practice is obvious. And the livestock subsector shows the similar tendency, concentrating in the beef production activity, reaching 70% of the stock-raising total when attempting to see the rate of the production sum. The ratio of the farmhouse who is maize cultivation as the primary accounts for equal to or more than 80 percent and when one thinks of the whole country average's being about 60 percent, the height with the ratio is conspicuous. The annual year crop who is represented by maize result in not passing to account for 77% at the cultivated area but to account for only 45% of the production sum and showing how low their yield is.

(2) Agricultural Development Plan

In due understanding of such prevailing situation, the Government of the State of Chiapas had forged the Agricultural and Livestock Development Program 1995 – 2000 comprising the following strategic policies:

1) To give social and juridical assurance to farmers in order to use their lands more intensively;

2) To alleviate an outstanding dissociation between crop farming and livestock;

3) To empower traditional farmers and to encourage non-traditional ones who have managed to overcome experimental stage;

4) To orient to switch land use in accordance with land suitability and marketing conditions;

5) To facilitate ecological-productive farming;

6) To change paternalism by means of training, incentives and assistance on the basis of promises at community level.

PART B: MASTER PLAN

CHAPTER 3 PRESENT CONDITIONS OF THE STUDY AREA

CHAPTER 3: PRESENT CONDITIONS OF THE STUDY AREA

3.1 GENERAL CONDITIONS

3.1.1 Climate

The climate of the Study Area is classified into 8 regions, influenced by the diversity of the topographic factors. In the Fig. 3.1.1, main characteristic of the climate is shown and the climatic factors are shown in the following table.

Main Climatic Characteristics of the Study Area

Region	Dominancy	Climate	Annual Rainfall (mm/Year)			Mean Temperature(°C)			Evaporation
	(%)		Max	Mean	Min	Jan.	Mean	April	(mm/Year)
Coastal Area	16	Aw1(w)	1,518	1,143	784	27.3	28.1	28.8	1,653.0
Plain Area	21	Aw2(w)	1,929	1,334	850	27.0	28.0	29.2	1,587.6
Southern Mountain Foot	2	Am	2,745	2,085	1,311	26.5	27.2	28.5	1,548.8
Mountain Foot	20	Am(w)	4,087	3,269	2,387	26.6	27.5	28.8	1,507.7
Northern Mountain Foot	2	Am	3,101	2,395	1,775	27.1	27.9	29.3	1,638.8
Mountain Area	28	A(C)m(w)	5,254	3,914	2,884	23.4	23.9	24.6	1,133.2
Highland Area	2	C(m)(w)	-	-	-	-	-	-	-
Back Highland Area	6	Cw2(w)	1,654	1,255	832	20.0	21.2	22.2	1,270.4

Source: Survey Data

(Note)

C(m)(w)	Tipos templados humedos	Am(w)	Tipos calidos humedos
Cw2(w)	Tipos templados humedos	Aw2(w)	Tipos calidos sub humedos (2)
A(C)m(w)	Tipos semicalidos humedos	Aw1(w)	Tipos calidos sub humedos (1)
Am	Tipos calidos humedos		

The rainfall of the Study Area is concentrated in the season during April to October, showing the defined dry and wet season. Major part of the area is classified into the tropical rainy areas, with the annual rainfall of more than 1,500 mm to 4,000 mm. The average annual rainfall in the Study areas was calculated as 2,450mm. The temperature in the Study Area is constant all year round with a small variation of temperature. The season of high temperature appears in April and lower temperature is in January, showing a low variance of 1.5 to 2.0 degrees. The mean temperature is 28°C in the plain area and 23°C in the mountainous area. The variance of the daily temperature is high in the highland area and low in the plain area. Mean monthly rainfall for each region is shown in the following table;

Mean Monthly Rainfall for Each Region (mm)

	Jan.	Feb.	Mar.	Apr.	May	Jan.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Coastal Area	1.2	2.1	5.7	21.3	111.3	206.4	192.4	185.6	245.0	123.3	29.0	8.5	1131.8
Plain Area	1.4	4.1	8.9	34.2	141.9	255.8	201.6	221.3	305.2	140.7	37.3	6.8	1359.2
Southern Mountain Foot	5.0	8.3	24.4	84.9	245.6	355.4	309.5	333.2	406.0	252.8	61.5	15.3	2101.8
Mountain Foot	13.2	13.4	33.3	106.5	361.0	530.6	483.6	539.2	606.2	412.9	125.4	24.2	3249.4
Northern Mountain Foot	6.8	7.2	21.5	66.7	228.6	413.5	405.6	475.3	473.7	248.1	53.2	7.5	2407.7
Mountain Area	35.9	45.0	87.7	219.0	456.5	602.7	481.1	566.8	650.1	485.9	188.2	57.0	3876.0
Highland Area	2.4	6.1	17.0	49.8	117.8	274.4	178.5	223.4	252.8	109.0	26.9	6.8	1264.8
Back Highland Area	13.8	17.6	36.9	102.1	272.4	408.7	341.8	386.1	455.3	293.1	96.5	25.0	2449.3

Source; Study Team

Main climatological parameters in the Tapachula Meteorological Station are shown in the following table.

Main Climatological Parameters

	Jan.	Feb.	Mar.	Apr.	May	Jan.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Mean Humidity(%)	73	69	70	73	78	82	80	82	84	82	79	76	77
Wind Direction	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Wind Velocity(m/s)	1.8	2.0	2.0	2.0	1.7	1.7	1.6	1.7	16	1.5	1.4	1.5	1.7
Pressure(mb)	997.3	997.3	997.0	996.5	995.6	996.3	997.1	997.0	996.4	996.4	995.2	997.5	996.7
Sunshine (hr)	229	206	217	187	146	138	162	166	150	181	206	218	2213

Source : Survey Data

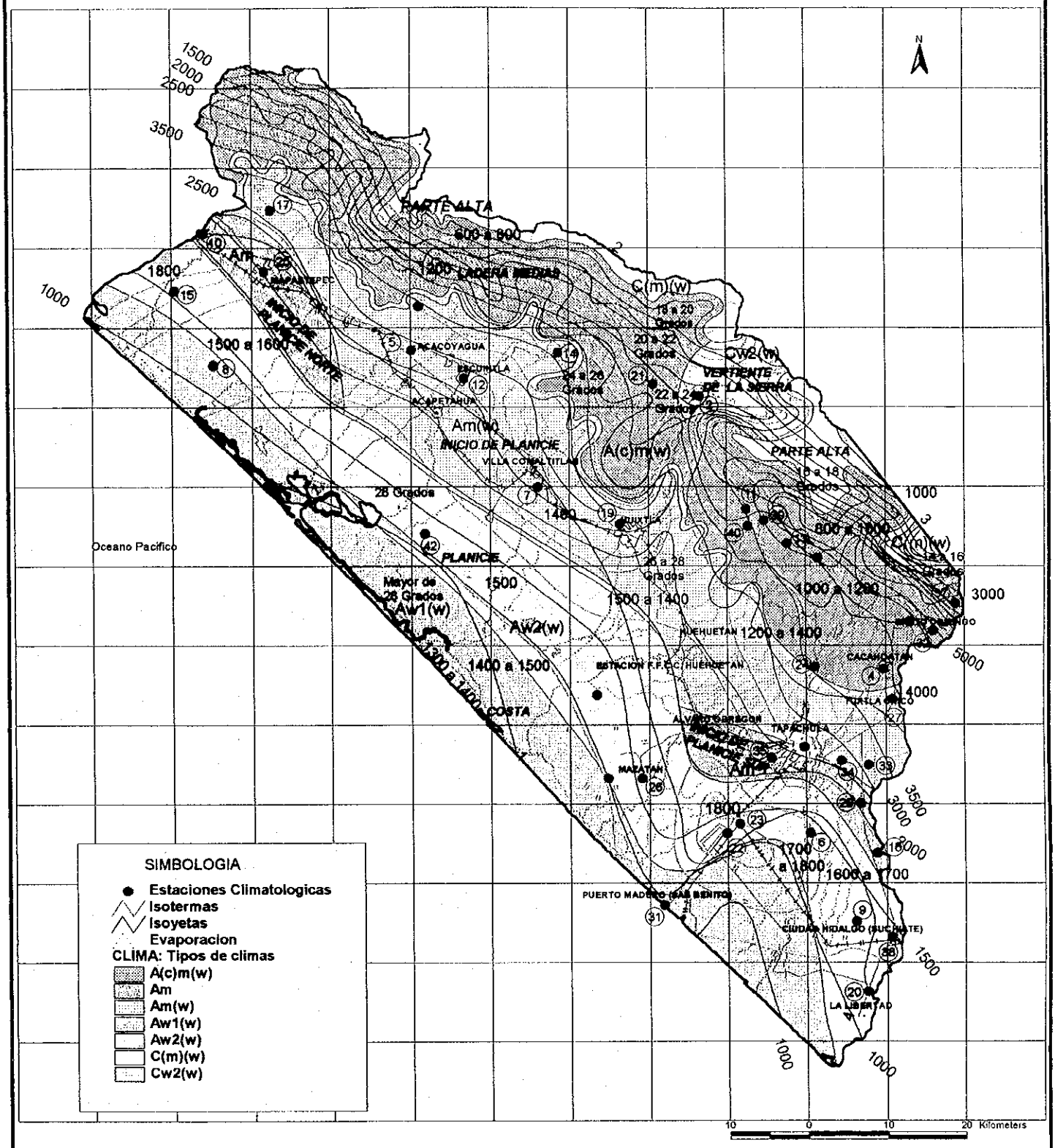
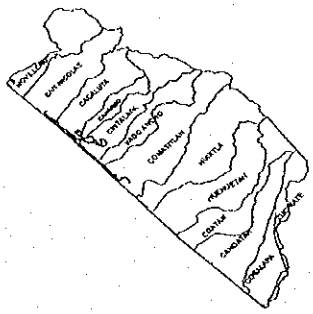


Fig. 3.1.1 Climatological Map

3.1.2 Hydrology and Water Resources



The rivers in the Study Area originate from the Sierra Madre Mountain Range, flowing down the mountainous steep areas with rapid flow, and then run down into the Plain Areas, and flash out to the sea, after stagnating in the swampy area. Mean length of the river is approx. 60 km, with a slope of 1/10 in the upper basin, and 1/300 in the middle basin. In the Study Area, there are 5 constantly running rivers, and the number of the rivers include 13 main streams and other tributaries. The river mouths are frequently closed, showing the stagnation of the water in the swampy area. Because of this reason, the water runs between the rivers through the lowland swamp.

The total basin area accounts for 6,234km^2, of which is part of the foot of a mountain and the upland with abundant rainfall accounts for about 55% of the whole area and the part where little compared rainfall occurs becomes 45%. Water resources in the area are closely related to the rainfall distribution, both of the basin areas at both sides of the region are abundant and the central part of Huixtla river basin has few. The mean monthly river discharge in each river upper stream area is as shown in the following table.

The mean monthly discharge from the area with the token amount of equal to or more than 100 m (m3/s)

The river name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Suchiate	33.77	28.91	28.80	31.28	22.40	71.22	95.63	120.51	209.39	130.94	66.95	43.61	73.62
Cahuacan	9.28	6.68	6.21	7.23	10.74	28.02	35.69	40.62	65.21	55.85	25.57	14.36	25.46
Coatan	6.15	4.43	4.11	4.79	7.11	18.56	23.64	26.91	43.20	37.00	16.94	9.51	16.86
Huehuetan	8.03	4.43	3.49	4.79	14.34	33.61	41.28	43.48	64.94	70.35	30.08	15.09	27.83
Huixtla	3.56	2.69	2.12	1.94	3.53	9.68	12.90	15.02	27.98	19.30	9.15	5.37	9.44
Comaltitlan	4.80	2.69	2.50	3.12	4.75	15.99	18.72	29.24	52.81	37.74	17.52	9.51	16.62
Vado Ancho	1.97	1.16	1.01	1.17	2.38	4.45	9.90	13.44	23.69	15.64	6.94	3.55	6.74
Cintalapa	2.89	1.70	1.48	1.72	3.50	11.34	14.55	19.75	34.81	22.98	10.20	5.22	10.85
Camargo	1.41	0.83	0.72	0.84	1.70	5.52	7.09	9.62	16.95	11.19	4.97	2.54	5.28
Cacaluta	3.61	2.21	1.79	1.97	4.91	15.60	20.95	26.40	45.87	28.69	12.36	6.00	14.20
San Nicolas	5.36	3.33	2.91	2.70	5.82	18.59	27.06	39.51	65.58	35.58	16.78	9.08	19.36
Novillero	2.04	1.30	1.19	0.97	1.74	5.59	9.02	15.20	24.20	11.29	5.91	3.52	6.83

On these rivers, the irrigation for the banana and annual crops is widely done in the downstream part, showing the shortage of water resources on the greater part of the river. As for the measure for this shortage of water, supplementary ground water is used.

Water resource development in the upstream part isn't developed, owing to the steep landform, and the surplus water occurring in the rainy season creating its discharge to the sea.

3.1.3 Landform, Soils and Land Use

(1) Landform

The study area extends from the Pacific Ocean coast in the south to Sierra Madre (Chiapas) mountain range in the north, and its landform is divided into 1) coastal dune, 2) brackish water area (back marsh) and mangrove, 3) alluvial plain, 4) fan and flood plain, and 5) mountains. Coastal dune is roughly composed of two dunes and is approximately 500m in width at the widest point. The coastal dune connects with brackish water where mangroves grow in the northern end.

Brackish water area is wide in Suchiate and Tapachula at the Eastern End, in Mapastepec at the Western End and narrow in Acapetahua, Villa Comaltitlán, and Mazatán. The southern end consists of alluvial plains with poorly drained soil. As for the alluvial plain, the altitude rises around the surrounding of Tapachula and Suchiate at the Eastern End and at the surrounding of Mapastepec at the Western End. The altitude rises gradually from the south to the north direction.

Fans and flood plains are observed at each side of the Río Coatán in the west of Tapachula, Río Huixtla in the northeast of Huixtla, Río Comaltitlán in the north of Villa Comaltitlán and especially Río Novillero and Río Tilapilla and between these two rivers. Southern end of the mountainous area starts from the northern side of National Road No. 200, which runs along a 100-m contour line. Northern end of the Study area is the dividing bridge at 2000 – 2200 m above sea level and the highest point is located on the northwestern edge of Mt. Tacana (4092m).

The upland begins from the northern side of the national highway number 200 for the most part. The elevation of range which becomes northern limit in this area is 2, 000m-2, 200 m and the maximum point is 4,092 m of the Tacana mountain which is located at the end of the northeast.

As for the distribution of the altitude in the Study area, the flat part of equal to or less than 100 m accounts for about 54% of the whole area, the area with the elevation of 100-800 m becomes 23% and the area with the elevation of equal to or more than 800 m becomes about 23%. As for the inclination degree distribution, inclination degree of 0~ 3 degrees accounts for 57%, inclination degree of 3~12 degrees becomes 16%, inclination degree of 12~35 degrees becomes 24% and the area with the inclination degree of equal to or more than 35 degrees becomes about 3%.

(2) Soils

The parent material of the soils in the Study Area is volcanic ash from Mt. Tacana and active volcanoes in Guatemala, which are rich in feldspar. It greatly contributes to the fertility of the soils in the Study Area. There are 8 soil units are observed in the Study Area and the areas of each soil unit are shown as below.

Soil units in the Study Area and their characteristics

Soil unit	Area (km2)	Ratio (%)	Area distributed and characteristic
Acrisols	1,849	29.6	Distributed in the mountainous area associated with Andosols. Low fertility.
Andosols	251	4.0	Distributed from the foot of Mt. Tacana to Tuxtla Chico. High fertility.
Cambisols	1,767	28.3	Distributed on the coastal plain. Percolation, water retentivity, chemical property are good. High fertility. Suitable for agriculture.
Fluvisols	267	4.3	Sedimentation progresses continuously. Anaerobic condition is occurred by saturated water at rainy season or throughout the year. Soils under initial pedogenic process
Gleysols	42	0.7	Soils developed under condition of poor drainage or high groundwater level resulting in reduction of iron and other elements and in gray colors. Low agricultural productivity.
Phaeozems	681	10.9	Distributed surrounding Tapachula. High fertility. Suitable for agriculture
Regosols	509	8.2	Distributed on the coastal dune rich in tidal deposits such as sand. These fresh deposits have not yet had time to enter on more than the initial stage of weathering.
Solonchaks	877	14.0	Distributed on the brackish water area and poor drainage area. Soils having an electric conductivity of saturation extract of more than 15 dS m^{-1} within 125 cm of the surface. Soils should be given special drainage treatment to ensure that the soluble salts are kept to a minimum.
Total	6,243	100.0	-

Source: Carta Edafológica Tapachula (D15-5) Huixtla (D15-2), Escala 1:250,000, INEGI (1990)

Soil map is shown in Fig. 3.1.2.

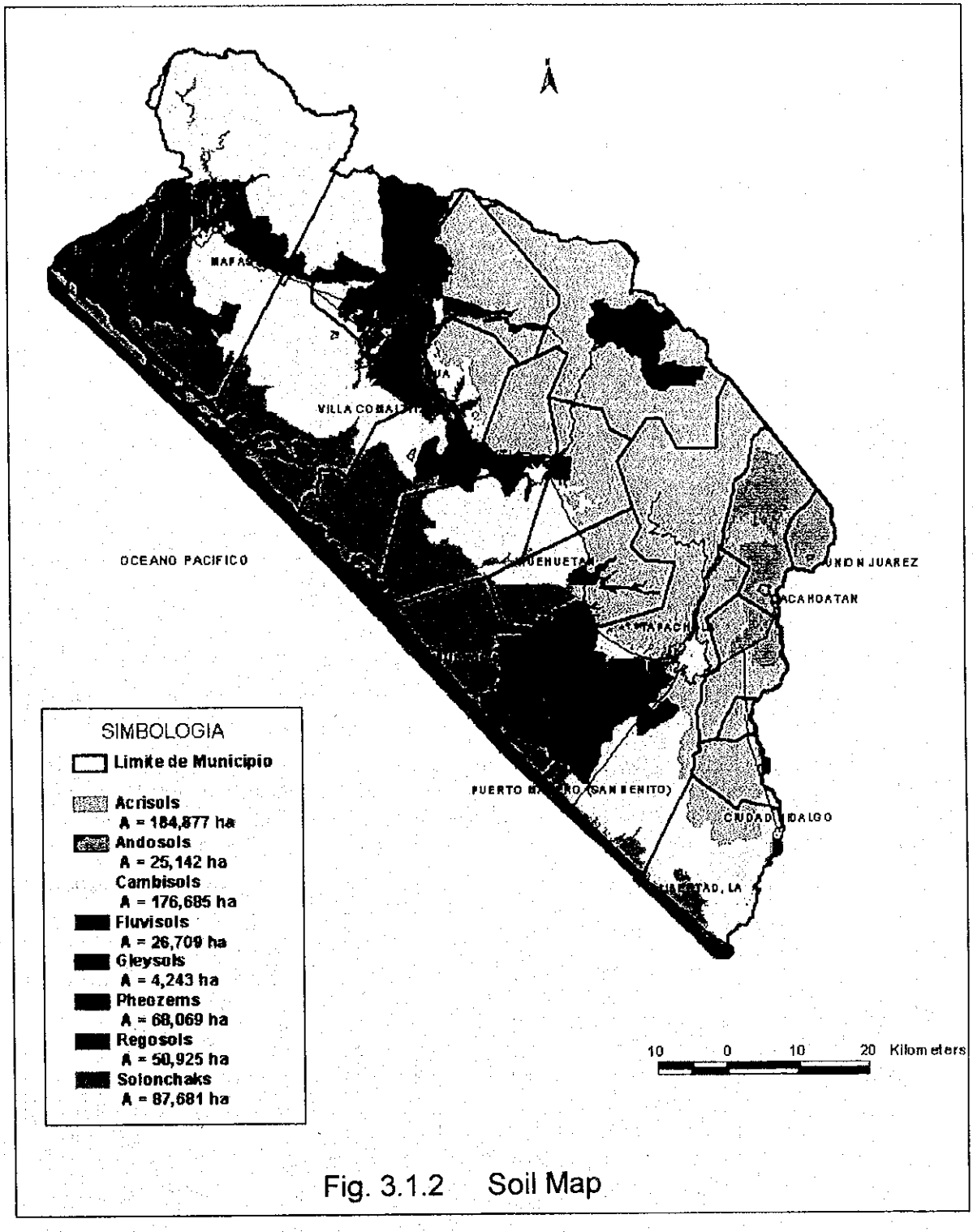


Fig. 3.1.2 Soil Map

(3) Land Use

The land use of the Study area depends on the elevation. On the low flats with elevation of equal to or less than 20 m, the pastureland and the annual cropland become the main constituent and next, are the marsh and the mangrove woods. Out of these areas, a marsh, Mangrove forest, pasture and annual cropland are specified as La Encrucijada Biosphere Preservation Area. The area of elevation from 20 m to 100 m suits agriculture like landform and ground, too, and the great part is used as arable land. The area with elevation from 100 m to 400 m is utilized as annual crop land, the orchard yard and coffee cultivation is accomplished from 200m. In the area of elevation from 400 m to 1200 m, the coffee cultivation becomes main constituent and as for annual crop land being seen from the area with the elevation of equal to or more than 1200 m partially, the forest zone gets to account for the greater part. Land use area according to the token amount of this area is shown in the following table.

The land use distribution according to the elevation (ha)

Elevation	0-20	20-100	100-400	400-800	800-1200	1200-2000	>2000	Total
Urban Area	1,297	2,837	2,618	630	206	144	0	7,734
Tropical rain forest	0	0	0	0	0	36,705	21,926	58,631
Templates Forest	5,962	5,009	20,967	12,636	10,349	17,061	0	71,984
Mangrove Forest	25,825	0	0	0	0	0	0	25,825
Dune	2,725	0	0	0	0	0	0	2,725
Mash	45,336	465	0	0	0	0	0	45,827
Pasture	51,040	38,243	13,886	342	0	0	0	103,511
Africa palm	3,090	1,579	2	0	0	0	0	4,670
Banana	12,511	4,327	0	0	0	0	0	16,837
Mango	11,861	8,015	907	0	0	0	0	20,784
Cacao	5,238	4,700	6,283	507	0	0	0	16,729
Coffee	0	0	5,209	45,815	36,838	1,783	0	89,644
Other fruit	997	540	46	0	0	0	0	1,583
Annual Crop	50,173	53,264	25,905	8,127	3,292	12925	4,160	157,846
The total	216,056	118,980	75,823	68,057	50,685	68,618	26,112	624,331

Classifying from the inclination of the land, the plantation of cacao and coffee are prevailing in the steep land. Especially for the coffee plantation land, 7% of the plantation are carrying in the land with more than 12 degrees. Cultivated area is shown in the following table according to the inclination range of each crop.

The land use according to each inclination repartition (The hectare)

	0-3°	3-6°	6-12°	12-17°	17-25°	25-35°	Equal to or more than 35°	The total
Annual Crop	111,605	9,740	12,418	7,755	8,929	5,405	1,992	157,844
Coffee	7,579	8,568	19,170	17,613	22,302	11,366	3,029	89,627
Pasture	88,872	6,130	5,775	1,666	792	174	102	103,511
Cacao	14,135	1,030	948	359	199	55	3	16,729
Mango	20,416	244	113	7	3	0	0	20,784
Other Orchard	23,090	0						23,090
Mash	45,827							45,827
Urban Area	47,152	9,831	20,808	19,000	29,795	26,004	14,328	166,918
The total	358,676	35,543	59,233	46,400	62,021	43,004	19,454	624,331

Land use map is shown in Fig. 3.1.3.

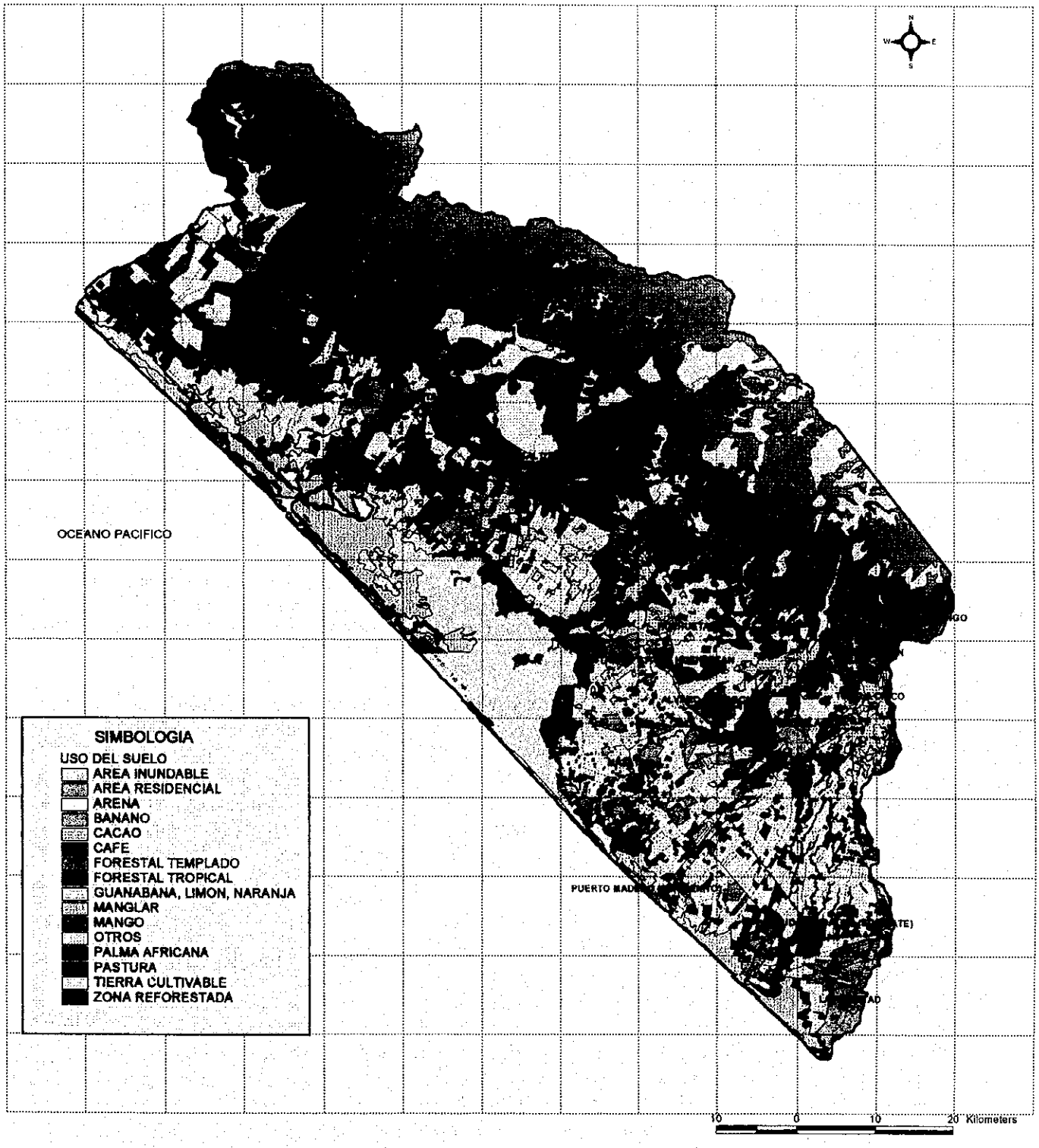


Fig. 3.1.3 Land Use Map

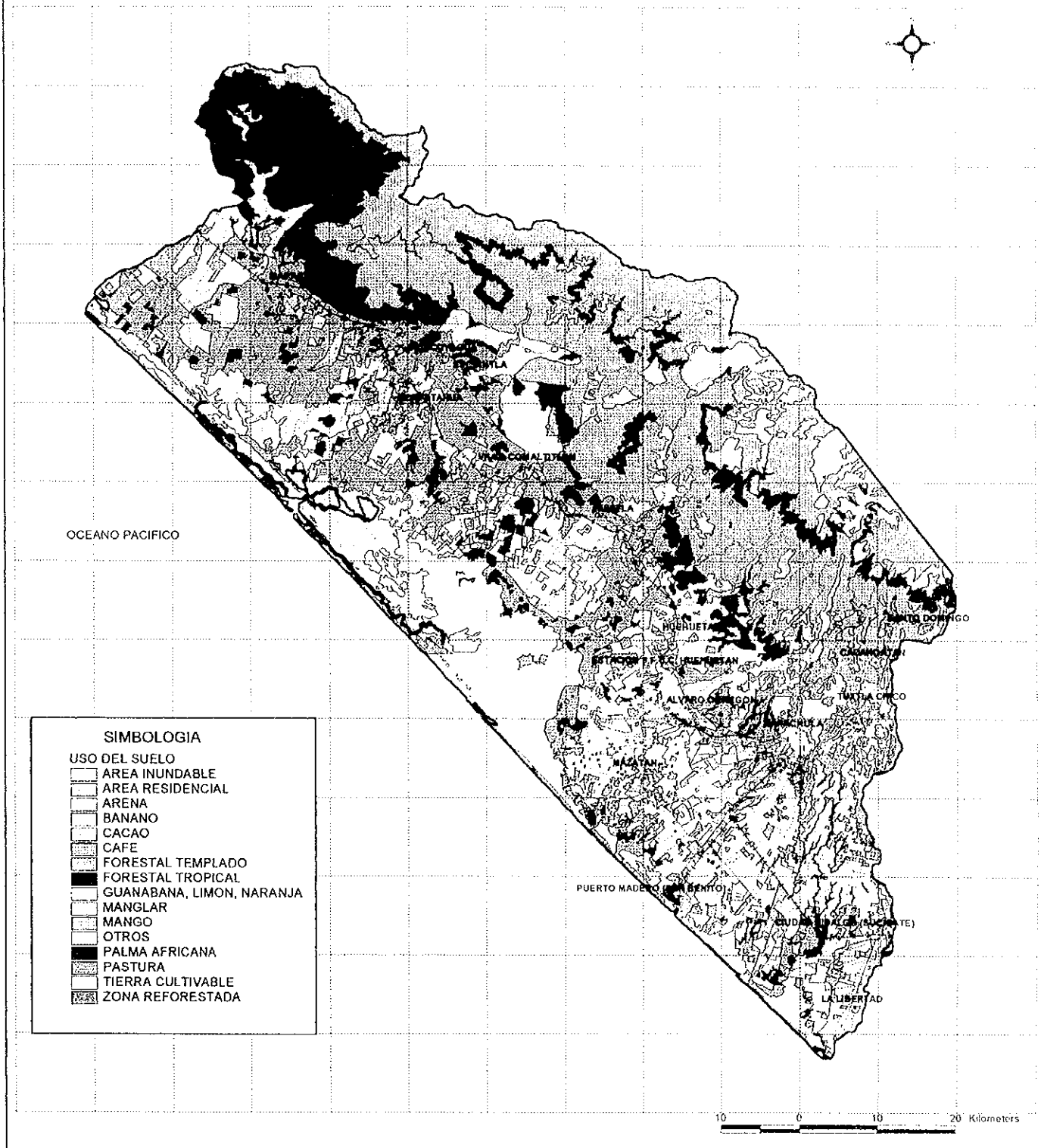


Fig. 3.1.3 Land Use Map

3.2 ECONOMIC AND SOCIAL CONDITION

3.2.1 General of Economic and Social Condition of the Study Area

The Study area (the Soconusco Region) is located in the south-eastern part of the State of Chiapas between 14° 10' and 15° 20' North Latitude and 92° 10'and 93° 10' West Longitude and abous on the Republic of Guatemala alongside its eastern limit. The Soconusco Region, which is one of the nine economic regions constituting the State of Chiapas is composed of sixteen municipalities, has a total territorial extension of 5,475.5 km2 and a population of 622,044 (1995). The main characteristic and the location of the 16 municipalities are shown in the Fig 3.2.1, with information on areapopulation

The economic activities in the Soconusco Region is highly dependent on the agricultural and livestock sector (forestry and fishing are included). According to the National Census on Population and Housing carried out in 1990, about 45% of the economically active population (EAP) in the region were represented by the primary sector, which is nearly twice as high as the national average (22.6%). More than 50% of the EAP in all municipalities in Soconusco excluding Tapachula, Huixtla and Metapa were covered by the primary sector and municipalities with higher share of the primary sector in the EAP are: Union Juárez (73.6%), Villa Comaltitlán, (72.3%), Acacoyagua (69.6%) and Tuzatán (69.4%).

At present, coffee, banana and mango constitute the leading agricultural products, covering more than 80% in value terms among the principal 13 agricultural and livestock products. The agricultural output represented by such three products, which are exportable ones, has been stagnated recently as a consequence of dull behavior of their prices at international market. For breaking the deadlock confronted by the sector, an effort to diversify farming activity to be less vulnerable to external circumstances is in progress, but its fruit has not been born yet in a satisfactory manner.

Industrial sector in the region is closely linked with agricultural production; industries in the field of packing and processing agricultural products and manufacturing of intermediate and durable materials for packing of fruits and vegetables are representative in Socunusco. Coffee and cacao processing factories (Tapachula, Cacaoatán, etc.), oil extraction plants (Villa Comaltitlán, Acapetahua), sugar refinery factory (Huixla), cashew processing factory (Tapachula), fish processing factories (Tapachula), and cheese processing factories (Mapastepec) are examples of these industries. Besides, coffee fruits husking plants and fruits (Banana, papaya and mango) packing yard, etc. are established in the vecinity of production areas.

In parallel with agricultural prosperity, population in the Study area has burgeoned with a rate of 3.9% per annum during the decade of the 80's, but it is decelerated in the 90's to 1.4% reflecting stagnated performance of the agricultural sector.

The marginal index by state and by municipality was estimated by CONAPO on the basis of data for the National Census on Population and Housing (1990) and states and municipalities have been classified into four categories of marginal grade: "Very high", "High", "Medium" and "Low". Of the 16 municipalities in Soconusco, only three municipalities (Huixtla, Cacaoatán, Metapa) are classified as "Medium" marginal grade, the remainder being classified as "High" marginal grade. The highest index of marginal grade was for Acapetahua, which is followed by Comaltitlán and Acapetahua.

3.2.2 Land Tenure

(1) Agrarian land structure in Mexico

Through the land tenure system of the Constitution, which was enacted in 1917, the creation of "independent farmer" by Ejido (communal landholding) and small land-owners was achieved. Article 27 of the Constitution was revised in order to revitalize investment to the land and to introduce enterprise farming being enforced on February 26th, 1992. By this agrarian law, the limitation of the area and land use right for agricultural land, which is in possession of Ejido farmers (*ejitadario*), individual farmers and corporate bodies, was mitigated. In addition, the purchase, sale and lease of the land with a limitation have enabled through introduction of a plot certified system of land for *ejidatarios*.

According to the land tenure data of the Soconusco region prepared by SRA, the Ejido's area accounts for 42.4% of the entire area (10.8% of the total plot of land). It is relatively similar to the area in comparison with private land area of 42.6% (82.6% of the total plot of land). The majority of the land is occupied by the private landowners. Average holding area of the private landowner shows approximately 55.0ha. However, by the rural sociological survey, it was found that the land holding area of small individual farmers who have less than 5.0 ha is predominant.

In general, Mexican farmers are classified into four groups: *ejidatarios,* who are distributed land by the government in line with agrarian reform projects, communal farmers whose lands are also distributed by the government, farmers with private land ownership and colonial farmers. Apart from these farmers who have been endowed with the right to cultivate land, there are landless tenant farmers. It is estimated that the proportion of the lands to be cultivated by landless tenant farmers represents below 1% (0.7% on average in the region and 3.3% in the municipality of Metapa which accounts for the highest proportion among 16 municipalities in Soconusco). Colonial farmers are found only in Mapastepec.

After the Revolution in 1917, the government of Mexico has prohibited latifundio (large state), and the largest land holding is limited legally up to 300 ha (up to 100 ha in case of irrigated land and up to 150 ha in case of cotton-cultivated land). The public documents in Mexico stipulate Mexican farmers exclusively as ejidatario and small farmers (private farmers). On the other hand, Agricultural Census (the most recent one was conducted in 1991) reports summarize their result classifying farmers by size of their holdings into two groups: up to 5 ha and larger than 5 ha. This fact indicates that the Mexican government puts the criterion on definition of small farmer as 5 ha. Referring to the result of the Agricultural Census in 1991, features of land tenure in the region of Soconusco are disclosed as explained hereinafter.

(2) Land tenure in the Soconusco Region

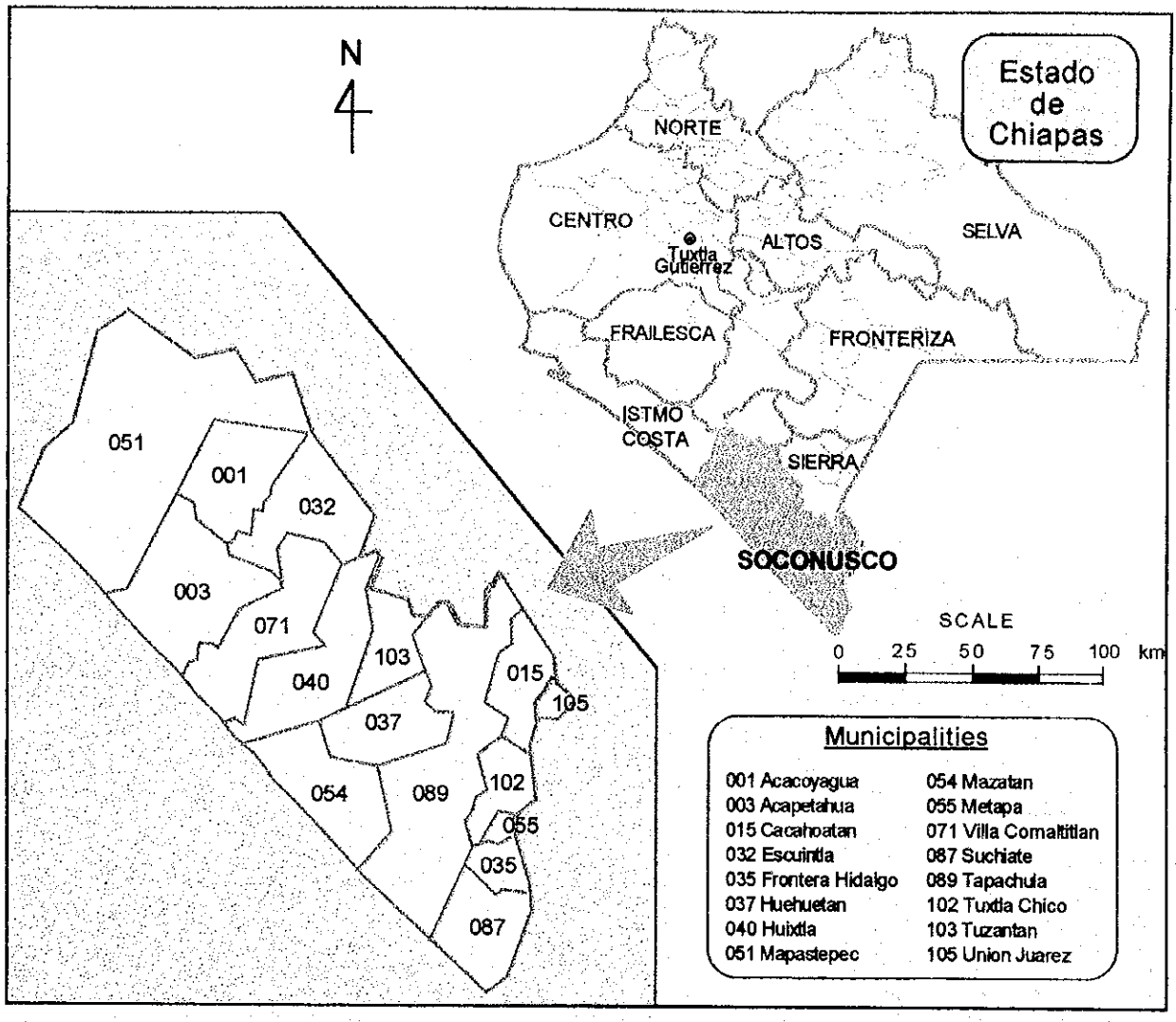
Farmers in the region are dominated by *ejidatario* against private farmers by a great margin of 63.0% to 35.6% (the remaining 1.4% are farmers of mixed ownership). The absolute number of *ejidatario* is the highest in Tapachula and Huixtla where there is a large rural population, but the proportion of *ejidatario* is higher in the Unión Juáres, which leads the region by 93%, and is followed by Escuintla (91%), Mapastepec (85%) and Villa Comaltitlán (84%). On the contrary, the municipalities with the greater portion of private farmers are Tuxtla Chico (84%), Frontera Hidalgo (76%) and Metapa (71%) and more than half of the farmers are represented by private farmers in Tapachula and Huehuetán.

Supposing that the farmer with a land holding up to 5 ha should be defined as small farmer, the proportion of these small farmers accounts for 46% of the total farmers in Soconusco on average; the highest share of small farmers is in Unión Juáres and Tuxtla Chico with 865 and

80%, respectively and the municipalities with share of small farmers exceeding 50% are Cacaoatán, Frontera Hidalgo, Metapa, Tapachula and Tuzatán.

The average farm size in the region is calculated to be 11.6 ha (8.5 ha among *ejidatarios* and 16.8 ha among small farmers) and is closely linked with the proportion of small farmers. The municipalities with a higher proportion of small farmers have smaller size of farmland on average, such as 3.6 ha in Tuxtla Chico, 3.9 ha in Unión Juáres and 5.8 ha in Cacaoatán, which is predominated by coffee, cacao and maize. By contrast, farmers with larger holding are found in Suchiate (average farm size is 29.8 ha), where the only large scale irrigation district is located, and in livestock-dominated municipalities such as Mapastepec (21.4 ha), Acapetahua (20.0 ha) and Acacoyagua (15.3 ha).

The proportion of small farmers among private farmers is higher than that among *ejidatarios* with a margin of 60% against 39%. This is due to the fact that, in the case of *ejidatarios,* even though the farmers with land holding larger than 5 ha outstrip those with holding up to 5 ha in number, the greater majority of the former falls in the range of 5 ha - 10 ha, meanwhile major disparity in farm size prevails among private farmers; in particular, it is supposed that not a few farmers with holding larger than 100 are found in such municipalities as Mapastepec, Villa Comaltitlán and Acapetahua, in which the average farm size is larger than 40 ha.



Profile of Municipalities

Municipalities	Area (km2)	Population (1995)	Population Density per km2
Acacoyagua	191.3	12,607	65.90
Acapetahua	358.3	25,647	71.57
Cacaoatán	173.9	35,738	205.50
Escuintla	206.2	26,282	127.45
Frontera Hidalgo	106.8	9,852	92.24
Huehuetán	313.0	30,356	96.98
Huixtla	385.0	47,644	123.75
Mapastepec	1,085.6	39,293	36.91
Mazatán	382.6	23,293	60.88
Metapa	101.8	4,381	43.03
Suchiate	303.0	28,498	94.05
Tapachula	857.0	244,855	285.71
Tuxtla Chico	64.6	32,395	501.47
Tuzantán	268.3	22,833	85.10
Unión Juárez	72.0	12,835	178.26
Villa Comaltitlan	606.1	25,535	42.13
Total (Average)	5,475.5	622,044	113.60

Source: Agenda Estadistica Chiapas 1997, Secretariate of Finance, State Government of Chiapas

Fig.3.2.1 Location Map and Profile of Municipalities in Soconusco Region

3.3 AGRICULTURE AND STOCK RAISING

3.3.1 Agriculture

(1) Agricultural Production

The agricultural production of the Study Area is done from the coastline to the mountainous region by 2,000 m above sea level and the altitude characterizes the cultivation crops.
Maize for the self-support is grown in the high ground part of above sea level 1,200m or more, and coffee is almost distributed in the whole area from 400m. to 1200 m. The mixed cropping of cacao and banana is done in the vicinity of altitude 400 m where the lower bound of the coffee cultivation. Grain and the fruit tree are grown in the area less than 400 m above sea level; majority of grain, sugarcane, and oil palm in the study area are grown in the area between 20 m -200 m. Sesame, watermelon and melon are cultivated on a small scale in the coastal dune where is between 0 m to 5 m at the coastal area.

The fruit trees are growing in the area between 20 m to 400 m above sea level. Cashew nut is grown in the region along the coast, and the soybean is planted in the inland part of cashew nut, then banana, mango, papaya are grown in the inland part.

In addition, the cacao is widely grown toward the inland, and connects with the coffee growth area by about 400 m above sea level.

The amount of production of crops in the Study Area is as shown in the next table.

Amount of production and yield in the Study Area (1996/1997)

Annual crops			Perennial; crops		
Crops	Production (ton)	Yield (ton/ha)	Crops	Production (ton)	Yield (ton/ha)
Maize	99,598	1.6	Coffee	55,669	0.7
Field beans	850	0.7	Sugar cane	716,438	79.6
Sorghum	7,007	2.7	Cacao	7,145	0.5
Soy bean	12,567	1.2	Banana	336,627	35.7
Sesame	4,716	0.5	Mango	51,094	3.6
Rice	558	2.7	Oil palm	40,298	12.9
Cotton	2,143	1.7	Orange	2,010	5.0
Melon	2,529	9.0	Cashew nut	222	0.1
Water melon	680	8.0	Rubber tree	130	1.0

Source: Distrito de Desarrollo Rural 08 Tapachula, SAGAR (1997)

The annual changes in the cultivation area are shown in the next table.

Annual changes in cultivation area in the Study Area

Crops	87/88	92/93	93/94	94/95	95/96	96/97
			Annual crops			
Maize	29,165	38,735	29,637	47,442	61,836	51,390
Field beans	213		624	199	873	1,138
Sorghum	248	2,401	595	1,181	2,652	2,579
Soy bean	22,238	6,868	7,301	6,434	8,737	10,519
Sesame	1,396	1,279	740	3,313	6,722	9,309
Rice	408	181	169	292	20	210
Cotton			1,874	4,412	1,227	1,233
Melon	517	130	200	645	298	281
Water melon	1,923	516	394	370	163	85
Others	3,272	1,549	158	420	594	1,051
Subtotal	59,380	51,659	41,692	64,707	83,122	88,351
			Perennial crops			
Coffee	60,500	75,180	75,180	75,180	75,180	75,180
Sugar cane	7,120	6,000	6,000	7,389	9,000	9,000
Cacao	13,492	13,373	13,600	12,320	13,169	13,168
Banana	9,919	13,180	14,627	9,296	9,296	9,442
Mango	4,609	4,000	4,000	8,597	8,597	14,055
Oil palm	990	1,150	1,950	2,721	3,119	3,119
Orange	402	402	402	402	402	402
Cashew nut		50	1,070	2,000	2,000	2,000
Rubber tree		130	130	130	130	130
Others	3,534	4,281	4,935	3,209	3,205	3,540
Subtotal	100,565	117,746	121,894	121,243	124,098	130,036
Total	159,945	169,405	163,586	185,950	207,220	218,387

Source: Distrito de Desarrollo Rural 08 Tapachula, SAGAR (1997)

The cultivation area of coffee and maize are 37 % and 25 % of total cultivation area respectively and they account for about 60 % of total cultivation area, then in the order of mango, cacao and sesame. Crop with a largest area decrease is soybean, and this is due to the price depression. Crops with a large fluctuation in the annual cultivation area are maize, field beans, rice, melons, and these large fluctuation is due to the fact that yield of these crops are controlled easily at the beginning time of the rainy season.

(2) Growing Period

The cultivation type in the Study Area is classified into three types, i.e. 1) Cultivation under rain fed condition at rainy season. Growing period is May to October; 2) Cultivation under irrigation at dry season. Growing period is from November to April.; 3) Cultivation under residual soil water follows the rain fed cultivation. Crops are sowing at the latter half of rainy season and harvested at dry season.

The cultivation area under rain fed condition accounts for about 90 % of the total cultivation area, i.e. 365,171 ha. The cultivation area under irrigated condition accounts for 23,295 ha, where banana, papaya etc. have been planted. The cultivation areas under residual soil water condition account s for 23,160 ha, where sesame, field beans, melon, pepper, watermelon etc. have been planted.

3.3.2 Livestock Industry

(1) General

The livestock population in the study area is as follows:

Cattle	Swine	Sheep	Poultry	Turkey	Bees
181,905	252,857	52,132	1,582,267	27,600	6,750

Source: SAGAR; Agenda Estadistica Chiaps, 1998.

According to this report, the study area possesses the 7.5% of state total cattle, ranked 6th, and the highest number of swine and sheep, 25% and 20% respectively, and second highest number of poultry, consist of 17%. However, the cattle industry dominated other livestock industries in terms of volume, value of production and job opportunities in the rural area. Although the region is self-sufficient in beef and poultry meat, it depends on other states for pork, milk and eggs. A family and private or small-scale holder management mostly manages current livestock industry.

(2) Cattle Farming

According to the 1991 census, municipal wise distribution of animals, half of the total cattle population is concentrated in the western area, viz. 32.3 % in Mapastepec, and 19.2% in Acapetahua, which is carried out by relatively larger scale farms. Most prevailing breed is Cebu with Brown Swiss crossbreed in every farm for milk and meat dual purposes. Milking are mostly carried out by hands, once a day, for production milk about 4-6 liters per day per cow with 250-305 lactation days periods. Milk is collected by the NESTLE Co. in the western region and others sell to the local cheese factories through middlemen and reach to the consumers.

Management, feeding and breeding practices on these large scale private owned farms in most of the region are usually superior to those on the small scale farms not because they are inherently more efficient units but because of the superior knowledge and resources of the operators. Recently, there are constant illegal cattle enter from Guatemala, as a result of this invasion, the regional cattle producers, income have been reduced. There are several types of improved pastureland mainly tropical grasses such as Guinea, Signal grass, Esterella (African star), Para grass, Berumuda and Napier grass.

(3) Swine Farming

Traditional scavenging farming is widely practiced in all the regions. Due to lack of modern breeds and shortage of grain feeds during the dry season, and last outbreaks of hog cholera and Aujesky disease. The most common breed is the Large White and Landrace crosses. The next common breed is the local breed. It is hardy, small, long-bodied and black in color with hardy and good disease resistance. It is kept mainly as the scavenger as smallholdings but few large-scale farms raising pigs as the confinement systems. Local swine industry is considered one of the least developed fields in the region, but pork demand is really high.

(4) Sheep Farming

So far, sheep development activities in the study area have been directed to the production of meat. The most common sheep species are "Pelibuey" and "Tabasco" which are traditional local breeds. Sheep is traditionally important source of meat for Mexicans but no systematic sheep farming can be found in the study area.

(5) Poultry Farming

Except eastern highland area where a large-scale modern broiler farm exists, there are no systematic egg productions. The local chicks and turkeys are still predominant due to their high disease resistance. The local chicken eggs and meat produced in rural area are normally consumed by farmers and very limited amount reaches local market.

(6) Other Animals

Horses are very important traction animals in the rural areas where road conditions are poor. Goats, rabbits and bees are raised by the part of the farmers though they are not popular in the region.

(7) Slaughterhouse

Every main municipality has public slaughterhouses mainly processing beef; however, most of them are not in good conditions. In addition, most slaughterhouses are located on riversides, and waste and drain water are released directly into the rivers without any treatment, thereby causing river contamination. There is a one modernized TIP (Tipo Inspeccion Federal) slaughterhouse in Huixtla, established in 1994, processing capacity is around 400 cattle per day, but after operating once, due to financial problem it is no longer in services.

(8) Animal Health

Due to vaccination programs and veterinary inspection, the animal herd has not been suffered from heavy contagious diseases in recent years. Among a variety of animal diseases, are considered more important, bovine brucellosis, bovine tuberculosis, reproductive disorders, tick-bone disease, internal parasitism, etc.
There is a federal livestock disease diagnostic laboratory in Mapastepec but lack of found and modern equipment, their activity is limited.

(9) Extension and Research

The government does not provide training and extension services.
University of Chiapas (UNACH), Campus IV located in Huehuetan, is the only livestock research institutions in the region. However, there have not conducted except for local cattle studies due to lack of budget and equipment.

(10) Commercial Feed

Commercial feeds are mainly obtained from private commercial feeds in the outside of the study area, but market prices of these feeds are very high for small scale farmers. There is one private small scale feed plant exist, but due to financial problems, this plant lease to the private large scale broiler farms which producing own poultry feeds.

3.3.3 Agricultural Rresearch and Agricultural Extension Service

(1) Agricultural Research Institution

There are UNACH and INIFAP in agricultural institution in the Study Area. They carry their own research theme. The fourth branch school of agricultural science of UNACH at Huehuetan which is composed of the plant pathology, the entomology, the crop cultivation, the crop breeding, and stock raising science, and promotes the agricultural engineer at the same time as research on the tropical agriculture and stock raising corresponding to the Soconusco region. However, agricultural extension services is not carried out, because of the budget and equipment shortage.

On the other hand, Rozario Izapa Agricultural Station which is belonging to the southern Pacific Ocean region research center (Oaxaca state) of INIFAP has ten researchers, and the researches on coffee, cacao, grain, mango, banana, tropical fruit, pasture, and oil palm are carried out.

INIFAP has good facilities and laboratory machine and equipment, has achieved various results of the agricultural research and supplies coffee seedlings, and is training the agricultural technology for producer and extension workers.

(2) Agricultural Extension Institution

DDR and CADER are scheduled to be transferred to the state government as decentralization of power. But CADER and SAG carry the extension service together as it is under processing period.

1) CADER

CADER of the Study Area belongs to Tapachura No.8 Agricultural Development District, which is the branch office of SAGAR, and is arranged at Acapetahua, Huixtra, Tapachula and Suchiate. Its activities on agriculture are cultivation method, pest control, and on the stock raising production are vaccinations. Moreover, as a rural society activity, the campaign for the vaccination and the family plan are carried out in cooperation with IMSS and SSA and also CADER prepare the application document against the farmer who hopes for the subsidy to PROCAMPO and pay the subsidy.

However, the business of PROCAMPO is the major duties among these duties and because of shortage of the budget on extension activities, the extension activities hardly done.

2) SAG

Extension services by SAG are done for medium scale producer who has a potential productive capacity. PEAT, which is extension service to the basic grain such as maize, field beans and soybean represent SAG'S activity. There are two private companies, which dispatch extension service workers to PEAT. These private companies invite applications for agricultural engineers by newspapers and select experts by his curriculum vitae and resist the candidate list. SAG selects experts from this candidate list and assigns the project every year. The experts assigned have been evaluated and trained by INCARURAL every year. Employment period is six months for rainy season cropping, which is the majority of the extension workers, to 11 months at maximum. Thirty-four extension workers including its coordinator are engaged in extension services by PEAT at present; May 1999. An extension worker covers one or three cities, which area are called Module, and his service area is about 650 ha on the average. Numbers of demonstration fields are 25 places for maize, 4 places for field beans and 7 places

for soybean.

As far extension services by SAG, the experts who are private agricultural experts dispatched by the private Recruiter Company carry out the extension services. They can not work earnestly for lack of unemployment compensation and enough time to take technical guidance. Moreover, they can not work well and effectively, because they have no cars and fuels to visit farmers and have to visit by their own expense. Extension services by SAG has another problem, that is, extension services can not be started from on middle of May to toward the end of June, when maize is already seeded, because the execution of SAG's budget starts from July.

3) FIRA

The agricultural technique supports carried by FIRA are two programs. One is ATI, which does directly to the farmer who receives the capital financing of FIRA. The other is Club de Productores, which is prepared for the producer who can acquire the technology regardless of the capital financing of FIRA

a. SATI

SATI, which is an agricultural extension service to collect the loan by FIRA easily, is not always a condition to get a loan. But farmers, who want to get loan for crops, i.e. Coffee, maize and soybean in Soconusco, which are difficult to get benefit by large fluctuation of the price, have to take SATI. Twenty percent of SATI's cost is charged by FIRA at the first year, the charge by FIRA decrease by 20 % every year and the farmers have to pay 100 % of the cost after 5 years.

Extension services by FIRA covers all crops and practices such as preparation of land to post harvest.

b. Club de Productores

There are two methods, one is by using the model field set up at different soil types which prepared by agricultural material and machinery sailing company (chiefly agricultural chemicals company), and the other is several training course on demand, which expense is charged partly by FIRA.

- Cities, towns, and villages
  There are engineers in charge of the agriculture and stock raising production promotion in each cities, towns, and villages and the technology is guided to the farmer based on the instruction of the city and the mayor in cooperation with the extension services workers of CADER and SAG.

- Private organization
  There is CIICA as a research organization by the private company, and some producer is requesting technological guidance directly to CIICA. Moreover, farmers, who have capital, recruit expert on agriculture by newspapers and contracts with him by piecework payment.

(3) Supply of Agricultural Seed and Seedling:

Agricultural seeds, which are registered, inspected and certificated by SNICS (Nacional de Inspección y certificación de semillas), can be sold in Mexico. The private company and the government organization are supplying the seed and the seedling in the Study Area.

1) Annual Crop

Breeder seed are Public institution sells the stock seed of the annual crop to the seed multiplication farmers and the private companies. The private companies are selling the multiplication seeds authorized by SNICS. Hybrid maize seed (crossing by their own field), sorghum hybride seed, soybean and sesame seeds are sold in the Study Area.

2) Perennial Crop

Two public institution are supplying the seed and seedlings. CEIDPHPACH which is the one the institution sells at Manguit Station in Tapachula the tropical fruit seeds; citrus fruits, guanabana (*Annona muricata L*), mango (*Mangifera indica L*) chicosapote (*Achras mammosa* L), mamei (*Mammea americana L*), carambola (*Averrboea carambola*), and litchi (*Litchi chinensis*) and rambutan (*Nepbelium lappaceum*), flowers seedlings (gladiolus, rose, and chrysanthemum) and the vegetables (potato) by the cost price. They guide the marketing of those crops besides the cultivation guidance.

The other institution is INIFAP, and they sell coffee seedling (Oro Azteca , Arabian coffee) and cacao seedlings (multiplicand by cutting and grafting, no variety name) are sold.

3.4 AGRICULTURAL AND RURAL INFRASTRUCTURE

3.4.1 Agricultural Infrastructure

(1) Present Situation of the Irrigation

The study area has a privileged annual mean rainfall of 1,500 to 4,000 mm, but has the dry and rainy seasons very defined, needing the irrigation in the dry season to increase the agricultural productivity. The irrigation facilities were constructed by SAGAR, CNA and individual farmers, but the large scale one, the 46th Irrigation District, was constructed by the CNA. The small scale irrigation units sum approximately 140, and are mainly concentrated along the Highway No.200, in the plain area.

The large scale irrigation district, the 46th Irrigation District, is formed by the Suchiate and Cacaoatan sub-districts, which has being operating since 1954. The district has 8,916 ha, where the projected irrigation area has 7,356 ha, having 652 beneficiaries producing mainly banana. The land property is divided in 32% of Ejidal, 28% of Pequena Propiedad and 40% of Colonia Agricola. As the Suchiate sub-district is taking water from the Suchiate river, an international river that makes frontier with Guatemala, no permanent construction of water intake is available. The water intake is done by weirs made by stones of the river bed. The conduction canal has 20.2 km with capacity for 12 m^3/sec, the main canal 66.2 km and secondary canal 18.4 km. Other structures are available in the district as 103 km of drainage canal and 95 km of roads. The main irrigation method is the sprinkler, but the furrow irrigation is utilized partially. The operation and maintenance is realized by a water user's association, which the infrastructures and equipment were transferred by the CNA, where the association is responsible for it's financial resources. The 1997 budget of the association was 1,750,000 peso, an average of 25 peso per irrigation / ha, summing 500 peso / year for the banana cultivation.

The small scale irrigation farms are formed by 140 units of organizations and individual farmers, having an irrigable area of 33,600 ha, but about 10,000 ha of irrigable farms not utilized, due to bad maintenance or deterioration of irrigation facilities. So, it is important to increase the actual irrigation area by the construction or improvement of the deficient facilities, and select crops

with adequate balance of benefit and investment that correspond to the improvement of the farming techniques.

The small scale irrigation unit varies from 6 to 3,700 ha, where the Ejidal has 51% and the Pequena Propiedad 49%. The irrigation facilities are divided in surface and groundwater utilization. The surface water intake is done from intake facilities in rivers, by gravity or pumps, and from irrigation canals by small size pumps irrigating small areas of about 1 ha. The groundwater is taken by pumping up from shallow wells (10 to 30 m deep) and deep wells (80 to 120 m deep) depending on the relief or farm scale.

The present situation of the irrigation area in the study area is shown in below table.

Scale of Irrigation Area	Water Intake Facility	Number of Irrigation Units	Irrigation Area (ha)	
			Projected Area	Present Irrigated Area
Small Scale Irrigation Area	Deep Well	70	14,882	9,976
	Derivation	41	15,186	10,592
	Pump Station	28	3,565	3,194
	Sub-total	139	33,633	23,762
Large Scale Irrigation District	Derivation	2	8,550	7,357

The main crops irrigated in the area are banana, cacao, papaya, mango, sorgum, sugar cane, etc., being mainly irrigated the banana and papaya that reach about 50% of the actual irrigation area. Sprinkler is mainly utilized for the irrigation, but the center pivot system is employed in about 10 individual farmers.

The ferti-irrigation project is implemented, since 1997. This project is the main component of the Alianza para el Campo, having as main objective decrease the production cost by increasing the irrigation efficiency, utilizing sprinklers and drip irrigation. The project started on 1996 in the hole country, but in Chiapas it started on 1997 in 18 locations with benefits for 1,000 ha.

(2) Present Situation of the Drainage

Some parts of the area have been suffered from the flooding of rivers and damaged by the inundation due to poor drainage. Such inundation damages are concentrated in the alluvial fans formed by rivers where ground slope is gentle and the elevation is less than 30m. The area is totally 2,850km^2, and extends from the Highway No.200 up to the coast line.

The drainage facilities which were installed in the study area are the drainage canals of the 46th irrigation district and the main drainage canal and the group of river levees constructed in the Hydraulic Project of the Coastal Area of Chiapas by CNA. The drainage condition in the 46th irrigation district is good, where the drainage canal consists of the main drainage canals which connect with Rio Cozalapa and Rio Suchiate, respectively and the group of their subordinate branch drainage canals. Furthermore, the field drainages were dug with human power by each farmer, individually. This shows the outstanding effect on drained the surface runoff from the fields rapidly into each branch drainage canal.

In the Hydraulic Project of the Coastal Area of Chiapas, the main drainage canal whose total length is 597km and the group of river levees whose total length is 453km were installed in the study area. Through this, the drainage condition of 803km^2 among 2,850km^2 land whose drainage condition had been poor was improved. This project installed, as main infrastructures, roads, drains, roads for canal maintenance, storehouses, etc. Those infrastructures were

constructed and operated by the CNA, but in 1992, with the new National Water Law, the management is been transferred to the civil associations, constituted by beneficiaries farmers. The transference program is done for each civil association of each sub-district, and is expected to be concluded in 2001.

The main infrastructure which was installed by CNA and transferred to the water users' associations in the Study Area is presented in the table below.

Infrastructure	TAPACHULA		HUIXTLA		ACAPETAHUA		Margarita-Pijijiapan*	
	Construction	Transfer	Construction	Transfer	Construction	Transfer	Construction	Transfer
Roads	310km	171km	365km	228km	325km	92km	135km	No dada
Drainage canal	110km	46km	187km	111km	208km	79km	92 (24)km	No dada
Levee roads	38km	26km	165km	76km	230km	131km	20km	No dada
Crossing culvert etc.	244 sites	91 sites	162 sites	162 sites	100 sites	100 sites	81 sites	No dada

* Margarita-Pijijiapan includes the area where is not the Study Area. The number within ( ) shows that of the Study Area.

The design drainage discharge of the drainage canals in the area is based on 5 year probability. Although that of river levees is based on from 10 to 25 year probability due to their importance, the water routes will be not expanded. Nevertheless, this project covered only the group of the main drainage canals and the levees of main rivers. The branch drainage canals which connects with them and the drainage canals in the fields were not installed. Therefore, the farmlands are still damaged by inundation in the rainy season, and agricultural production has been stagnant.

Although main eighteen rivers flow into the marsh including the environmental conservation zone, estuaries that always open are only two. Many of watercourses do not reach to the estuaries and disappeared in the marsh. The annual fluctuation of its water level ranges between EL1.10 and 2.30m. Because of this situation, few farmlands exist in the lower land that covered with water by rise of the water level. Thus, if the hydraulic problem is solved, there would be the possibility to expand land use. However, it is also true that the area is protected as the environmental conservation zone by the government because this hydraulic situation brings about the peculiar ecosystem. Therefore, it is impossible to implement the large-scale development project, and the hydraulic situation in the zone has not improved.

3.4.2 Rural Infrastructure

(1) Roads

The roads in the study area are projected, constructed, operated and maintained by SCT, CEC and CNA. The SCT is responsible for the national and rural roads(without asphalt), and the CEC for the rural roads with asphalt. The CNA is responsible for the construction and operation/maintenance of the rural roads situated in the Chiapas Coast Hydraulic Project area. But in the moment the operation/maintenance responsibility is been transferred to the Civil Associations.

The main road network in the study area is relatively well constructed and maintained, but the rural roads of rural areas are not. The rural roads conditions are becoming bad, and the rural roads that are not covered with asphalt, have serious problems of locomotion in the rainy season. The study area's main roads are composed by the Highway No.200, 190, 18 and 19. The rural roads are settled in form to connect the rural communities and centers of each municipality. The Soconusco region has in the present moment (1998), 3,310 km of roads, with 605 m/km^2 of

density, that is greater than Chiapas with 254 m/km^2 of density.

The percentage of roads covered with asphalt is 21% in Chiapas and 15% in Soconusco, that are very low, remaining great part of the rural roads without asphalt. This condition is problematic mainly in the rainy season, needing an urgent improvement. The length of each road in the study area is shown in the below.

Kind of Road	Earth Road (Km)	Gravel Road (Km)	Asphalt Road (km)	Total (km)	Asphalt Ratio (%)
Federal Highway	-	-	303.2	303.2	100
Rural Road (SCT)	-	885.5	42.8	928.3	4.6
Rural Road (CEC)	22.0	485.6	155.2	662.8	23.4
Rural Road (CAN)	431.7	785.0	-	1,216.7	0
Others	47.3	146.6	5.0	198.9	2.5
Total	501.0	2,302.7	506.2	3,309.9	15.3

Source: Survey Data

(2) Water Supply Facility

The Tapachula city is the only one that has a large scale water treatment facility. Major towns of each municipality have small scale water treatment facilities, but the rural communities have none. The water supply facilities are concentrated in urban areas, being most of rural communities without it, needing an urgent improvement of the present condition. The facilities were constructed by the CEAS, CNA, SDUCOP and COPLADE. Those installations source are rivers, mountain stream, springs and deep wells, being conducted to a elevated tank from which are supplied by gravity. The operation/maintenance responsibility is on each municipality. In rural communities, with no water supply facility, the inhabitant itself must take water from mountain stream or springs by pipes, or from shallow wells around their houses.

The water supply facility is covered for 58% of the population in the study area, but if converted to rural communities it decreases to 10%. There are about 2,600 communities in the area and those communities has populations varying from 10 to 2,000 inhabitants, which most part of the rural inhabitants live in towns. The water supply fee has small differences between municipalities, but the basic value for domestic water supply for each 20m^3 is from 16 to 20 peso/month.

Population and Communities with Water Supply in the Study Area

Communities				Inhabitants			
With Water Supply		Without Water Supply		With Water Supply		Without Water Supply	
Community	%	Community	%	Inhabitant	%	Inhabitant	%
269	10	2,329	90	180,510	58	131,455	42

Source: CEAS, Cobertura de la Infraestrutura Disponible, 1998.

(3) Sewerage Facility

Despite of all municipality centers have their sewerage pipelines, there is no one with water treatment facility. So, all sewerage is drained to the rivers without any treatment, polluting them. Except some rural houses that have simple septic tank, most of them drain the sewerage in the nearest river. The number of municipality sewerage pipelines in the study area is 80, but almost all of them have problems in the pipeline or operation/maintenance.

(4) Power and Communication Facility

The study area has the power source in Angostura dam, and there are 12 substations for the power supply. There are about 160,000 households in the study area, it receives 134,000 users (84%) and about 100 non electrical communities are exist in the remote area. The area has 134,000 users, but the electrification rate in rural communities is 84%. The electricity demand increased 28.4% in this six months, and is expected an increase of 24.1% for the next 10 years. The electric consume was 1,554 kwh/month in 1997. Now, it is planning a new distribution network for the future demand.

The telephone services is being developed by a program in national level. The telephone in rural areas is settled in most of communities over 500 persons, and is installed in 464 communities in the study area. There are public telephones in the rural communities utilized by the inhabitants. In the public buildings as municipality offices and IMSS, there are radio communication systems between head office and branch office.

3.5 RURAL FINANCE

3.5.1 Rural Finance System in Mexico

In Mexico, especially after the financial crisis taken place at the end of 1994, financial institutions have been circumspect in granting loans to farmers. The finance to the agricultural sector was amounted to 69 billion pesos in 1997, which is expanded by 42% in nominal terms but reduced to 64% in real terms, in comparison with the accomplishment in 1994. Thus, the participation of the agricultural sector within the total credit services was lowered from 8.6% in 1990 to 5.4% in 1997. Another aspect which is worth while to indicate is that the share of the development banks in total lending to the agricultural sector has shrunk significantly from more than 50% in 1988 to less than 30% in 1997, as a consequence of government's policy in downsizing development bank (in the case of BANRURAL, 300 of its 500 branches were closed in 1992 with reduction of its staff from 22,000 to 10,000).

At present, FIRA, an affiliated financing institution with Mexico's Centran Bank - Banco de México (BANXICO), leads the rural finance market. FIRA does not give credits directly to beneficiaries, but functions as the "Second Floor" bank channeling its financial resources targetted to farmers and farm entrepreneurs through BANRURAL and commercial banks. FIRA's credit line is categorized into two forms: "Refaccionario" (For fixed investment and purchase of durable goods) and "Avío"/ "Prendario" (For working capital in farming activities, acquisition of inputs or initial payment for marketing) and the maximum loan period is up to 20 years for the former and up to 3 years (Avío) and 6 months (Prendario) for the latter. FIRA also classifies their beneficiaries by their income level and interest rates applicable to respective group of stratum are variable as follows.

Farmers and/or Farm Entrepreneurs	Interest Rate	
	Refaccionario	Avío y Prendarios
Up to 1000 times of the minimum salary of the area and credits up to $ 150,000	CETES	CETES
More than 1000 times of the minimum salary of the area and credits more than $ 150,000	CETES + 4pp	Free

Note: CETES means the Federal Treasury Bills and FIRA's interest rate is referres to those of 28-days