JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF AGRICULTURE, LIVESTOCK AND FOOD
REPUBLIC OF GUATEMALA

MASTER PLAN STUDY ON INTEGRATED RURAL AND AGRICULTURAL DEVELOPMENT PROJECT IN JUTIAPA

FINAL REPORT

MARCH 1993

PACIFIC CONSULTANTS INTERNATIONAL
TOKYO, JAPAN

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PREFACE

In response to a request from the Government of the Republic of Guatemala, the Government of Japan decided to conduct a Master Plan study on the Integrated Agricultural and Rural Development Project at Jutiapa and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Guatemala a study team headed by Dr. Shoji KANATSU, Pacific Consultants International, twice between February, 1992 and September, 1992.

The team held discussions with the officials concerned of the Government of Guatemala, and conducted field surveys in the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Guatemala for their close cooperation extended to the team.

March, 1993

Kensuke Yanagiya

Kensuke Yanagiya
President
Japan International Cooperation Agency

March, 1993

Mr. Kensuke Yanagiya
President,
Japan International Cooperation Agency,
Tokyo, Japan

Dear Mr. Yanagiya,

Letter of Transmittal

We are pleased to submit to you the final report of the Master Plan Study on Integrated Agricultural and Rural Development Project at Jutiapa in the south-east region of Guatemala. The report contains the advice and suggestions of the authorities concerned of the Government of Japan and your Agency as well as the formulation of the above mentioned project. Also included are comments made by the official concerned from the diverse organizations of the Government of Guatemala during discussions on the draft report which were held in Guatemala City and Tokyo.

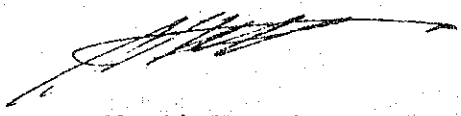
The present study area is located in a semi-dry zone in the south-eastern part of the Republic of Guatemala; its central-northern part is located in a mountainous zone while its southern part has low coastal plains facing the Pacific Ocean. The present project presents the formulation of integrated development plans for the Department of Jutiapa which includes each development component, and within the planned development projects, those with the highest priority were selected. Those projects were thoroughly investigated and the present plans were confirmed to have the biggest impact on the rural and agricultural and livestock development from a social and economic point of view.

In view of the urgency of agricultural and rural development in Guatemala and of the need for socio-economic development of Guatemala as a whole, we recommend that the Government of Guatemala implement this Project as a top priority.

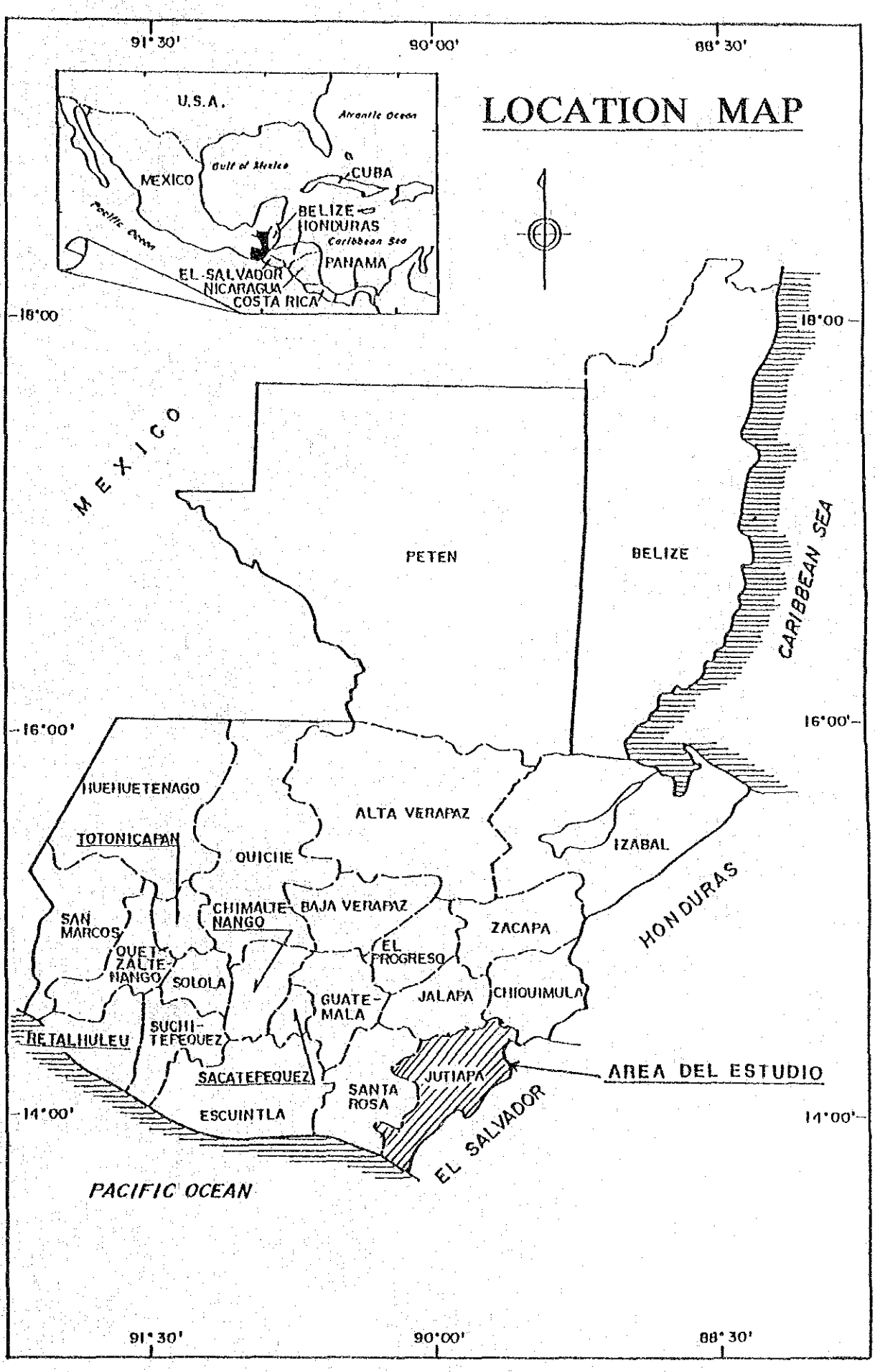
We wish to take this opportunity to express our sincere gratitude to your Agency, the Ministry of Foreign Affairs, the Ministry of Agriculture, Forestry and Fisheries and the Embassy

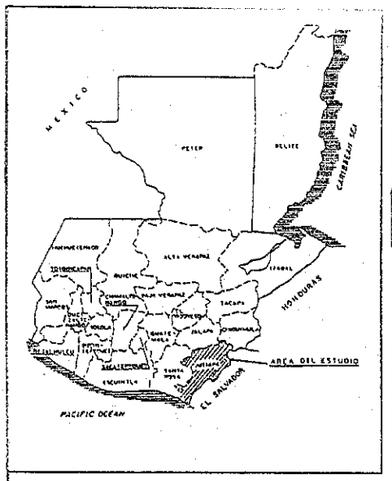
of Japan in the Republic of Guatemala. We also wish to express our deep gratitude to the officials concerned from the diverse organizations of the Government of Guatemala for the close cooperation and assistance extended to us during our investigations and study.

Very truly yours,



Dr. Shoji Kanatsu, Team Leader,
Master Plan Study Team on
Integrated Agricultural and Rural
Development Project at Jutiapa,
Pacific Consultants International


LOCATION MAP
91°30'
90°00'
88°30'
U.S.A.
Atlantic Ocean
Gulf of Mexico
MEXICO
CUBA
BELIZE
HONDURAS
Caribbean Sea
Pacific Ocean
PANAMA
EL SALVADOR
NICARAGUA
COSTA RICA
18°00
MEXICO
PETEN
BELIZE
CARIBBEAN SEA
16°00'
HUEHUETENAGO
ALTA VERAPAZ
TOTONICAPAN
QUICHE
IZABAL
SAN MARCOS
CHIMALTE-NANGO
BAJA VERAPAZ
ZACAPA
HONDURAS
QUET-ZALTE-NANGO
SOLOLA
EL PROGRESO
GUATE-MALA
JALAPA
CHIQUIMULA
RETALHULEU
SUCHI-TEPEQUEZ
SACATEPEQUEZ
JUTIAPA
AREA DEL ESTUDIO
SANTA ROSA
14°00'
ESCUINTLA
EL SALVADOR
PACIFIC OCEAN



SANTA CATARINA MITA INTEGRATED RURAL DEVELOPMENT PROJECT

AMAYO INGENIO IRRIGATION PROJECT

SOIL CONSERVATION PROJECT

ALTO MONGOY IRRIGATION PROJECT

ATESCATEMPA IRRIGATION PROJECT

COMAPA INTEGRATED RURAL DEVELOPMENT PROJECT

TEMPISQUE IRRIGATION PROJECT

MONTUFAR INTEGRATED RURAL DEVELOPMENT PROJECT

LEGEND

- : Irrigation Project
- : Integrated Rural Development Project
- : Soil Conservation Project
- : Priduction, Agricultural Extension and Education Sthrengthening Project
- : Animal Health Sthrengthening Project
- : Breeding Improvement Center Project
- : Forest Fire Prevention Project

0 5 10 km

GENERAL PLAN OF THE MASTER PLAN FOR THE INTEGRATED RURAL DEVELOPMENT PROJECT

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ABBREVIATIONS

NATIONAL GOVERNMENTAL INSTITUTIONS AND ORGANIZATIONS

BANDESA	: Banco Nacional del Desarrollo Agropecuario
CATIE	: Centro Agronómico de Investigación y Enseñanza
CGDCR	: Coodinadora General de Caminos Rurales
CONAMA	: Comisión Nacional del Medio Ambiente
CONAP	: Consejo Nacional de Areas Protegidas
DGC	: Dirección General de Caminos
DIGEBOS	: Dirección General de Bosques y Vida Silvestre
DIGESA	: Dirección General de Servicios Agrícolas
DIGESEPE	: Dirección General de Servicios Pecuarios
DIRYA	: Dirección Técnica de Riego y Avenimiento
ICTA	: Instituto de Ciencia y Tecnología Agrícola
IFM	: Instituto de Fomento Municipal
IGM	: Instituto Geográfico Militar
INACOP	: Instituto Nacional de Cooperativas
INDE	: Instituto Nacional de Electrificación
INDECA	: Instituto Nacional de Comercialización Agrícola
INE	: Instituto Nacional de Estadística
INGUAT	: Instituto Guatemalteco de Turismo
INSIVUMEH	: Instituto Nacional de Sismología,Vulcanología,Meteorología e Hidrología
INTA	: Instituto Nacional de Transformación Agraria
MAGA	: Ministerio de Agricultura,Ganadería y Alimentación
MCTOP	: Ministerio de Comunicación,Transporte y Obras Públicas
MINDES	: Ministerio de Desarrollo Urbano y Rural
MSPAS	: Ministerio de Salud Pública y Asistencia Social
SEGEPLAN	: Secretaría General del Consejo Naciona de Planificación Económica
UNEPAR	: Unidad Ejecutora de Acueductos Rurales
USPADA	: Unidad Sectorial de Planificacion Agropecuaria y de Alimentación

AGRICULTURAL AND LIVESTOCK DEVELOPMENT PLANNING

PAFG	: Plan de Acción Forestal para Guatemala
PRODAC	: Programa Nacional de Diversificación Agricola y Comercialización
PROGETTAPS	: Proyecto de Generación y Transferencia de Tecnología Agropecuaria y Producción de Semilla

INTERNATIONAL ORGANIZATIONS AND INSTITUTIONS

BID	: Banco Interamericano de Desarrollo
CIAT	: Centro Internacional de Agricultura Tropical
CIMMYT	: Centro Internacional de Mejoramiento de Maíz y Trigo
FAO	: Food and Agriculture Organization of the United Nations
IICA	: Instituto Interamericano de Cooperación para la Agricultura
JICA	: Agencia de Cooperacion Internacional del Japon
OEA	: Organización de Estados Americanos
UNDP	: United Nation Development Plan
UNESCO	: United Nation Educational,Sceientific,and Cultural Organization
USAID	: United States Agency for International Development

O T H E R S

B/D	: Basic Design
D/D	: Detailed Design
F/S	: Feasibility Study
GDP	: Gross Domestic Product
GRP	: Gross Regional Product
GATT	: General Agreement on Tariffs and Trade
NAFTA	: North America Free Trade Agreement
PROLAC	: Planta Procesadora de Productos Lacteos de Asuncion Mita
S/W	: Scope of Work
USBR	: United States Bureau of Reclamation
USDA	: United States Department of Agriculture

U N I T

US$	=	United States Dollar
Q	=	Guatemalan Quetzal
mm	=	millimeter
cm	=	centimeter
m	=	meter
km	=	kilometer
cm^2	=	square centimeter
m^2	=	square meter
km^2	=	square kilometer
ha	=	hectare
Mz	=	manzana (0.7ha)
l	=	liter (1,000cm^3)
m^3	=	cubic meter (1,000l)
MCM	=	million cubic meter ($10^6 m^3$)
g	=	gram
kg	=	kilogram (1,000g)
t,MT	=	ton (1,000kg)
qq	=	quintal (45.36kg)
m/s,m/sec	=	meter per second
m^3 /s,m^3 /sec	=	cubic meter per second
t/ha,ton/ha	=	ton per hectare
m^3 /km^2	=	cubic meter per square kilometer
mm/day	=	millimeter per day
m^3 /km^2 /year	=	cubic meter per square kilometer per year
l/s,l/sec	=	liter per second
qq/mz	=	quintal per manzana
Q/qq	=	quetzales per quintal
Q/kg	=	quetzales per kilogram
Kw	=	kilowatt
%	=	percent
°C	=	celsius degrees

SUMMARY

SUMMARY

1. INTRODUCTION

1.1 The Government of Guatemala asked to the Government of Japan for technical cooperation for the elaboration of a Master Plan of the Integrated Rural and Agricultural and Livestock Development of Jutiapa Project (hereinafter referred as the "Study"). As response to this request, the Government of Japan through the Japan International Cooperation Agency (JICA) sent a mission for the preliminary study which performed a reconnaissance study of the targeted area and determined the scope of the works. Once discussions between the preliminary study mission and the Guatemalan authorities were conclude. an agreement was reached and the scope of the works were signed by both parties.

In agreement with the scope of the works mentioned above, JICA sent a Japanese Team to Guatemala to make a study in two stages.

1.2 This report has been elaborated as a product of the Study of the Master Plan for the Integrated Rural and Agricultural and Livestock Development Project at Jutiapa which was formulated in agreement with the recompilation and analysis if those works in Guatemala.

2 BACKGROUND OF THE PROJECT

2.1 The Republic of Guatemala has a population of 9.2 million people (1990) and the Gross Domestic Product (GDP) per capita was estimated as US$936 (1989).

The foreign trade sector in Guatemala depends mainly on agricultural products, specially on six traditional agricultural export products (coffee, sugar, banana, cotton, cardamom and meat).

Due to the fall of the international price of coffee and other factors, the balance of payments has been suffering a continuous deficit.

2.2 Within the "Economic and Social Policy of the Government of Guatemala, Period 1991-1996" of the President Jorge Serrano Elías administration, it is set up as a main objective of the agricultural policy to achieve an efficient and integral development of the sector, as well as the sustained growth of the production, based on a rational utilization of the renewable natural resources.

3. DIAGNOSIS OF THE DEPARTMENT OF JUTIAPA

3.1 Location, population, etc.

The Department of Jutiapa is located in the southeastern part of the Republic of Guatemala and shares borders with El Salvador to the east, the Pacific Ocean at the south. The estimated population for the year 1990 is 346,774 habitants, of which 79,4% lives in the rural area. The territorial extension is around 3,200 Km^2 and population density is 108 habitants/Km^2. administratively the department has 17 municipalities.

3.2 Climate and Hydrology

The Department of Jutiapa belongs to the subtropical climate zone with a rainy (May-October) and dry (November-April) seasons perfectly delineated. Annual rainfall varies widely between 800 mm and 1,800 mm. Around 95% of annual rainfall is concentrated in the rainy season.

The hydrographic basins in Jutiapa are divided in two main basins: those of the Paz river and those of Ostúa river. Most of the rivers and ravines of small and medium scale do not have water flow in the dry season.

3.3 Topography and Geology

According to the topographic characteristics, the department is classified in three physiographic groups: coast plain of the Pacific, recent volcanic piedmont, and volcanic mountain chain.

Accordingly to the topographic classification, it can be said that the Department of Jutiapa is formed by volcanic rocks in the mountainous zone which are distributed in the volcanic chains and piedmonts and by alluvial deposits which are distributed in the costal plains and main depressions of the valleys.

3.4 Soils

The soils in Jutiapa are of diverse types and distributed based on parent materials, degree of erosion and drainage. These soils are classified as follows as below:

- Alluvial soils
- Volcanic ashes soils
- Brown soils
- Red-yellow heavy clayish soils

3.5 Land Classification

Lands were classified according to their utilization in the following 7 units:

Surface (Km^2)	(%)	Symbol	Land Class: Dry Soil	Wet Soil	Pasture	Fruit trees,etc.
38.5	(1.2)	S2	S2	S2	S2	S1
340.5	(10.6)	S2-S3	S2-S3	S2-N2	S2	S1
344.0	(10.7)	S3-N1(T,P)	S3-N1	N2	S2-S3	S2-S3
106.5	(3.3)	N1(W)	N1	S3	N1	N1
1270.0	(39.4)	N1-N2(T,P)	N1-N2	N2	N3-N2	N3-N2
161.0	(5.0)	N1-N2(T)	N1-N2	N2	S1-N2	S3-N2
958.5	(29.8)	N2	N2	N2	N2	N2

S1: Highly suitable
S2: Moderately suitable
S3: Marginally suitable
N1: Non-suitable (at present)
N2: Non-suitable (permanently)

3.6 Land Utilization

The actual use of the lands is as follows:

Land use	Km^2	%
Dry-soil agriculture	503.8	15.7
Wet-soil agriculture	13.2	0.4
Pastures	660.0	20.5
Fruit trees and coffee	35.0	1.1
Forests	145.0	4.5
Bushes, w/o use & other uses	1,862.0	57.8
Total	3,219.0	100.0

3.7 Land Tenency

The number of farms by size is as follows:

Class	No. of Farms	(%)	Surface (ha)	(%)	Farm Surface (ha)
Microfarms	3,209	(11.2)	1,079	(0.6)	0.3
Subfamiliars	21,024	(73.6)	41,692	(21.8)	2.3
Familiars	3,657	(12.8)	56,783	(29.6)	15.5
Multifamiliar Medium	666	(2.3)	74,648	(39.0)	112.1
Multifamiliars Big	11	(0.1)	17,139	(9.0)	1,558.1
	28,567	(100.0)	191,341	(100.0)	3.2

3.8 Agricultural Production

With the exception of the lands under irrigation, the agricultural activity in Jutiapa depends on the behavior of the rainfall. Main crops cultivated in dry-soils are corn, sorghum, and kidney beans, while tomato, onion and other vegetables are cultivated in irrigated lands. The situation of the agricultural production is as follows:

Crops	Cultivated Area (ha)	Annual Prod. (Ton)	Yield (T/ha)
Corn	32,600	50,500	1.55
Sorghum	17,900	21,200	1.20
Kidney beans	16,000	12,700	0.80
Coffee	2,100	3,500	1.70
Rice	1,100	2,300	2.10
Tomato	1,000	31,600	31.60
Onion	1,000	6,700	6.70

3.9 Categories of Agricultural Exploitation

The system of agricultural exploitation can be divided in the following 5 main categories:

Category Symbol	System of Exploitation
A1-III-A	It is the group of intensive activity, only in cultivation of basic grains and the income strata of the farmers is low. The level of equipment of agricultural infrastructure is relatively high.
A1-III-C	Production and income level of the farmers are similar to those of category A1-III-A, but the level of equipment of the agricultural infrastructure is low.
A2-II/III	As well as the group above, production of basic grains is developed intensively, but the income strata of the farmers is fairly high. In general, the conditions of the production infrastructure are low.
B/C-I/II	It has an agricultural scheme of joint exploitation of basic agriculture based on the production of grains complemented by other sectors; it is a group with an income strata of farmers is above the average. It is considered that the production infrastructure is in level ranging from medium to superior.
D-1	Its agriculture is based on a single production sector of grains and the technological level of agricultural production and income level of the farmers are high. However, it is a group where the intensive use of the land and crops diversification are underdeveloped compared with other groups.

3.10 Livestock Production

The Department of Jutiapa has around 170 thousand heads of bovine cattle and 50 thousand heads of swine; both occupy the 4th place at a national level making it possible to think that the livestock production is an important sector within the economic branches of the department.

In spite of this fact, farmers raise cattle at a small scale and with traditional technologies; also, due to the inferiority of species and varieties, raising method. cattle class, feeding, etc., the difference in yield and production is quite big compared with the big-scale exploitations. On the other hand, livestock diseases of tropical zones proliferate and the contagious cattle diseases in general, influencing the livestock and poultry productivity in a negative way.

3.11 Irrigation and Drainage

The area under irrigation covers an extension of 3,345 ha, which is quite below the potentially irrigable area due to water scarcity. structural deterioration, etc. Concerning drainage, more attention is paid to ground drainage; there are not any works related to underground drainage.

3.12 Social Infrastructures

There are three central american highways which cross the department, but the equipment of the road network which connects them with the towns is underdeveloped.

The coverage rate of the water supply services is 90% in the urban sector and 30% in the rural sector, an average of 40% at a departmental level. The existing facilities for water supply faces a bottleneck consisting in the deficiency of the water flow during the dry season and the structural deterioration.

3.13 Ecological Aspects and Conservation of Agricultural Soils

The ecological problems of the Department of Jutiapa are: deforestation, erosion and degradation of the soils, and water contamination. The lands prone to suffer from erosion cover and extension of 630 Km^2 of the volcanic piedmont located in the north of the department.

3.14 Commercialization of the Agricultural Products

Without having the adequate infrastructures for the marketing of agricultural products, it is notorious an excessive intermediation of traders (carriers) between producers and final consumers. The main markets of the agricultural products generated in Jutiapa are Guatemala city and El Salvador, besides the local market.

3.15 Institutional Services

The participating institutions in the development of the agricultural and livestock sector are, among others,

DIGEST, DIGESEPE, DIRYA, ICTA, DIGEBOS, INDECA and BANDESA. The supporting services to the farmers are not granted efficiently due to a lack of equipments and materials for inspection and research, etc. At this moment, there is no specific credit line with soft conditions for small and medium scale farmers.

The farmers organization is underdeveloped and there are no more than 16 cooperatives in Jutiapa.

4. DEVELOPMENT OBJECTIVES

4.1 Restricting Factors of Development

The restrictions faced by the rural and agricultural and livestock sectors are due to two main factors: the unstable and underdeveloped environment and the low level of living conditions and welfare in the rural zones. Within the restrictions of the agricultural and livestock sector, water and soil unfavorable conditions can be mentioned, as well as the immature situations of cultivation, agricultural and livestock exploitation, raising system, etc.; besides the structural deterioration of the agricultural and livestock infrastructures and inefficiency of the institutional services of support to the farmers, a factor which obstructs the development of the agricultural and livestock sector. On the other hand, about the rural sector, the subsectors of roads, water supply, electrical energy generation, communication systems, and public health are underdeveloped.

4.2 Development Potentiality

4.2.1 Land Resources

The Department of Jutiapa has a total of 82,950 ha of lands suitable for agricultural purposes (37,900 ha for exploitation in wet lands, and 34,000 ha for pastures and fruit trees growing). In these moments the areas suitable for agriculture in the dry lands are dedicated in practical terms for cultivation of grains and vegetables. Even though there is no possibility of widening the agricultural surface in the dry lands, there is still a basic hope for a better and intensive utilization of the lands by introducing irrigation systems and facilities.

4.2.2 Water Resources

The flow of available water resources to be used for development purposes is estimated to be about 500 million m^3 per year, divided in 450 million m^3 of groundwater and 50 million m^3 underground water. Quantitatively, with this flow, it is possible to use the extension of suitable lands

for agricultural and livestock development.

4.2.3 Socioeconomic Conditions

Because of its geographical location and human resources, the Department of Jutiapa presents a high potentiality for development.

4.3 Basic Concepts for Development

4.3.1 Governmental Agricultural & Livestock Development Policy

The agricultural and livestock public sector has five specific policies:

(1) Production development and exploitation of renewable natural resources

(2) Optimal land utilization

(3) Commercialization and export support

(4) Support of food-supply stabilization policies

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

4.3.2 Development Objectives

The specific development objectives are chosen in agreement with the governmental development policy, as well as with the physical and socio-economic conditions of the Department of Jutiapa, as shown below:

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

2) Securement of adequate food supply

3) Export promotion through diversification of agricultural products

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

5) Farmers' income increase

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

7) Enlivening of rural life

4.3.3 Development by Stages

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

4.4 Rural and Agricultural and Livestock Development Strategies

4.4.1 Agricultural and Livestock Sector

(1) What is fundamental in the agricultural and livestock exploitation is to cultivate according to the production capability of the land. This principle will be used when executing the Project. A top priority is given within the field of agricultural and livestock production to securement of the food supply, crops diversification, and contribution to the increase of the income level of the farmers and to the activation of the departmental economy.

(2) Intensification of the land utilization will be encouraged by the introduction of the irrigation system,, in order to prevent deterioration of the production capability of the soils, eliminate the deforestation, and keep the agricultural and rural life conditions.

(3) The strengthening of the services of the institutions participating in the development of the agricultural and livestock sector and the equipment of the marketing infrastructure (recollection, storage, processing) of agricultural products, will be contemplated.

4.4.2 Rural Sector

Development of the rural infrastructure is based on the road system which takes care of transportation of agricultural products and inputs, and in the supply of drinkable water, both, closely related with the improvement of the life conditions level.

4.4.3 Integration of the Rural Development

This integration of the rural development aims to combine the projects and programs proposed by each sector (or subsector) in the municipalities or districts with the objective of generate multiple effects. The main components can be divided according to their objectives into two categories: improvement of the agricultural productivity and equipment of the rural infrastructure.

5. PROPOSAL FOR SECTORIAL DEVELOPMENT

Concerning the formulation of the Master Plan, the following development proposals are presented:

1) Land utilization

2) Agricultural and Livestock Development
   - Agricultural Production
   - Livestock Production

3) Agricultural and Livestock Infrastructure

4) Conservation of Agricultural Soils

5) Institutional Services for the Support of Farmers
   - Development of adequate technologies
   - Organization of producers
   - Agricultural credit
   - Participation of women in the rural development process

6) Commercialization of agricultural products and promotion of agroindustrial activities

7) Rural Infrastructure
   - Farm roads
   - Rural water supply

8) Integrated Rural Development
   - Development focused on improvement of the agricultural and livestock productivity
   - Development focused on equipment of the rural infrastructure

6. FORMULATION OF THE MASTER PLAN

6.1 Selection Criteria

The projects included in the Master Plan were selected based on the following criteria:

1) Coordination with sectorial policies

2) Implementation schedule

3) Beneficiaries' characteristics

4) Technical aspects

5) Required investment and its financing

6) Maturity of the projects

6.2 Selected Projects

The selected projects for the present Master Plan were as follows:

1) Strengthening of the agricultural production, extension, and education project

2) Strengthening of animal health project

3) Breeding and reproduction center project

4) Irrigation and drainage projects

   - Santa Catarina Mita Zone (include within the Integrated Rural Development Project)
   - Atescatempa Zone
   - Tempisque Zone
   - Montúfar Zone (included within the Integrated Rural Development Project)
   - Alto Mongoy Zone

5) Soil conservation project

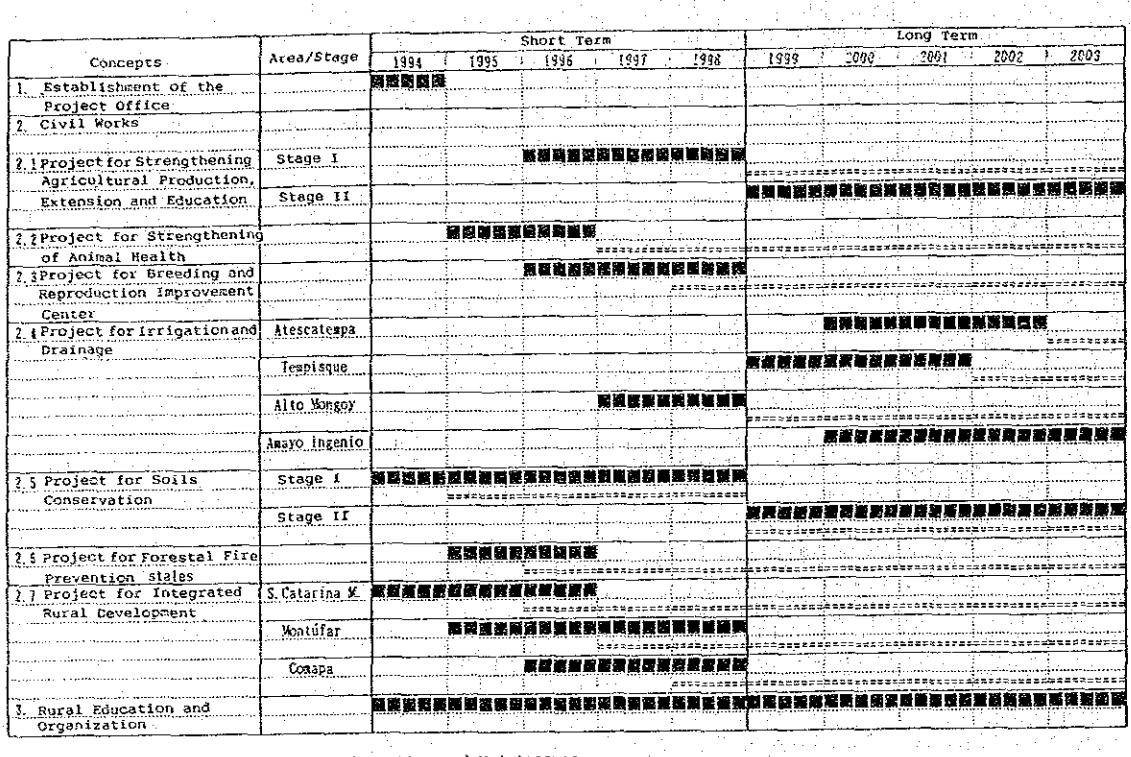
6) Forest fire prevention project

7) Integrated rural development projects

   - Santa Catarina Mita Zone
   - Montúfar Zone
   - Comapa Zone

6.3 Implementation Schedule of the Projects

The project included in the Master Plan will be implemented in a period of 10 years from 1994 to 2003 (the first 5 years will be denominated "short term" and the next 5 years as "long term"). The projects which their implementation is urgent and vital will be discriminated within the scope of the short term.



Note : ■■■■■ :Construction ======== : Operation and Maintenance

6.4. Required Investments

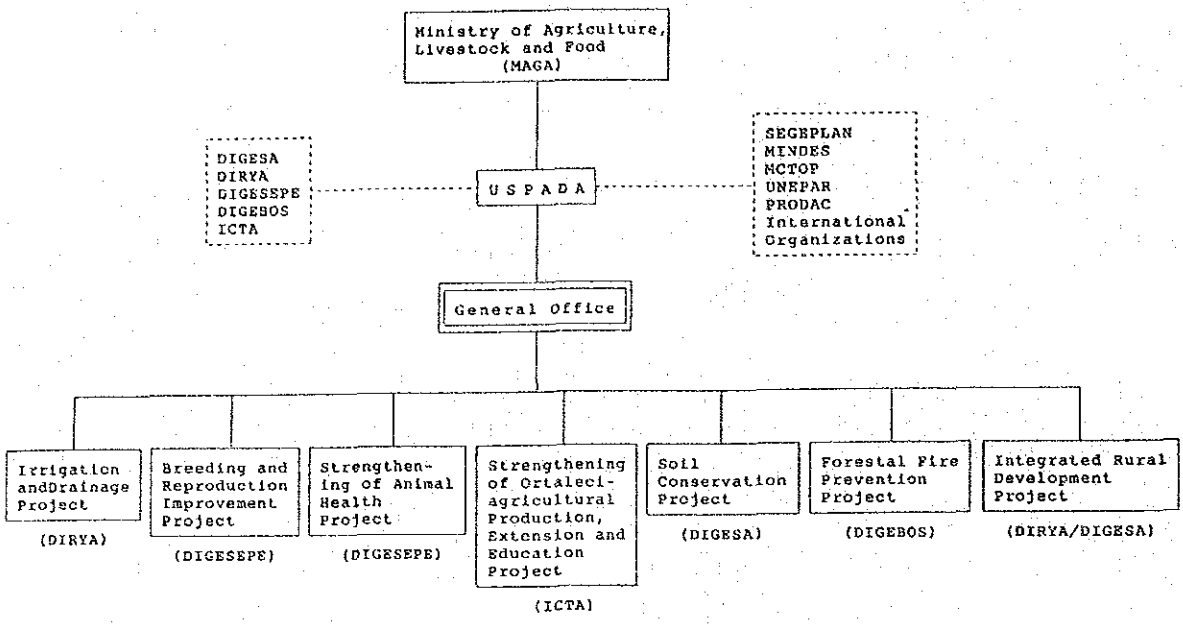
Total investment for the projects of the Master Plan including the physical contingencies is around 317,000,000 quetzales (US$61.3 millions).

Projects	Short Term	Long Term	Total
1. Strengthening of the agricultural production, extension and education	15,193	2,845	18,083
2. Strengthening of animal health	9,473	-	9,473
3. Breeding and reproduction improvement center	31,477	-	31,477
4. Atescatempa Irrigation	-	15,675	15,675
5. Tempisque Irrigation	-	21,564	21,564
6. Alto Mongoy Irrigation	3,076	-	3,076
7. Amayo Ingenio Irrigation	-	46,169	46,169
8. Soils conservation	6,832	4,750	11,582
9. Forestal fires prevention	8,511	-	8,511
10. Santa Catarina Mita Integrated Rural Development	24,292	-	24,292
11. Montúfar Integrated Rural Development	111,982	-	111,982
12. Comapa Integrated Rural Development	15,524	-	15,524
Total	Q226,360	Q91,003	Q317,363

6.5 Organization of the Execution of the Master Plan and Program of Operation and Maintenance

6.5.1 Organization of the Execution of the Projects

It is proposed to establish the Office of the Integrated Rural and Agricultural and Livestock Development Project in Jutiapa as an executing agency of the Master Plan.



6.5.2 Plan for Operation and Maintenance

The operation and maintenance will be in charge of the public organizations for the top priority projects; in charge of the users' association for irrigation and drainage projects; and the general office of the project for integrated rural development projects.

6.6 Project Evaluation

6.6.1 Economic Evaluation

The Master Plan has 12 projects covering 7 items; 6 of those projects of integrated rural development objectives and irrigation and drainage were evaluated to assess their economic and financial feasibility.

The financial internal rate of return of the whole Master Plan is 11.7%. This rate is quite close to the opportunity cost of capital in Guatemala (12%), showing that the present Master Plan has a high profitability.

6.6.2 Social Evaluation

(1) With the implementation of the projects of the Master Plan it is expected an increase in the income level of the farmers, diversification of crops bound for external markets, and generation of greater volumes of basic grains, vegetables and fruits. Also, the recovery and conservation of the production capability

of the soils, to be achieved through the execution of the soils conservation project, and planting of forests to obtain firewood, will contribute to improvement of the environment for the agricultural and livestock production and rural life as well.

(2) The arrangement of the marketing infrastructure and the road system will mean the active participation of the producers in the commercialization stage, employment generation, and raising the added value of the agricultural products.

(3) Thanks to the equipment of the water supply services, the women's works of carrying water will be alleviated and they could use that free time for productive activities and others which will help to raise their position. On the other hand, the improvement of the public health conditions will decrease the rate of occurrence of contagious diseases caused by contaminated water.

7. PRIORITY PROJECTS

7.1 Selection of Priority Projects

From the projects of the Master Plan the following two projects were chosen as priority projects:

- Santa catarina Mita Integrated Rural Development Project

- Montúfar Integrated Rural Development Project

7.2 Santa Catarina Mita Integrated Rural Development Project

The present project tries to improve the agricultural productivity and achieve better life conditions for the farmers by the integrated rural development project which combines rural roads works and supply of drinkable water besides its connection with the irrigation system. Total investment is Q.24,292 thousand quetzales (US$4,698 thousand) and the financial internal rate of return is 9.9%. The project includes the following sub-projects:

- Farm roads
- Rural aqueduct
- Vegetables commercialization center
- Small-scale cattle insemination center
- Community center

7.3 Montúfar Integrated Rural Development Project

The present project includes, beside the irrigation and drainage sub-projects, the farm roads and water supply

works, and their objectives are the improvement of the agricultural productivity and the raising of the living conditions of the farmers. The total investment is Q.111,982 thousand quetzales (US$21,660 thousand), and the financial internal rate of return is 19.2%. The components of the project are the following:

- Irrigation and drainage works
- Levee construction
- Farm roads
- Rural aqueduct
- Vegetables commercialization center
- Cattle insemination center
- Pisciculture of mojarra fish
- Community center

RECOMMENDATIONS

1. IMMEDIATE EXECUTION OF THE PRIORITY PROJECTS

It is of the highest importance that the study and design of the priority projects of Santa Catarina Mita and Montúfar must be made as soon as possible in order to facilitate their execution.

2. EXECUTION OF THE MASTER PLAN PROJECTS BY STAGES

It is proposed that the execution of the other projects, besides those considered as top priority in the Master Plan, should be made by stages. The priority of the projects included in the short term will have the following order:

1) Soils conservation and forestal fires prevention project

2) Comapa integrated rural development project

3) Strengthening of animal health and strengthening of agricultural production, extension and eduction projects

4) Breeding and reproduction improvement project

3. EXECUTING AGENCY OF THE PROJECT

The projects of the Master Plan will be implemented under the jurisdiction of the Agricultural and Livestock and Food Public Sector. As the projects include other sub-projects beside those of the agricultural and livestock sector, like roads system, water supply, etc., it is expected an active participation of the related ministerial entities in order to achieve an efficient and timely execution of the projects.

4. PARTICIPATION OF THE BENEFICIARIES

It is a sectorial policy the transfer of the state-operated irrigation units from a public organization to the water users. With the aim of fulfilling this policy, it is necessary to conform as soon as possible a group of professionals in the field of irrigation, technical promotion and assistance concerning the water users association, training of the farmers, etc.

5. COLLECTION OF METEOROLOGICAL AND HYDROLOGICAL DATA

The meteorological and hydrological data are indispensable for the planning of the irrigation and drainage projects. It is recommended that the organization in charge of collecting and compiling that data must be strengthened and the network of meteorological and hydrological data collection must be expanded with adequate equipments and apparatuses.

6. PROMOTION OF REFORESTATION

It is suggested to implement reforestation projects in Jutiapa in order to improve the rural environment, preserve the soil resources, protect water resources, obtain trees for firewood production, etc.

CHAPTER 1
INTRODUCTION

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND OF THE PROJECT

The agriculture and livestock sector of the Republic of Guatemala (hereinafter referred as Guatemala), represents approximately 25% of the Gross Geographical Product (GGP) and absorbs around 48% of the economically active population. Also, agricultural and livestock exports generate near 70% of total exports value.

In consequence, the behavior of the agricultural-livestock sector deeply influences economic activities, specially those affecting the stability of the socioeconomic development of the country.

On the other hand, socioeconomic disequilibrium is becoming more and more pronounced between the urban and rural sectors, bringing about the problem of migratorial flows from the rural zones to urban zones; this, in consequence, contributes to the increase of unemployment, a problem which must be urgently resolved. As a countermeasure, the "Agricultural Diversification and Commercialization Program" is being promoted within the context of an agricultural and livestock development policy.

Having this background in mind, the Government of Guatemala choose the Jutiapa Department, which is located in within the agricultural region of the country and limits with the Republic of El Salvador by the east, to carry out the study for an integrated development aiming to promote the agricultural and livestock sector and improve rural infrastructure.

The Jutiapa Department is located in the southwestern part of Guatemala, has a surface of 3,200 Km^2 and a population of about 350,000 habitants. Its an agricultural department which essentially produces basic grains like maize, beans, sorghum, etc., cultivates vegetables and fruits, and raises cattle for meat consumption. However, due to climatic conditions not suitable for cultivation of traditional export products like coffee, cotton, sugar cane, etc., there has been a lack of private and public investment for providing irrigation works and social infrastructure to the zone; as a consequence, living conditions for the farmers are not the best. However the Department is relatively near to Guatemala city, about 117 km. Its topographical conditions are favorable with soils slightly ondulated and surrounded by valleys in which mountain plains can be found. Its agricultural development potential can be fully exploited if its production infrastructure is improved and new works are implemented. Trade outside the area can grow by encouraging export of vegetables and fruits to El Salvador and the United States.

With this purpose. in 1991 the Government of Guatemala asked to the Government of Japan for technical cooperation for the elaboration of a Master Plan of the Integrated Rural and Agricultural and Livestock Development of Jutiapa Project

(hereinafter referred as the "Study"). As response to this request, the Government of Japan through the Japan International Cooperation Agency (JICA) sent a mission for the preliminary study which performed a reconnaissance study of the targeted area and determined the scope of the works. Once discussions between the preliminary study mission and the Guatemalan authorities were conclude. an agreement was reached and the scope of the works were signed by both parties.

In concordance with the scope of the works mentioned above, JICA sent a Japanese Team to Guatemala to make a study in two stages from March 1992, and the present report is a product of that study.

1.2 OBJECTIVES OF THE STUDY

The objectives of the Study are as follows:

- Formulation of a Master Plan of the Integrated Rural and Agricultural and Livestock Development of Jutiapa and prioritization the development projects from a short and long term of view.

- Training of the counterparts during the Study.

1.3 LOCATION OF THE STUDY AREA

The study area which covers the whole territory of the Department, has an extension of approximately 3,200 Km^2 in the Jutiapa Department.

1.4 PROFILE OF THE STUDY

The implementation of the Study is divided in two stages, which are subdivided in works to be performed in Guatemala and those in Japan.

1.4.1 Stage I of the Study

(1) Works in Guatemala (March 11 - April 19, 1992)

In this stage, the main objectives were to get acquainted with the physical and socioeconomic conditions of the region; to make a diagnosis of the actual infrastructures; and to identify the main problems related with the agricultural, livestock and rural development.

1) Exposition of the Inception Report

With the presence of the representant of the JICA's Study Advisors Committee, the exposition and exchange of opinions on the Inception Report were made and afterwards, the minute of the discussion was signed by the three parties.

2) Recollection of information and data

Information and data related with each specialty item were recollected from the corresponding authorities and a reconnaissance study was performed. The study covered the whole Department to diagnosis the physical conditions as well as socioeconomic. At that time, the dry season was ending in the Jutiapa Department, and it was a good chance to study in-situ the effects of the drought in the area and assess the effects on the agricultural and livestock production together with the climatic and hydrological conditions.

The results of the reconnaissance study and information and data recollection were analyzed for preparation of a summing-up of the potential and constraining factors for the agricultural, livestock and rural development of the Jutiapa Department. The results were explained in the Progress Report (I).

3) Installation of the water-level recorder and pluviometer

After investigating alternative sites for installation. a definitive site for the water-level recorder in the upper basin of the Paz river, in the municipality of Quezada, and Tempisque/El Coco, in the municipality of Comapa for the pluviometer.

4) Exposition of the Progress Report (I)

The exposition of the Progress Report (I) in which the results of the Stage I Study made in Guatemala are reported. Its conclusions were discussed between the representants of the Government of Guatemala and the Study Team; afterwards, the discussion minute was signed by both parties.

(2) Work in Japan

Based on the information and data recollected during the works done in Guatemala, the situation of the agricultural and livestock sector was analyzed and constraining and potential factors for development were identified. Development objectives and goals were stated before the formulation of Integrated Agricultural, Livestock, and Rural Development in Jutiapa Department Project. Information and data recollected were summarized in the Interim Report.

1.4.2 Stage II of the Study

(1) Works in Guatemala (July 8 - September 1, 1992)

1) Exposition of the Interim Report

With the presence of the representant of the JICA Study Advisers and the persons pertaining the Government of Guatemala, the presentation was made and opinions were exchanged concerning the Interim Report summarizing the results of the Stage I of the Study. Afterwards, the discussion minute was signed by the three parties.

2) Recollection of supplementary information and data

Data and information were recollected for each field of specialization during the field works and visits to the related authorities.

3) Preliminary formulation of the development plans

Preliminary development plans were formulated based on the potentialities and constraints for the rural and agricultural and livestock development, as well as taking into consideration the development objectives for each component of the Project.

4) Exposition of the Progress Report (II)

At the end of the works for Stage II of the Study in Guatemala, Progress Report (II) was submitted for review by the Government of Guatemala, followed by the signing of the discussion minute by the representants of the Government of Guatemala and the Study Team.

(2) Work in Japan

Within the development plans preliminarily formulated during the course of the works in Guatemala, plans were chosen according to the criteria set up for the present Master Plan and an execution plan was formulated.

Those plans were priorized and their execution was also materialized in this stage of the Study.

(3) Exposition of the Draft of the Final Report (December 1 - December 15, 1992)

With the presence of the representants of the Advisers Committee of the Study set up by JICA, the exposition of the Draft of the Final Report was made to the officials of the Guatemaltecan authorities related with the Study. After the conclusion of the opinions exchange between the

Japanese Study Team and the Guatemaltecan officials, the discussion minutes of the exposition of the Draft of the Final Report was signed.

Taking the opportunity of the presence of the Study Team in Guatemala for the exposition of the Draft of the Final Report, a seminary on the present Study was held on December 8, 1992.

(4) Elaboration of the Final Report

Taking into consideration the comments and observations expressed by the Guatemaltecan counterparts on the Draft of the Final Report, and making a more detailed review by the Study Team, this Final Report was elaborated having the following components:

Main Text: (Spanish, English and Japanese version)

Annex: (Spanish version)

CHAPTER 2
PROJECT BACKGROUND

CHAPTER 2: PROJECT BACKGROUND

2.1 PHYSICAL AND SOCIOECONOMIC CONDITIONS OF THE REPUBLIC OF GUATEMALA

2.1.1 Location, Topography and Climate

The Republic of Guatemala is the most northern country of Central America at a latitude of 13° 45' - 17° 44' north and longitude 88° 13' - 92° 14' west and share borders with El Salvador, Mexico, Honduras and Belice. Territorial extension is around 108,900 Km^2, and according to its dimensions is the third biggest among the five Central American countries, besides being the most populated.

The mountainous and highland plains predominate in the country and the Cordillera of the Andes bifurcates into two mountainous systems: the Sierra Madre and the Sierra de los Cuchumatanes. There are many volcanoes which are over 3,000 meters of altitude. Due to its topography, the Republic can be subdivided into three zones: Central Highland Plains, Northern Plains, and Southern Coastal Plain. In the Central Highland Plains, the most populated departments are concentrated and the capital city, Guatemala City, is located there. The Northern Plains is a big forestal zone where many mayan ruins and semi-humid rain forests are preserved.

The temperature of the Central Highland Plains is variable, from warm to cold, and with two well defined seasons: rainy, from May to October, and dry, from November to April. In the "Coastal Southern Plain", located in the Pacific Ocean coast, the savanna-tropical climate predominates , while in the "Northern Plain" predominates the tropical wet forest and savanna climate.

2.1.2 Socioeconomic Conditions

According to estimations made by USPADA-UNDP-FAO (Estimation and Forecast of the Republic of Guatemala), the population was estimated as 9,197,345 habitants for the 1990, where 40% lives in urban areas. This population was distributed by age groups as follows: 45.5% (0-14 years), 44.4% (15-49 years), 7.0% (50-60 years) and 3.1% (65 years and over). The annual population growth rate for the period 1985 - 1990 was 2.92%; this rate was higher for the urban sector which was 3.75% due to the process of emigration from rural to urban zones. According to information from the National Institute of Statistics (National Sociodemographic Census 1989), it was estimated that the country had an economically active population of 2,976,406 in 1989, from which the agricultural and livestock sector represents 48% of it. It is also estimated that the open unemployment rate for 1989 was 3.2%.

Gross Domestic Product (GDP) was estimated as 284.6 million quetzales in 1989 at market prices of 1958 and the agriculture,

forestry, game and fishing, and wholesale and retail commerce sectors shared more than half (58.2%) of total value of the GDP; participation rate was 25.7% for the former and 24.5% for the latter. In 1984, the commercial sector surpassed the agricultural sector in the sense that its contribution share to the GNP was higher than the one of the agricultural sector. But, from 1985, the agricultural sector has occupied the first place within the productive branches comprising the GDP. The composition rate of the agricultural sector in the GDP did not fluctuated widely during the period 1984 - 1989; the rate fluctuated between 25.6% and 25.9%.

About the general behavior of the GDP during the period 1984-1989, a negative growth or depression took place, more specifically during the period 1984-1986 due to a fall in exports and to the austerity policy of the Government of Guatemala; positive growth was registered during the period 1987-1989 at rates between 3.5%-4%, thanks to the economic reactivation within the pacification process of the country by the government of president Vinicio Cerezo. However, considering the annual population growth rate of 2.9% in Guatemala, the growth rate of the GDP per capita was lower than the one for the GDP, achieving a rate of 0.6%-1.5%. It is estimated that the GDP per capita was around US$ 936 for 1989.

The foreign trade sector in Guatemala depends mainly on agricultural products, specially on six traditional agricultural export products (coffee, sugar, banana, cotton, cardamom and meat). These six traditional agricultural export products represented in 1991 the 49% (23.4% covered by coffee) of the total exports value of the country. This participation has been declining due to the fall of the coffee price in the international markets; in 1986 when the coffee price peaked, that participation rate was higher than 86%, coffee occupying almost 49.2% of total exports value. After 1980, when exports value reached its highest historical level, it has been continuously declining and at present shows an stagnation level. The balance of payments has been always in deficit, reaching the US$573 million level in 1991, which was higher than the US$380.1 million level of 1990.

In 1990. the inter-annual rate of inflation was 59.7%, the highest rate in the history of the country; but in 1991, this rate was 10% thanks to the anti-inflationary policies applied by the government who set an inflationary goal of less than 15%. In accord with the rate of inflation, the quetzal/dollar exchange rate showed a very dynamic variations with an annual variation of 172% between the highest level (Q.5.87399 = US$1.00 in September) and the lowest (Q.3.40810 = US$1.00 in January). In 1991, the exchange rate was stabilized with a minimal annual variation of 1.05% (Q.5.09553 = US$1.00 being the highest and Q.4.85482 = US$1.00 the lowest). For 1992 it is expected the same devaluation pace as in 1991. The exchange rate for August 1992 was Q.5.19220 = US$1.00).

2.1.3 Relative Importance of the Agricultural and Livestock Sector and its Recent Behavior

The country has a territory of 108,889 Km^2, from which 28,500 Km^2, or 26% of it, belongs to agricultural lands, while those lands suitable for raising cattle is estimated at 23,700 Km^2, even though at present there are 36,300 Km^2 being used for that activity.

Land tenency at a national level, as in other latinamerican countries, is characterized by an unequal land distribution; according to the III Agricultural and Livestock Census of 1979, the micro-farms and sub-familiar farms with a size less than 7 ha represent 88% of the total number of farms, but only cover 17% of total land surface of them, while 20% of total surface of the farms belong to the farms belonging to big multi-familiar farms whose surfaces are greater than 896 ha, representing only 0.1% of the total number of farms.

Concerning the "Agricultural Products Statistics for the Period 1979-1992, Bank of Guatemala", the crop with the most extensive cultivated land for the period 1991/92 was maize with 652,400 ha, followed by coffee with 244,300 ha. The other crops with significant cultivated areas are: beans (147,00 ha), sugar cane (125,600 ha), sorghum (56,000 ha), cardamon (44,100 ha) and cotton (39,200 ha). Concerning rice and wheat, which are the basic grains besides maize and beans, their cultivated areas are very small, 18,900 ha and 13,300 ha, respectively. Demand for those two products are satisfied through imports.

With the exception of sugar cane and cardamon, production of the main crops mentioned before shows a tendency to decrease due to the discouragement of the farmers to cultivate those crops as international prices fall and there is a lack of supporting policies for the promotion of basic grains. Cotton production was specially affected.

Concerning vegetables and fruits, tomato, okra, watermelon and melon, there has been a remarkable increase in the past decade, while onion, potato, and cauliflower registered a negative growth or stationary state during the same period (see Table A.1.9).

Cattle meat, which is the main livestock product and traditional export product, has not reached a production level high enough to match the population growth rate. There is no growth registered for cattle, pigs, or sheep, while poultry has grown thanks to a promotional policy for poultry raising. As a consequence, 65% of the meat consumed by the domestic population is chicken meat.

The agricultural products, in particular those 6 main traditional export products, have significantly contributed in foreign exchange generation for the country, and represented 49% of total export value for 1991, coffee representing almost half of the

whole value of the 6 products. However, as a consequence of the fall of the international price of coffee (the average annual price descended from US$1.96/lb in 1986 to US$0.86/lb in 1991, a 56% fall), the value generated by coffee exports fell from US$522.3 million to US$293.7 million. Due to the fall of the coffee export value, the aggregated value of the 6 traditional export products also decreased from US$722.2 million in 1986 to US$609.2 million in 1991. It must be mentioned that sugar experimented an expansion in international markets counterbalancing the drop of the relative weight of the other products. Within the public strategies for the agricultural and livestock sector oriented to increase non- traditional exports, such as vegetables, tobacco, gum, etc. Export of non-traditional products grew during the decade of the 70's, but it became stagnant during the 80's; in 1991, thanks to the drastic increase in the exported amounts of onions and tomatoes, the global amount of exported vegetables and fruits recorded the highest historically level.

Imports in the agricultural and livestock sector is represented by wheat. The imported amount of wheat during the period 1981-1990 was 60,000 tons as an annual average and, additionally, 10,000 tons of wheat were donated by the United States of North America. The behavior of the corn imports depends on production and shows a widely swinging variation which oscillates between 3,000 tons and 117,000 tons per year. Kidney beans has been imported since 1985 and the amount, as well as with corn, fluctuates widely depending on production.

Rice, which is a permanent import good, showed an increasing trend in recent years reaching an average annual level of 4,300 tons and in 1992 it was permitted to import 5,750 tons for that year. Sorghum is another regular import good, but its volume is very small, below the 500 tons per year.

It is worth to mention that an export records log for the above mentioned basic grains could be found because most of the production of the Department of Petén is not commercialized in the domestic market, but in Mexico and Bélice due to the accessibility of those markets.

2.2 POLICIES AND PLANS FOR THE DEVELOPMENT OF THE AGRICULTURAL AND LIVESTOCK AND NUTRITION SECTORS

2.2.1 National and regional Policies and Plans

(1) Agricultural Policy of the Government of Guatemala

Within the "Economic and Social Policy of the Government of Guatemala, Period 1991-1996" of the President Jorge Serrano Elías administration, it is set up as a main objective of the agricultural policy to achieve an efficient and integral development of the sector, as well as the sustained growth of the production, based on a rational utilization of the renewable

natural resources.

To achieve the objectives above mentioned, the Government will promote activities in the following fields:

- Research and agricultural extension, which main objective will be the incorporation of small farmers to more profitable and regular production systems.

- Agricultural commercialization. This policy will be oriented to the establishment of adequate conditions by which competition and greater efficiency may be achieved.

- Agricultural financing. The aim is to provide timely, efficient and adequate financing in agricultural public investment.

- Irrigation and mini-irrigation. Within the framework of this program activities oriented towards the promotion of the establishment of a legal framework which will facilitate an adequate management of water resources and start the transference of the irrigation units to the final users will be set up.

- Animal and plants health. Clear regulations based on a modern legal framework, according to what is stipulated by international or bilateral agreements, will be established.

In accordance with the macroeconomic policy of the Government, objectives and instruments of agricultural and livestock and natural renewable resources policies have been established in order to give clarity and direction to the sectorial actions.

The Agricultural and Livestock and Nutrition Public Sector is planning to develop five specific policies:

- Production development and rational exploitation of natural renewable resources

- Optimization of land usage

- Commercialization and exports support

- Food security support

- Strengthening and modernization of the Agricultural and Livestock and Nutrition Public Sector

For each specific policy targets and means to achieve them are established.

(2) Tri-national Border Regional Development Plan (TRIFINO)

The Development Plan in the border region of three countries (Guatemala, Honduras and El Salvador) - Plan TRIFINO, defines the target area of the Plan a total surface of 7,584 Km^2 which partially covers 4 municipalities (Santa Catarina Mita, Agua Blanca, Asunción Mita, and Atescatempa) with a total surface of 1,016 Km^2.

As specific objectives of the Plan the following ones have been established:

- Improve the income level and life conditions of the population in the zone.
- Increase the complementarity of the economic structures among the different sectors of the area.
- Preserve, restore, and protect the natural renewable resources of the area.

2.2.2 Development Programs and Projects in the Department of Jutiapa

(1) CIPREDA - USPADA Projects

In accordance with the CIPREDA - USPADA information in the Department of Jutiapa various projects are proposed covering the sub-sectors of agriculture, livestock, forestry, irrigation, commercialization, agroindustry, and environment. Most of these projects are at the profile or idea stage requiring a more detailed technical and economic study before their implementation.

(2) Budget Distribution by Sector

The Central Government budget allocated to the Department of Jutiapa is Q.46 millions, from which around 90% is allocated to the roads sector, assigning a high priority to the improvement of the farm roads. Besides the mentioned sector, attention is given to the health and education sectors.

2.3 CHARACTERIZATION OF THE DEPARTMENT OF JUTIAPA

The territorial extension is 3,219 km^2 and the estimated population for the year 1990 is 347,774 habitants, representing 2.97% and 3.78% of the national total respectively. The population density is 108 habitants per square kilometer, which is higher than the national average of 84.5 habitants per square kilometer. The annual average growth for the 1980-1990 period is 1.99%, showing that the growth rate of the departmental population is lower than the national average (2.98%). Even though the fertility rate of Jutiapa is the highest at a national level and the birth rate is also high (fourth place at a national level), the population growth rate is below the national average due to the emigration dynamics and the highest mortality of the population.

Within the economically active population, around three fourths are employed in the agricultural, livestock, fishery and forestry sector. When comparing this percentage with the national percentage (48%), it can be noticed that the habitants of Jutiapa highly depend on the agricultural and livestock sector and the development of the economic sector outside the agricultural and livestock sector which are underdeveloped. On the other hand, a high fertility and birth rates become a factor which makes it difficult the active participation of women in the labor market. The open unemployment rate in Jutiapa is 10.2%, much higher than the national rate.

The Gross Domestic Product of the Department is 190.6 million quetzals at current prices of 1989, which is equivalent to 0.98% of the Gross Domestic Product and occupies the 17th place among the 22 Departments of the country. The Departmental GDP per habitant is 561 quetzales - a fourth of the GDP level and occupies the 19th place among the 22 Departments. The annual average income of the economically active population actually employed is 3,947 quetzales for 1990 (5th place at a national level).

The coverage rate of the road network is 0.22 Kms/Km^2, which is higher than the one estimated for the country (0.12 Kms/Km^2). In contrast, the number of health centers and medical posts established in the Department os one for each 6,400 habitants quite below the one for the Department of Santa Rosa. According to the 1981 Census, three fourths of the houses in the Department do not have water supply services.

Lands in Jutiapa are classified as follows: 21% for agriculture, 29% for livestock, and 45 % for forestry. If this percentage is compared with the one estimated for the country (26%, 21%, and 37%, respectively), it can be said that the highest percentage of the territory of Jutiapa is allocated to livestock and forestry.

Even though the agricultural activity is the pivot of the

departmental economy, the productivity level of the crops is not very high; the basic grains yield is almost the same as the national average and lower than the one of the Department of Jutiapa.

It is notorious the scarcity of native population living in the Department, which according to the 1981 Census represents only the 8% of the population while at a national level, the proportion of native population is 42%. The percentage of the population which is catholic is below the national average. The ethnical group of the Xinca is almost the only one which speaks a dialect; at a departmental level, spanish is spoken. The illiteracy rate is 67% according to the 1981 Census, which is almost the same as the national level.

The Department of Jutiapa depends socioeconomically on the agricultural and livestock activities, but its productive development has become stagnant. Also, the absence of a well developed industry is associated with the inactive situation of the departmental economy. Additionally, the scarcity of employment opportunities causes the immigration of part of the working population to other departments. The infrastructure at the social level is inadequate, excepting the road network, and, as a consequence, the population does not enjoy of satisfying social activities. In such circumstances, economic development and improvement of the social infrastructure are goals to be achieve by the Project.

CHAPTER 3

DIAGNOSIS OF THE DEPARTMENT OF JUTIAPA

CHAPTER 3: DIAGNOSIS OF THE DEPARTMENT OF JUTIAPA

3.1 LOCATION, ADMINISTRATION, AND POPULATION

The department of Jutiapa is located in the southeastern part of the Republic of Guatemala and shares borders with El Salvador to the east, the Pacific Ocean at the south, and the departments of Santa Rosa, Jalapa, and Chiquimula at the west and north.

Jutiapa, together with Santa Rosa and Jalapa, are the Region IV (Region South-East). It has 17 municipalities and the rural zones of them there are a total of 255 villages and 588 hamlets.

According to the information of the National Institute of statistics (INE-Urban and Rural Population Estimation by Department and Municipality 1990-1995)m the estimated population for the year 1990 es 346,774 habitants, of which 79,4% lives in the rural area. The municipality of Jutiapa, departmental head, occupies 22% of the population of the department with 76,956 habitants.

The rate of demographic growth in the last 6 years (1985-1990) is 2.1% as an annual average, which is lower than the national average of 2.9%. The same rate estimated in the urban and rural areas is 2.37% and 2.03%, respectively. Population density is 108 habitants/Km2 as an average for the department.

3.2 CLIMATE

3.2.1 Generalities

The department of Jutiapa belongs to the subtropical climate zone with a rainy and dry seasons perfectly delineated.

The average monthly temperature oscillates between 20°C y 28°C and the seasonal variations are small. The maximum and minimum monthly temperature is 33°C and 20°C, respectively, and even during winter (rainy season), it is rare that the temperature falls to 10°C. Annual relative humidity is around 70% and seasonal variations are small.

Annual average evapotranspiration is 1,920 mm and the maximum monthly average evapotranspiration is 6 mm/day in April and minimum of 3 mm/day in December.

Annual rainfall varies widely between 800 mm and 1,800 mm. Around 95% of annual rainfall is concentrated in the rainy season, In general, the rainy season is between May and October and the dry season is between November and April. Also, is the zone of less rainfall within Guatemala.

3.2.2 Rainfall

(1) Meteorological stations and records

The department of Jutiapa has 23 pluviometric stations, These stations are under the responsibility of the National Institute of Seismology, Volcanology, Meteorology and Hydrology (INSIVUMEH). The records of monthly rainfalls of the respective stations, besides INSIVUHEM, were gathered at the Technical Ministerial Department of Irrigation and Drainage (DIRYA) and the General Ministerial department of Agricultural Services (DIGESA) at the Regional Office IV of Jutiapa.

(2) Rainfall information

In all these stations, the monthly rainfall chart shows a peak in December.

Besides the fact that annual rainfall varies widely between 800 mm and 1,800 mm, most of the rainfall in the department is recorded from the northeast part to the southeast.

3.2.3 General Climate

(1) Meteorological Stations

In the Study Area, in the Ostúa river basin, there are the meteorological stations of Asunción Mita (478 meters above the sea level, m.a.s.l.) and the Guayabo Lago Guija (450 m.a.s.l.). Also, there are the meteorological stations of Quesada PHC (980 m.a.s.l.), Jalpatagua (557 m.a.s.l.), and Montúfar (450 m.a.s.l.). Among these stations, the Asunción Mita station was established in 1956 and has data of temperature, relative humidity, solar radiation time, wind velocity, evapotranspiration, and rainfall.

About the other stations, there is not complete meteorological data, making the data of the Asunción Mita R.H., the best for analysis and is considered as the most representative of the area.

(2) Meteorological Data

1) Average and maximum temperature

The annual average temperature is 26.2°C, but always is above 25°C during both seasons. The daily maximum temperature is registered in March and May, going above the 34°C.

2) Minimum temperature

The minimum temperature, which greatly influence the agricultural crops, is observed in January

and does not go above 10°C.

3) Relative humidity

The monthly average relative humidity varies from 55% in february to 78% in September. The maximum monthly humidity is 80-97%, while the monthly minimum humidity varies between 40% and 56%, The average humidity in the dry season is 59% and 71% in the rainy season.

4) Evapotranspiration

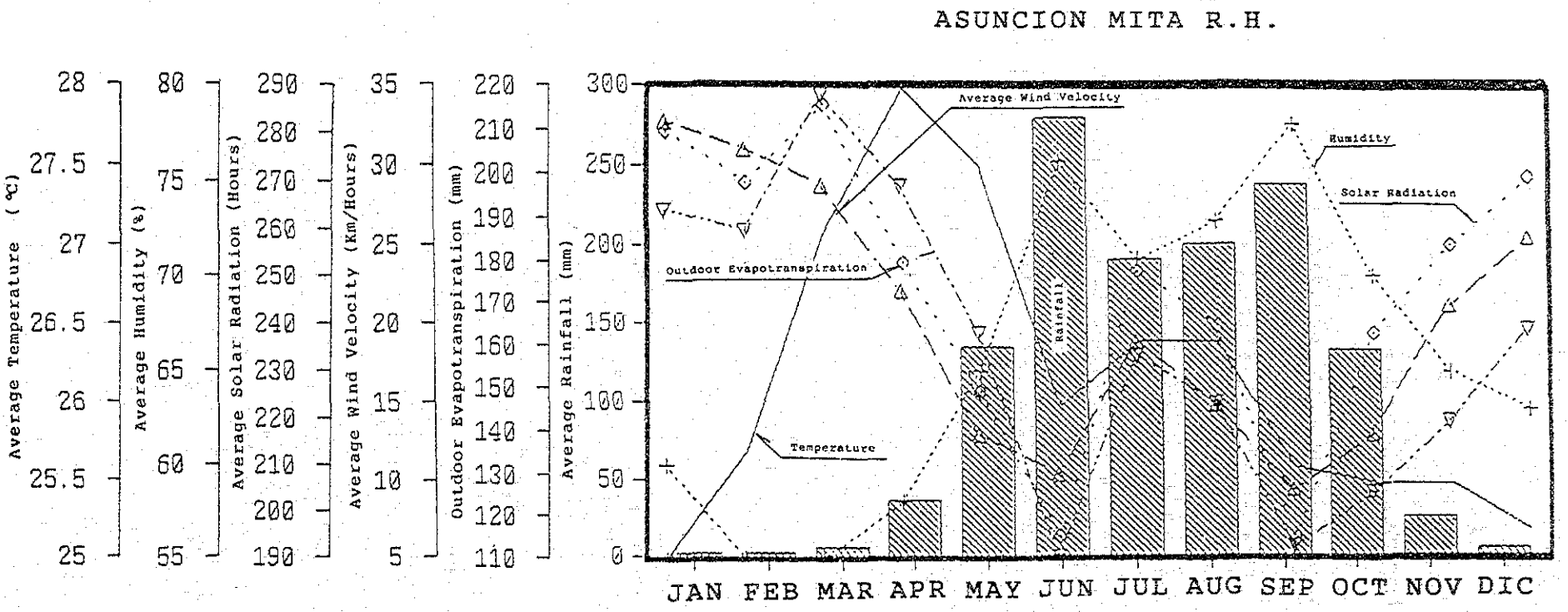
The evapotranspiration os 1,920 mm as an annual average. The daily average evapotranspiration is between 3.7 mm in June and 7 mm ib March. It increases at the end of the dry season in March and April.

5) Wind velocity

At the Asunción Mita the wind velocity is observed at a height of 2.5 m above ground surface being the daily average velocity about 20.1 Km/h (5.6 m/sec). It varies between 9.4 Km/h (2.6 m/sec) in September and 32.8 Km/h (9.1 m/sec) in January.

6) Solar radiation time

Daily solar radiation time is 8.2 hours. In the dry season is 8.8 hours as daily average and 7.3 hours in the rainy season.



Items	Unit	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DIC	YEAR
Average Temperature	(°C)	25.0	25.7	27.1	28.0	27.5	26.0	26.4	26.4	25.6	25.5	25.5	25.2	26.2
Average Humidity	(%)	60.0	55.0	55.0	58.0	65.0	76.0	71.0	73.0	78.0	70.0	65.0	63.0	66.0
Average Solar Radiation	(Hours)	280.3	269.6	285.8	252.8	225.4	194.7	251.0	239.2	193.9	237.5	256.8	271.2	246.5
Average Wind Velocity	(Km/Hours)	32.8	31.0	28.8	22.0	13.0	10.4	18.7	14.8	9.4	13.0	21.2	25.6	20.1
Outdoor Evapotranspiration	(mm)	192.0	187.2	218.1	197.1	162.8	110.7	157.6	146.7	113.3	125.7	142.4	164.1	159.8
Average Rainfall	(mm)	2.2	2.4	5.2	35.8	132.6	278.5	189.5	199.3	236.5	130.2	24.6	4.5	1,241.3

Source:INSIVUMEH

FIGURE 3.2.1 METEOROLOGICAL CHARACTERISTICS OF JUTIAPA

3.3 HYDROLOGY

3.3.1 Basins

In Jutiapa there are 4 basins belonging to the Ostúa, Atescatempa, Paz and Cusmapa rivers. At a national level, these 4 basins are classified within the basins of the Ostúa-Guija and Paz rivers. The joint surface of the sub-basins of the Ostúa and Paz rivers reach 3,000 Km2, which represents 95% of the total surface of the 4 basins.

(1) Ostúa River Basin

The Ostúa river, which has a basin of about 1,525 Km2 of surface, is originated in the center of the department of Jutiapa and in the southwestern part of the department of Jalapa and pour out in the Guija lake. From its origin, many streams and ravines flow into it digging deeply into the mountainous zone. After reaching the department of Jutiapa until the confluence with the Tamasulapa river, it is denominated as Ostúa river or Grande de Mita. The Ostúa river has two important branches, the Atescatempa and Cusmapa rivers.

1) Atescatempa River Basin

The Atescatempa river originates in Cerro Alto and flows out into the Atescatempa lake. Even though the basin has a small surface, its water resources are used for irrigation.

2) Cusmapa River Basin

As with the Paz river, the Cusmapa river, which flows out into the Guija lake, is a river bordering with El Salvador; the basin has a small surface and during the dry season it almost does not have water.

(2) Paz River Basin

The Paz river, which is the biggest and longest in the department of Jutiapa, originates in the northeastern part and becomes an international river when borders El Salvador from its central course (at the village of Las Lecheras) until near the its flowing out into the Pacific Ocean. The surface of the basin is about 1,722 Km2 and occupies almost half of the department. As well as the Ostúa river, many huge streams flow out into it, making it possible to say that, compared with the Ostúa river, where no important use of its groundwater can be made, the hydrological system of La Paz offers a high possibility for the development of the water resources.

3.3.2 Rivers Discharge

(1) Runoff

With the exception of the Cusmapa river basin, the other three are used for irrigation, water supply, and domestic use, even in the dry season. Many water affluents join them along their course, in such a way that in spite of their intake at their origins, upstream, its streams flow with enough force even downstream. This means that the affluents in the basis are abundant, Most of the rivers and streams become dry during the dry season; they vary according to the magnitude of the basin and the geological conditions.

On the other hand, the erosion caused on the riverbanks of their streams and the wear out of the river beds upstream and at intermediate points of the Study Area, is alarming.

The occurrence of falls in and materials slides, due to the scarce vegetation in the mountains and the carrying out of materials of the river beds, destroy the structures of connected facilities for water utilization, making them inoperative.

(2) Hydrometric measurement stations and registration of observations

In Jutiapa there were 7 hydrometric measurement stations, but were destroyed during the landslide of 1982 and since then no observations were recorded. About water flow measurements, it is carried out by INSIVUMEH using direct measurement systems by water level and discharge volume.

(3) Water flow measurement

During the Stage I of the present study, hydrometric registrations were made using the stream velocity measurement device at 19 places of the main rivers of the department of Jutiapa. The results are summarized in Annex B.2.

3.4 TOPOGRAPHY AND GEOLOGY

3.4.1 Topography

The department of Jutiapa is located at the east-southeast of Guatemala and its coordinates system is 13°40' - 14°35'north latitude and 89°30' - 90°20' west longitude and has a surface of 3,219 Km2. The altitude is 0 - 2,104 m and according to the topographic characteristics , the department is classified in two physiologic groups:

1) Coast plain of the Pacific (less than 100 m.a.s.l)

   Most of it is used for perennial crops and pastures. There are some disperse swamps.

2) Recent volcanic piedmont (100 - 800 m.a.s.l)

This part is located between the costal plain and the volcanic mountain chain. The secondary forests are the predominant vegetation also covering other perennial crops and some portion of pastures.

3) Volcanic mountain chain (above 800 m.a.s.l)

The volcanic mountain chain is located at the south of Sierra Madre and is characterized by the presence of highlands limited by numerous rough volcanic piedmonts. As main volcanos in the department the following can be mentioned: Cula, Ipata, Moyata, Chingo, Suchitán, etc.

A main feature is the presence of many mountain lakes, which can be found regularly lined up and parallel to the longitudinal axis of the volcanic mountainous complex. Some of them are Atescatempa and Guija lakes.

The maximum height in Jutiapa belongs to the Cerro Xecón located at the north of Jutiapa City with a height of 2,104 m.a.s.l.

3.4.2 Geology

The geology of Guatemala is divided by a existing fault along the Motagua river (fault river) and a wide fault with east-west strike located at the north and south of the former one. The zones located between these big faults belong to the rocky formation of the paleozoic era. It is composed by phyllite, chlorite schist, gramite schist, gneiss, marble, migmatite, etc.)

The Motagua river forms a sunk zone by the fault and in the pit which runs from east to west, tertiary and quaternary stratum can be found. From the west side of the fault to the zone located further to the north, rocky formations, mainly form the mesozoic era are distributed. In the volcanic chain of the south, near the fault there are the volcanic systems of the tertiary era running from east-west.

Further to the south, the quaternary volcanic group present lava flows forming alluvial fans oriented towards the Pacific Ocean, making it possible the formation of deposits of mud flows, boulders, and tuff.

Accordingly to the topographic classification, it can be said that the department of Jutiapa is formed by volcanic rocks in the mountainous zone which are distributed in the volcanic chains and piedmonts and by alluvial deposits which are distributed in the costal plains and main depressions of the valleys.

In the chain of the volcanic zone, the pyroclastic rocks (volcanic breccia, tuffish breccia, tuff) of the eruptions and sediments of the tertiary and quaternary era, deposits of pyroclastic flows (lava flow, composite tuff), pyroclastic materials (volcanic ashes, pumice, scoria) and volcanic rocks which form the basal rock of the valleys. The pyroclastic substances and alluvial sediments (sand, gravel, litmus, clay, etc.) are distributed forming alternating stratums of the valley and covering the basal rock. The distribution of lava flows is very wide covering around 10,000 ha according to the field study, as well to the analysis made by remote sensors (see Annex B.4).

The population and main cities of the department of Jutiapa are located in the small valleys surrounded by the volcanic mountainous zones. Also, in this zone sedimentary rocks from the cretaceous to the paleogenic (lutite and pumice) periods are locally distributed surrounded by volcanic rocks.

By the geological composition, there are many tectonic faults with north-east and north-south strike.

3.5 SOILS AND SOILS SUITABILITY CLASSIFICATION

3.5.1 Soils

(1) Profile

In general, the soils of the area were derived from volcanic eruptions and alluvial sediments, The soils have clayish to sandy textures with hard and compact sub-soils, sub-angular block structures with few or abundant gravel. The conditions of internal drainage of the soils profile vary from good to poor.

It is considered also that the area soils due to their age could be divided in three groups, because the soils development have been interrupted by volcanic eruptions, which have covered it all. For this reason, the aspect of the volcanic geology must be studied together with the chronological classification of the soils groups of the area in order to identify the limits of these groups.

Related to the practice of the FAO/UNESCO, the soils in Jutiapa are classified in two units as follows:

- Primary soils
  Fluvisols/Andosols/Cambisols/Vertisols/Luvisols/Acrisols

- Associated types
  Nitosols/Arenosols/Lithosols/Regosols/Gleysols

(2) Soils classification

the soils in the area can be divided into three period groups, five broad categories and 28 types based on parent materials, degree of erosion and drainage as below:

Latest group:

The soils which have a low developed profile, are found here and there in the area, overlain by older soil period groups. The degree of erosion and drainage are as follows:

1) Alluvial soils

The soils occur in alluvial lands, along main rivers and southern coastal plain. They are derived from recent alluvial deposits and have fine too coarse texture. The categories can be sub-classified into 10 types. The soil has a relatively high potential for agricultural use in the area.

2) Andosols

The soils are derived from volcanic ash and found on gentle sloping area surrounding volcanos. The categories could be further divided into 3 types based on texture.

Middle Group

The soils widely occur in rolling to hilly lands and highland plains at the northern half of the area. The group contains two categories:

3) Brown soils

The soils widely found in rolling to hilly lands and highland plains at the northern part of the area, having a brownish sub-soil. The soils are sub-divided into 7 types. In addition, spatial distributions of lithic soils derived from lava sediments and volcanic intrusions which are confirmed using remote sensing analyses, are widely found and the total area is estimated as more than 400 KM2 within the Study Area/

4) Heavy clayish soils

The soils occur on basins and gentle lands in rolling to hilly uplands, and might be derived from volcanic grass deposits. They are very poor drained and sub-divided into three types based on texture.