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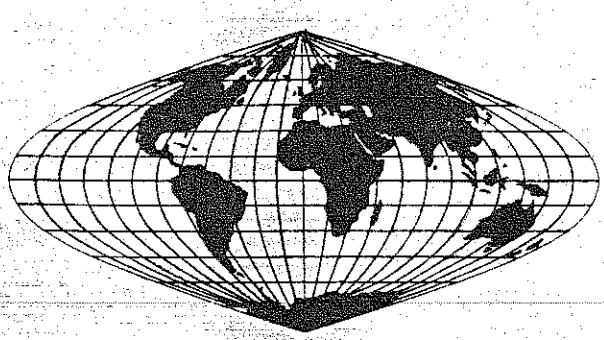
CORNELL/INTERNATIONAL AGRICULTURAL ECONOMICS STUDY

DEVELOPMENT AND EQUITY IN TROPICAL MEXICO: THIRTY YEARS OF THE PAPALOAPAN PROJECT

Sara J. Scherr and Thomas T. Poleman



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I first visited the Lower Papaloapan Basin, the gateway to the tropical Southeast of Mexico, in 1954. It was then an isolated, little developed region dominated by rain forest, empty savannah, and great rivers which periodically overtopped their banks. The newly created Papaloapan River Basin Commission had begun an ambitious program of development, but the early results, which I later documented in a small book,[1] were not promising.

When Sara Scherr, a student with long personal experience in Mexico, sought a research topic in 1975, I suggested that she evaluate what had happened subsequently. To my surprise and gratification, a great deal had occurred. The Lower Papaloapan had been transformed, with a booming commercial agriculture, busy highways, and modern towns newly evident. The first half of the 1970s had been a particularly buoyant time for both the Papaloapan Commission and the region's economy.

Over five years have passed since Ms. Scherr's study was completed and with them a turbulent period for Mexico. The sexenio of President Jose Lopez Portillo saw the oil boom in the Southeast reach its zenith. The country's economy began a dizzying acceleration, and great hopes for a more equitable course of development were entertained. These dreams were dashed in 1982. Following repeated devaluations of the peso, austerity has become the watchword.

It was originally planned that Ms. Scherr's study would be published by the Papaloapan Commission. However, completion of the Spanish text in 1978 coincided almost to the day with a helicopter crash which took the lives of the Commission's dynamic leaders, Ing. Jorge L. Tamayo and Ing. Guillermo Hernandez Castro. Plans for publication were abandoned--as, indeed, were most of the activities in which the Commission was engaged. Although the Lower Papaloapan now finds itself closely linked to both the national economy and the new centers of gas and oil production, little was done to exploit the new opportunities.

With the advent last month of the administration of President Miguel de la Madrid, the Mexican government will once again reassess its approach to the tropical Southeast and it is appropriate that we issue a shortened version of Ms. Scherr's study. Some of the changes in the Papaloapan took place as a direct consequence of governmental initiatives, some

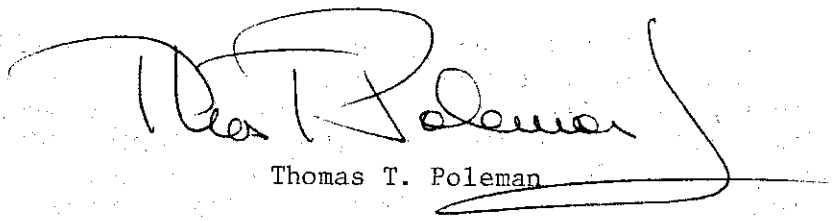
1/ The Papaloapan Project: Agricultural Development in the Mexican Tropics (Stanford University Press, 1964).

despite them, and some irrespective of them. From Ms. Scherr's evaluation of local "success stories" many guidelines emerge as to the most effective role a government strapped for funds can play.

We are greatly indebted to those who made the study possible. Sara Scherr's first year of research in the Basin was underwritten by a Fulbright Fellowship. Her final two months of field work and subsequent visits by her and myself to Mexico were made possible by a generous grant to Cornell University from the Tinker Foundation. While at Cornell, Ms. Scherr's work was funded by a Liberty Hyde Bailey Fellowship, administered by the New York State College of Agriculture and Life Sciences, and by the Department of Agricultural Economics.

Help from the Papaloapan Commission was unfailing. Ings. Tamayo and Hernandez offered more assistance than we might legitimately have sought. Friends in the Departamento de Fomento Agropecuario, in particular Ing. Jose Rodriguez Vallejo and Lics. Hector Duarte Penalosa, Victor Valle Aroche and Benjamin Pineda M., deserve special thanks. Srita. Sarita Flores R. was helpfulness personified.

Lillian Thomas, my secretary, typed the original manuscript and made our travel and business arrangements. She also edited this version and, with Joseph Baldwin, drew the many graphs and charts. The maps were drafted in Cuidad Aleman by Gilberto Carrasco Sanchez, Beda Olmedo F., Nestor Olmedo Luna and Pablo Virgen Pelayo. The present typescript was prepared by Wendy Barrett and Diana Atkinson. Thank you all.



Thomas T. Poleman

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List of Acronyms

BANAMEX	Banco Nacional de Mexico, S.A.
BANCOMER	Banco de Comercio, S.A.
BANRURAL	Banco de Crédito Rural, S.A.
CAPFCE	Comite Administradora del Programa Federal de Construcción de Escuelas
CFE	Comisión Federal de Electricidad
CNI	Comisión Nacional de Irrigación
CNIA	Comisión Nacional de la Industria Azucarera
COFRINSA	Complejo Fruticola Industrial, S.A.
CONACOSA	Comite Nacional Coordinadora del Sector Agropecuario
FINASA	Financiera Nacional Azucarera, S.A.
FIOSCER	Fideicomiso para Obras Sociales para Caneros de Escasos Recursos
FIRA	Fideicomiso Instituido en Relación con la Agricultura
FONAFE	Fondo Nacional de Fomento Agropecuario
IMPA	Instituto para el Mejoramiento de la Produccion de Azucar
INDECO	Instituto Nacional de Desarrollo de la Comunidad
INIF	Instituto Nacional de Investigación Forestal
INI	Instituto Nacional Indigenista
INMECAFE	Instituto Mexicana de Cafe
PIDER	Plan Integral de Desarrollo Rural
PLAMEPA	Plan para Mejoramiento Parcelario
PLANP	Plan Papaloapan
PNH	Plan Nacional Hidraulico

PRONAFOR	Programa Nacional de Aprovechamiento Forrajero
PRONDAAT	Programa Nacional de Agricultura en Areas de Temporal
SAG	Secretaria de Agricultura y Ganaderia
SARH	Secretaria de Agricultura y Recursos Hidraulicos
SOP	Secretaria de Obras Publicas
SRH	Secretaria de Recursos Hidraulicos

CHAPTER 1. THE ECONOMIC GROWTH "MIRACLE" AND THE EQUITY PROBLEM

For years, economists spoke excitedly about the "Mexican growth miracle." National product (shown in Graph 1-1) rose roughly six times between 1940 and 1970, at a rate of about five percent per year, with manufacturing at the fore. Urbanization proceeded at a very rapid rate, until well over half the population lived in towns. Professional, technical and white-collar workers comprise over ten percent of the economically active population (EAP). Workers in manufacturing, sales and other nonhighly skilled, but nevertheless "modern" work now comprise nearly 40 percent (32, p. 63). The country has been woven together as a nation for the first time in its history through a vast system of new roads and other communications infrastructure. Improved health standards led to a precipitous drop in the mortality rate.

But today the talk is more sober. The rate of growth has dropped markedly; agriculture is stagnating; Mexico has been forced to devalue the peso; unemployment and underemployment are rising. It is becoming obvious--if it ever was not--that Mexico's "miracle" completely bypassed at least half of the population. Studies are beginning to show that large groups experienced actual declines in real income.

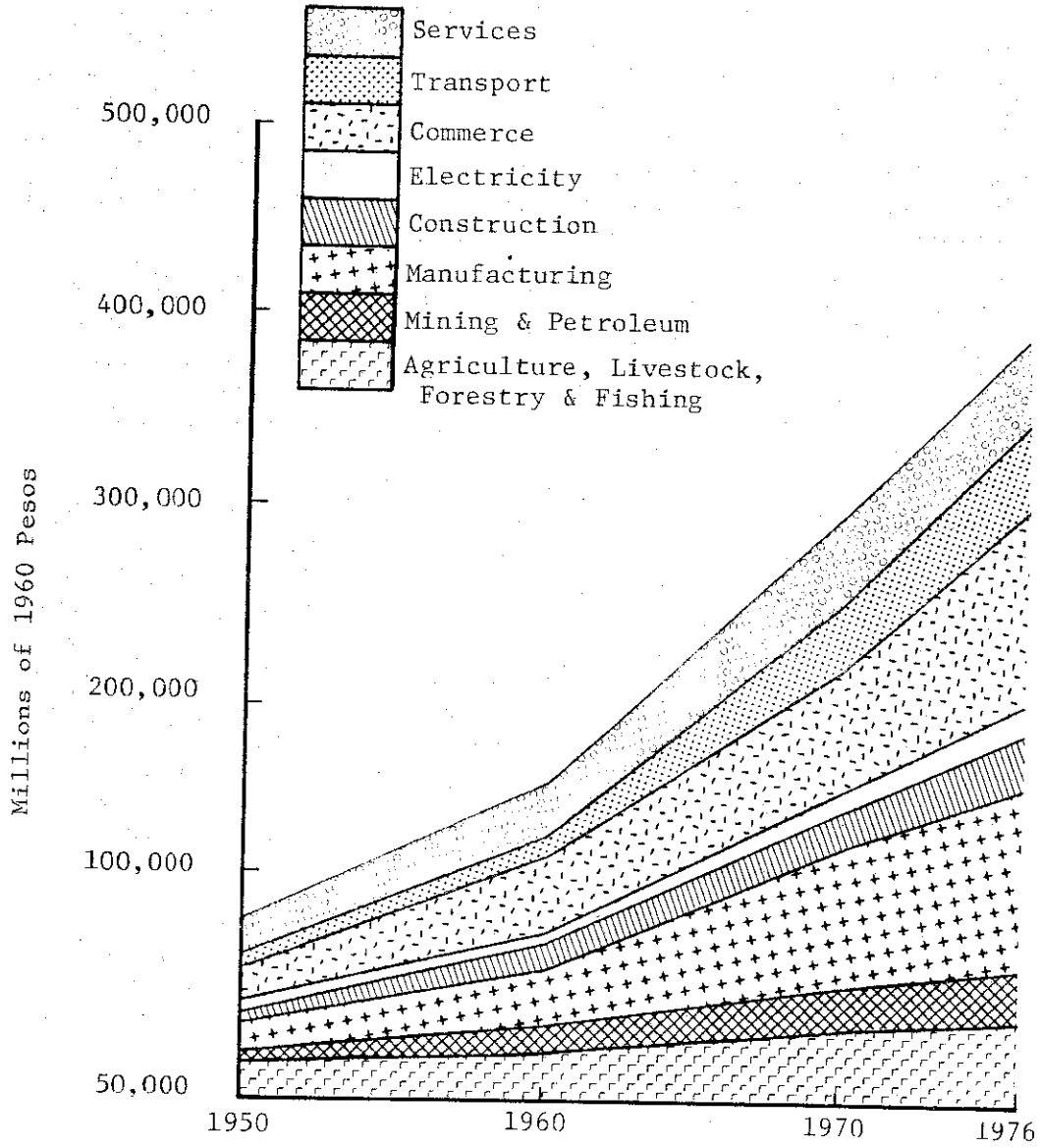
These phenomena, however, have not been universal. There are some pockets that have achieved both rapid growth, and a relatively broad distribution of the benefits from growth. The Papaloapan Basin in the tropical Southeast contains several such zones. Its experience suggests that there are viable options open to the Mexicans on two fronts. First of all, conditions today are ripe for a major thrust forward in tropical development. Sufficient technology is available; the infrastructure is there. It is a frontier that should hold the same potential for growth that the arid north held thirty years ago. Secondly, if properly supported, rural Mexico can indeed be a dynamic source of employment generation, both through intensification of production, and through urbanization of the countryside.

This chapter provides a national setting in which to consider the Papaloapan experiences. Chapters 2 and 3 describe the Papaloapan River Basin and the Papaloapan Commission which was set up to develop the region. Chapter 4 analyzes the general growth patterns of the Basin, and is followed by four case studies of particularly dynamic areas. The concluding chapter discusses a range of policy options open to the government to duplicate the production, income and employment achievements of these zones elsewhere.

Agricultural Structure in the 1970s

The goals of national agricultural policy until the 1970s were quite clearly the achievement of self-sufficiency of effective domestic

GRAPH 1-1. GROWTH OF MEXICAN GROSS NATIONAL PRODUCT*



*Source: Banco de Mexico, S.A.

food demand with cheap urban food prices, and an export surplus to finance capital imports for industry. Production between 1940 and 1970 more than tripled, with the overwhelming proportion of this increase in export crops.

The irrigation districts in the north are the major producers; the 20 percent of land under irrigation produced 43 percent of the value of production in 1970. Technology in this sector is quite advanced. In the tropics, only Veracruz is a major producer, particularly for livestock.

But whereas only 20 percent of the GDP in 1976 came from agriculture, nearly 45 percent of the EAP was employed primarily in that sector. There are three significantly different groups of rural producers. In 1968, 52 percent of holdings were classified as "subsistence"; another 41 percent were considered "traditional"; and only seven percent "modern"--those which use advanced technology and marketing systems. Graph 1-2 and Chart 1-1 describe the sectors.

With such a structure, stagnation came quickly to agriculture in Mexico, once the most productive investments in irrigation were completed. Agricultural product per economically active person in agriculture had risen 2.0 percent annually 1940-1950; 1.9 percent 1950-1960, and only 1.2 percent 1960-1970. Between 1970 and 1974, it actually declined .7 percent per year (30). Between 1940 and 1960, agricultural exports rose ten percent yearly, but in the 1960's, only 1.2 percent yearly. Imports were required in several years. The value of rainfed agricultural production has actually been declining.

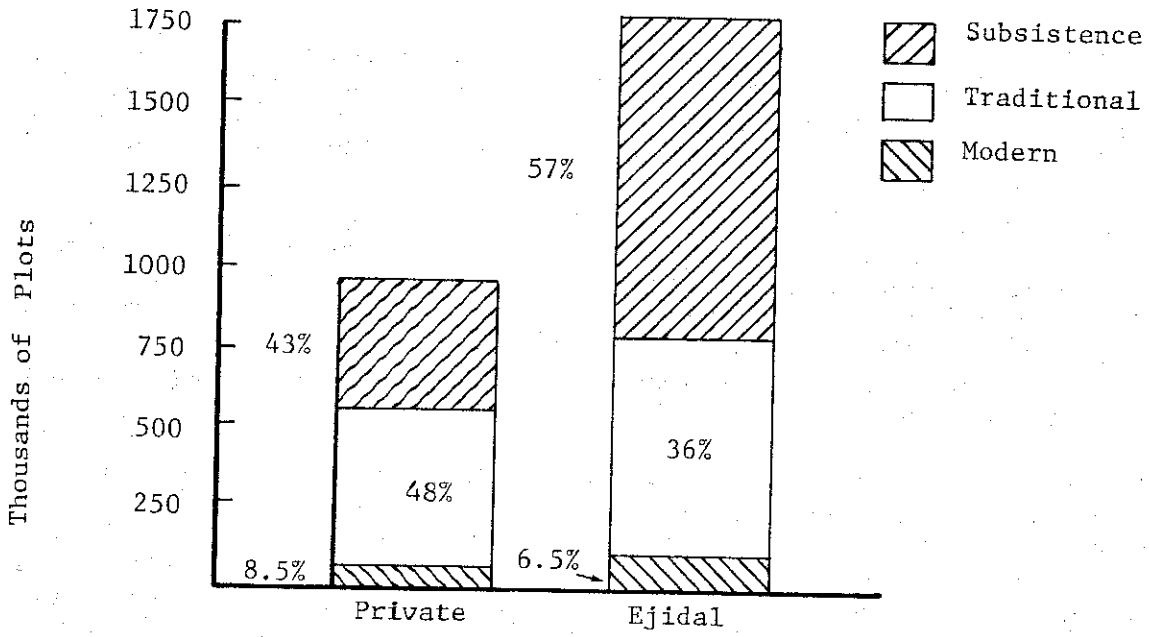
And beyond the now-critical production problems are even more intransigent problems of equity and employment.

The Equity Problem

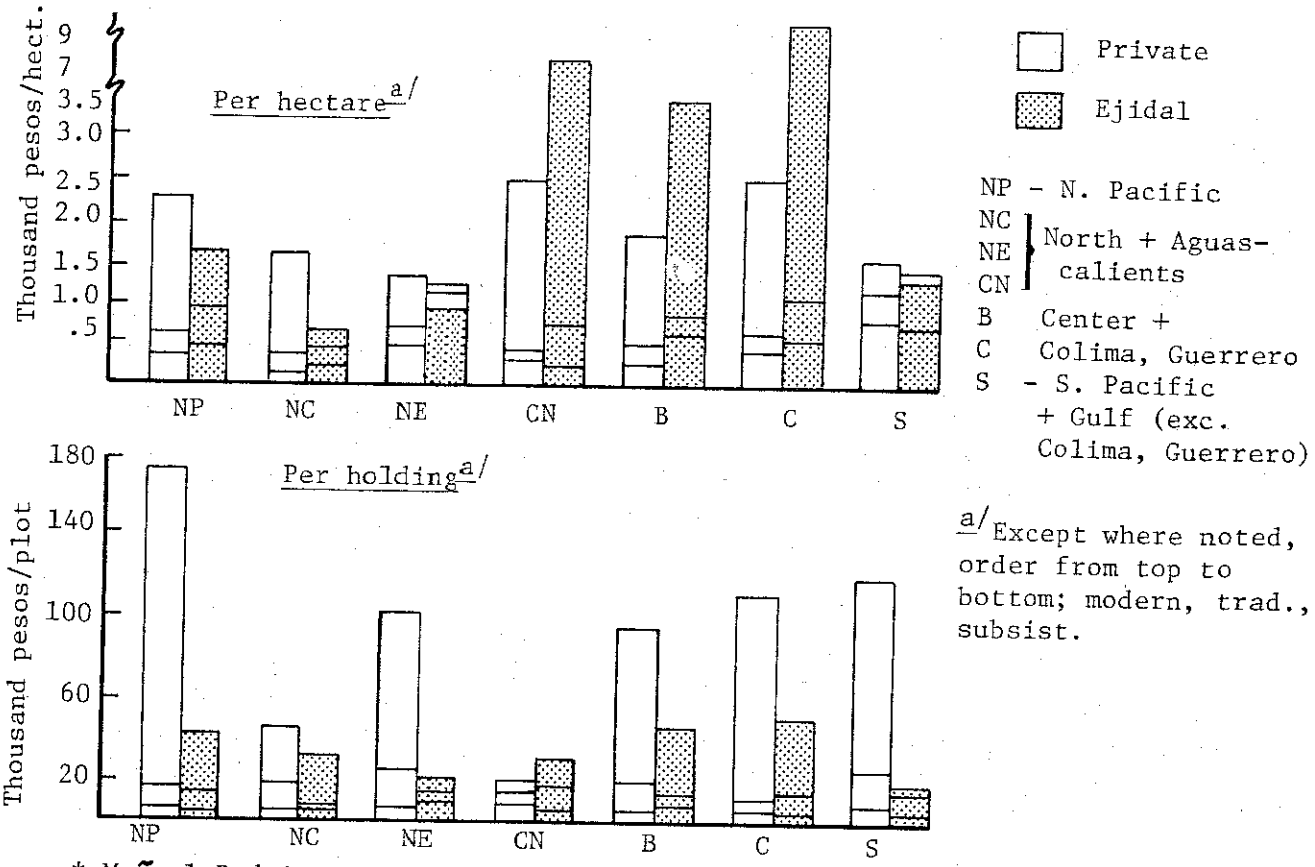
Graphs 1-3 and 1-4 show the characteristics of income distribution in Mexico according to the 1970 Census. While 62 percent of the work force as a whole earn less than $100 monthly (US $960 per year in 1970 prices, or about $1800 in 1976 prices), 94 percent of the agricultural labor force made as little. Less than three percent of the work force made over US $10,000 per year (by 1976 prices) compared to 50 percent in the United States. Even if it is assumed that the Mexican income figures are grossly deflated and that farm incomes do not include on-farm consumption, the rural-urban dichotomy is still notable, as is the large segment of Mexican society with extremely low living levels.

Because of lowered infant and total mortality rates, a very substantial portion of the population is in the "dependent" age group. The potential EAP of Mexico (those older than fourteen and younger than sixty) dropped from 58 percent in 1930 to about 50 percent in 1970. Because of the extremely low participation of women, the actual EAP, by the 1970 census was 27 percent. In the United States, the corresponding figure was around 50 percent.

GRAPH 1-2. MODERN, TRADITIONAL, SUBSISTENCE SECTORS BY STRUCTURE*



1967/68--INCOME BY SECTOR AND REGION, PRIVATE AND EJIDAL*



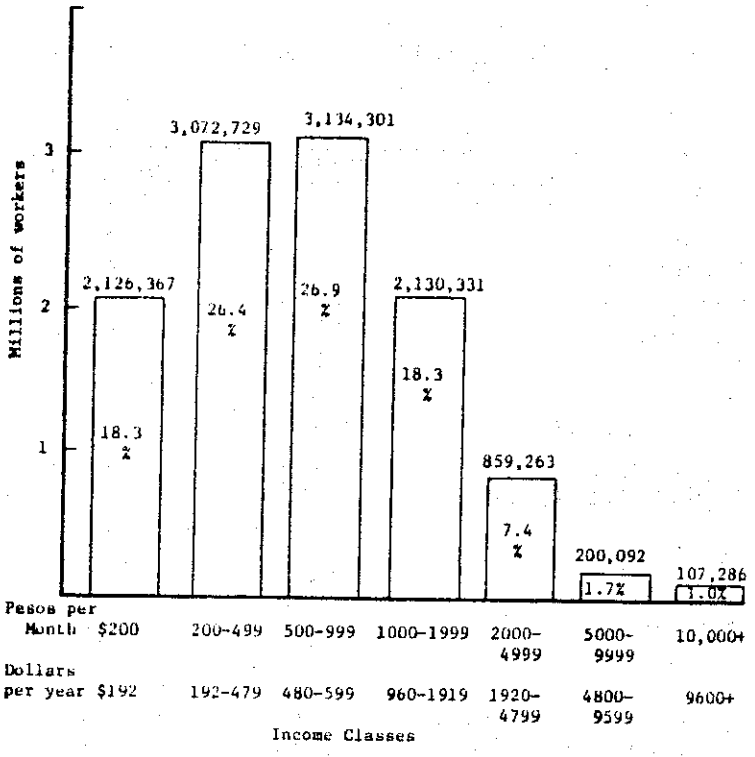
* Manuel Rodriguez Cisneros, et al., Características de la Agricultura Mexicana, 1970, pp. 156, 262.

CHART 1.1. CHARACTERISTICS OF MEXICAN AGRICULTURE*

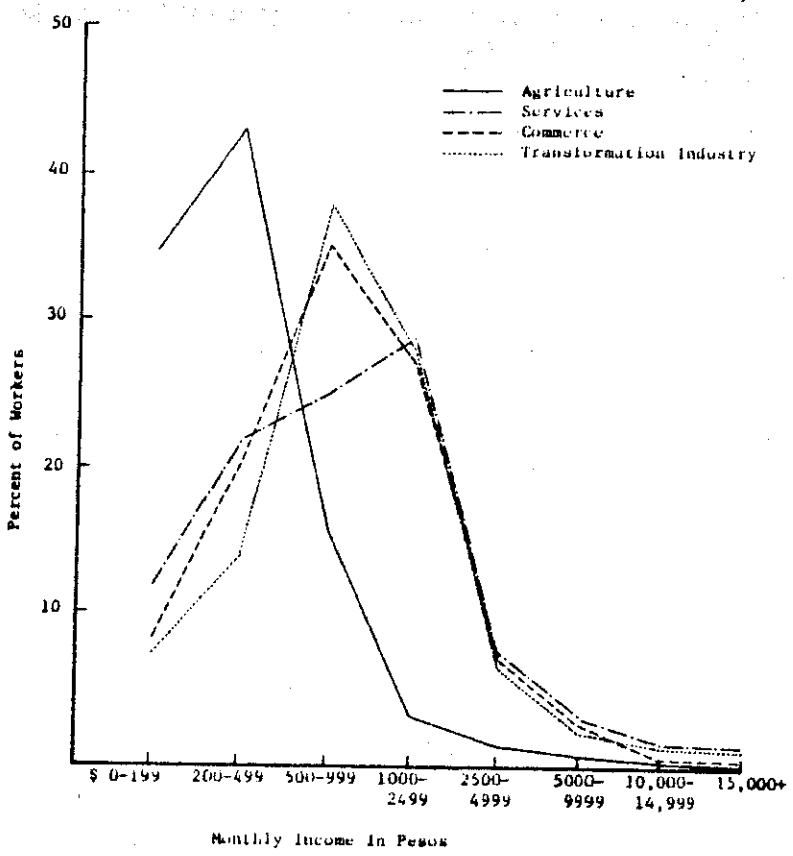
	Modern	Traditional	Subsistence
Percentage farms	7.1	40.5	52.4
Percent land irrigated	33.1	13.1	7.9
Percent improved seeds	85.6	33.6	14.0
Percent fertilized	83.1	41.9	16.8
Percent consumed by producer	7.2	15.5	38.8
Income per plot (pesos)	62,840	9282	3472
Cultivated hectares per plot	33.1	13.1	7.9
Productivity per plot (pesos)	2093	721	522
Capital per hectare	3675	1787	959
Tractor hours per hectare	10.8	4.7	.8
Oxen hours per hectare	4	23	54
Man hours per hectare	260	209	251
Cost of fertilizer per hectare	348	195	39
Cost of insecticide per hectare	47	18	6

* Mañuel Rodríguez Cisneros, et.al., Características de La Agricultura Mexicana, 1970, pp. 255, 264.

GRAPH 1-3. INCOMES IN MEXICO IN 1970*[a/]



GRAPH 1-4. INCOME DISTRIBUTION BY SECTOR IN MEXICO, 1970*



a/ Of 12,955,057 workers, 11,620,469 reported their income.

*Source: Mexico, SIC, Noveno Censo de Población, 1970 (1972).

The lack of integration into "modern life" is reflected in housing and literacy figures. Even by 1970, forty percent of all Mexican homes had earthen floors. Nearly 50 percent had palm or insulated tile roofs.

Literacy in 1970 averaged only 62 percent, with a range among states from 51 to 83 percent, the latter figure for Mexico City. Sixty-five percent of children ages six to nine had had no primary schooling; roughly 20 percent of children 10 to 19 had had none. Only five percent of children 10 to 14 had attended junior high school and 10 percent of those 15 to 19. Yet schooling has a crucial effect on employability.

There are geographical differences in living standards. The general welfare (as measured by a variety of indices) is highest in the northern border states, a little better than average in Veracruz and some of the western states, below average in most of the central states, and worst in the South Pacific (2, p. 68). Meanwhile, national health indicators on mortality and morbidity, after reaching a low in 1965, appear to have climbed since then.

In 1977, 9 1/2 million people--or one-seventh of the total population--resided in the capital city, not to mention another two to three million in the surrounding metropolitan area. The Central Plateau is extremely overcrowded, while the provinces are too underpopulated to provide either important markets or a qualified labor force.

Despite these glaring distributional problems, Mexico has funnelled an unusually small amount of public expenditure into welfare programs for the bottom quarter of the population--in fact, the lowest in Latin America, as of 1970. Relative rural peace has been bought by periodic distribution of land and the pull of the cities. Meanwhile, peace in the cities has been achieved through subsidies of food, health care, and transportation.

Employment

Employment is emerging as the single most crucial issue in development, from the standpoint of both production and distribution. In a poor society, few people are really "unemployed": they find a way to make a few cents here and there to live. Therefore "underemployment" is the more common term used: work of marginal productivity, marginal rewards or marginal value to society. Estimates of underemployment range from 35 to 45 percent of the EAP (4.8 to 5.8 million persons) (35). This figure does not include the millions of Mexicans working in the United States, not supported by the Mexican economy. According to the Census, 60 percent of those in agriculture are underemployed, 14 percent in services, 10 percent in the transformation industry sector and 6 percent in commerce. Only 81 percent of the EAP worked 10 to 12 months per year; in the agricultural sector, only 77 percent.

Agricultural Employment

The seasonal and multisectoral aspect of employment is important. For example, Chart 1-2 shows the distribution of workers in agriculture. The number of workers fluctuates between 6 million in the winter cycle harvest, and 9.6 million for the spring-summer cycle harvest.

The absorption of agricultural labor is dependent upon a number of variables such as land expansion, yields, mechanization, irrigation, and choice of crop. Ranching, while it generates 34 percent of agricultural product, absorbs only about 4 percent of the EAP.

Different sections of the country have different characteristics of labor absorption. Traditionally, it was greatest in the north, especially the northwest irrigation zones which have multiple harvests. Yet the substitution of wheat, and especially cotton, by sorghum, soy and safflower, and also high mechanization have reduced employment growth in recent years. The differential employment per hectare between rainfed and irrigated land was halved between 1960 and 1973 (20). After 1973, cotton dropped even more drastically, which eliminated thousands of jobs. What used to be a three-month long migration from all parts of the country, is now satisfied by local labor.

In the Center Gulf and South Pacific, increase in production and opening lands led to increasing absorption of free workers; but they also receive the lowest wages of any working group. There is a low level of capitalization, and few alternatives for workers who will not work for the wages offered. There is frequent migration to the sugar, coffee and copra fields for harvests. In Yucatan, the only real absorption of workers has been through opening of new lands. On the Gulf coast in general there were high levels of unemployment and underemployment until recent years, when increasing land-clearing and greater government investment created many new jobs.

In the Southern region (which includes Oaxaca, Guerrero and Chiapas) the problems are severe. Whereas 211,000 workers left agriculture in 1960-69, only 70,000 new jobs were offered in that region in industry and services.

The Central region has shown the greatest relative increase in use of the labor force, due to greater increases in land, large yield increases and a low mechanization rate, while change in crop composition was not negative. However, because there was already such strong pressure on the land, with widespread minifundism, the net result was pretty insignificant to the labor force. In 1972, the majority of farmers in the State of Mexico worked in Mexico City in the off-season and/or received income from a family member living in the capital (20, 25, 30).

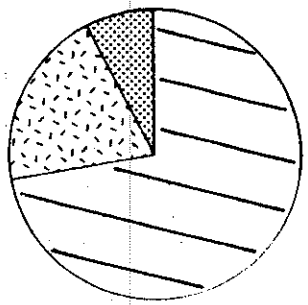
Urban Migration

Because of the comparatively higher rate of underemployment in the countryside, there has been a major rural-urban migration since about 1966. Prior to this, most internal migration was between productive rural zones. The immigrants are mostly young, single, and the

CHART 1.2. TYPES OF WORKERS IN AGRICULTURE*

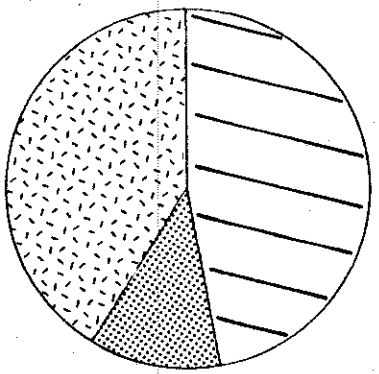
Private Properties Less than 5 hectares

1,190,859 workers



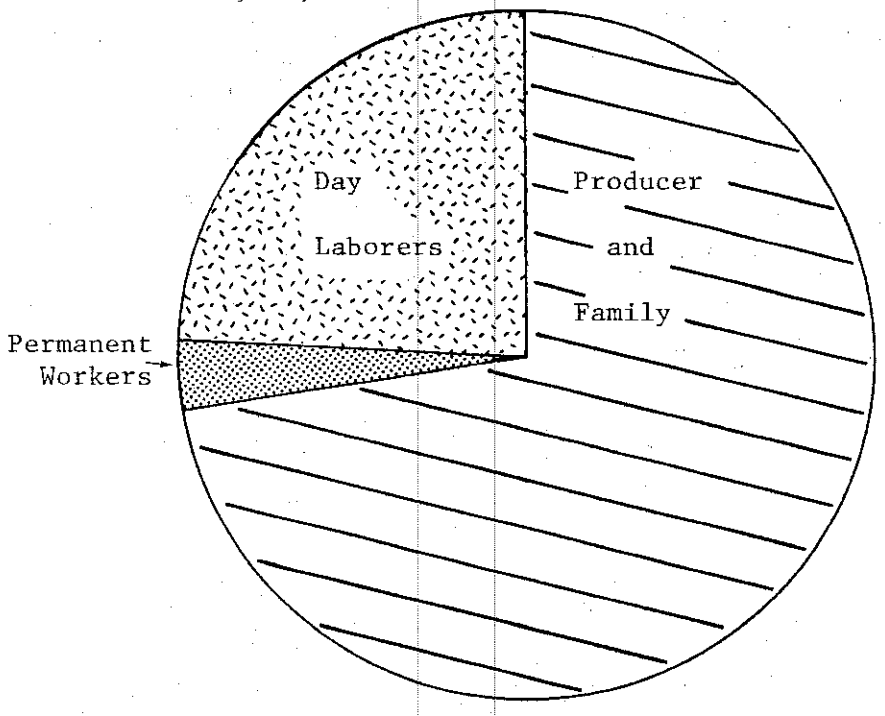
Private Properties Greater than 5 hectares

1,535,544 workers



Ejidos and Communities

5,110,934 workers



Workers in the harvest of:	Winter '68/'69	Spring/Summer '69
Private properties with:		
greater than 5 hectares	1,256,717	2,248,172
less than 5 hectares	343,676	1.197,529
Ejidos and communities	4,452,706	6,223,122

* Mexico, SIC, Censo Agrícola y Ganadero, 1970 (published in 1975).

better-educated groups from the provinces. Half of all migration between 1960 and 1970 was to cities greater than 50,000 population. Two-thirds of these migrants went to Mexico City, Monterrey, Guadalajara, Puebla or Ciudad Juarez in Chihuahua. The city of Netzahualcoyotl on the outskirts of Mexico City, was born and grew to a million people in about ten years.

Industrial Employment

A decline in agricultural employment would not be a problem, if the other sectors were absorbing new workers quickly. But from 1960 to 1969, the manufacturing sector absorbed only about 90,000 workers per year. Since it has been estimated that Mexico will need to create 600,000 jobs per year to absorb the net increase in EAP, this is not a very promising record (30). Food products and textile production, traditionally the most important sources of employment, are now losing workers. Absorption rates from 1960 to 1969 were greatest in machinery, electric and electronics equipment, chemicals and basic metals--i.e., the most modernized industries, which tend to hire skilled labor. Capital goods and consumer durable industries gave the best overall record in production, productivity and employment increases (30).

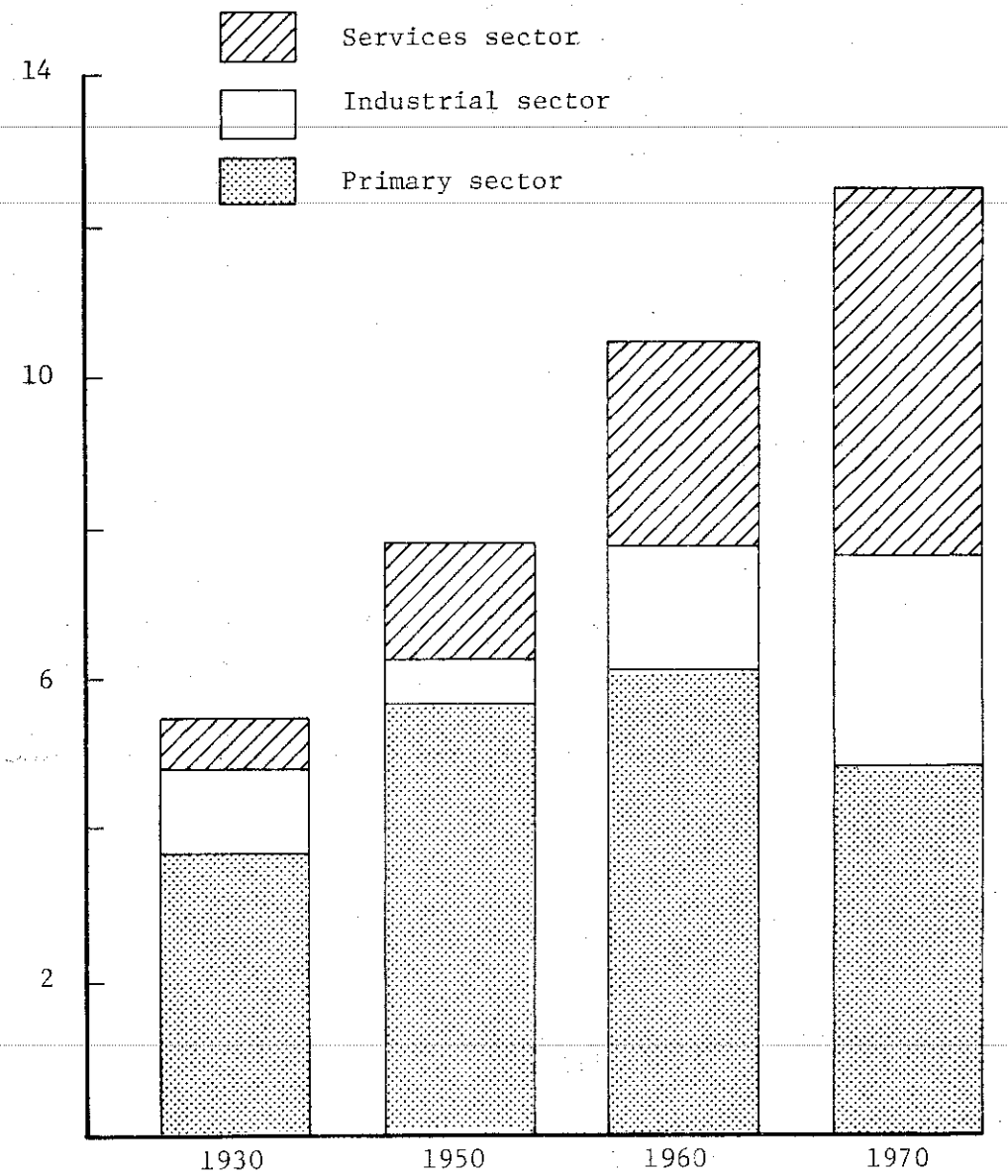
With urban migration, and the constraints of industrial employment possibilities, the greatest number of migrants have been absorbed by the service sector, which is larger in Mexico than in any European or American country with the exception of Guatemala (30). Unfortunately, a large portion of this is of a very marginal nature. Graph 1-5 shows the changes over time in the EAP.

Agricultural Policies of the Echeverria Administration

The government of Echeverria initiated many new projects to deal with the problem of rural stagnation. New irrigation projects were begun, through the Ministry of Hydraulic Resources (SRH) and the Ministry of Agriculture and Livestock's (SAG) Plan Benito Juarez. Rainfed land was cleared through the Ejidal Bank Clearing program and other SRH programs. A Water Law was passed in 1971 to reorganize Irrigation and Drainage Districts and a new Agrarian Reform law was passed. Road-building was at an unprecedented high, including many built with manual labor.

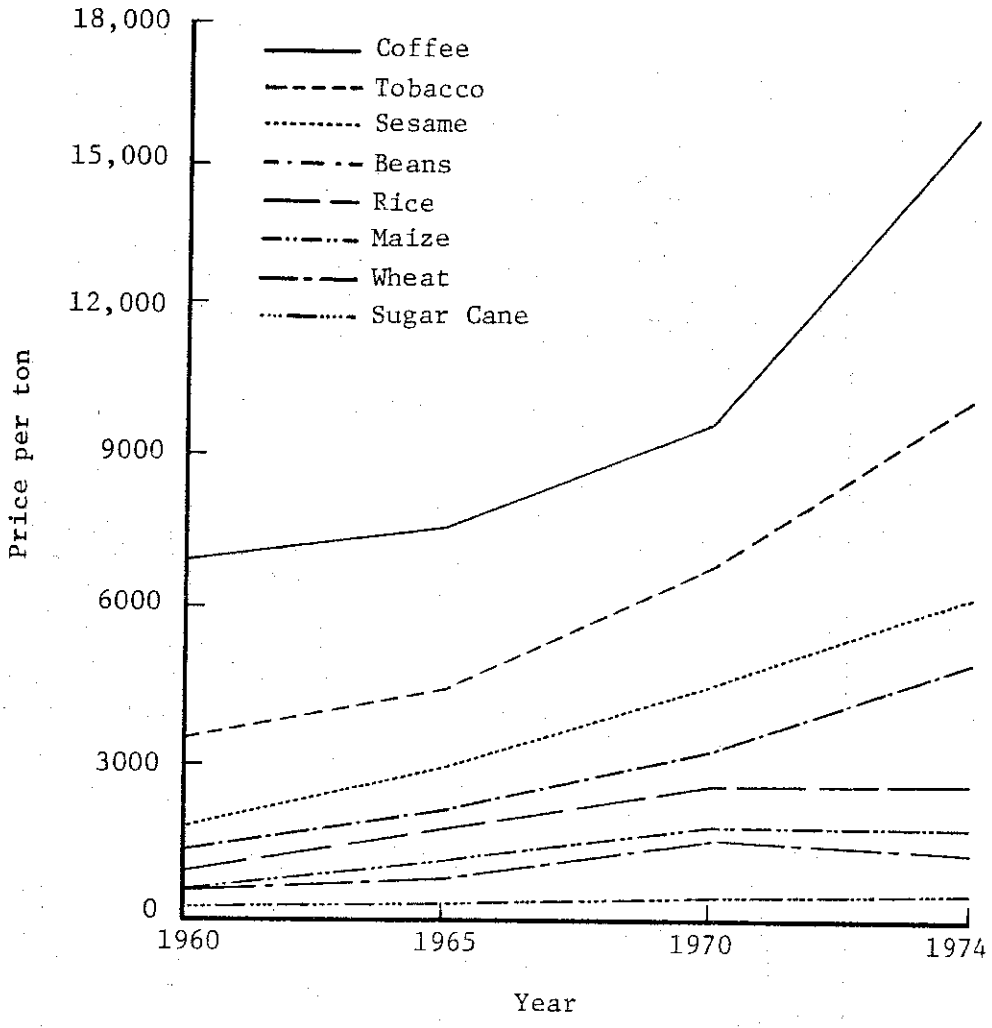
Guaranteed product prices increased, as shown in Graph 1-6. The participation of CONASUPO (National Company for Basic Staples) grew enormously. Both private and public credit have been provided on a large scale to agriculture, as illustrated in Graph 1-7. The Bank of Mexico's FIRA program--"Fideicomiso Instituido en Relacion con la Agricultura"--has funneled money from the Interamerican Bank for Development and the World Bank, through private banks, to poorer farmers at low interest rates. In 1974 the three public banks which used to lend to the rural sector (Banco Ejidal, Banco Agropecuario, Banco Agricola) were merged, to become the National Bank for Rural Credit (BANRURAL).

GRAPH 1-5. ECONOMICALLY ACTIVE POPULATION (EAP)*



* Secretaría de Recursos Hidraúlicos, Prontuario Estadístico de la SRH, 1974, p. 121.

GRAPH 1-6. AVERAGE NATIONAL AGRICULTURAL PRICES*



Input prices rose: 1.7 percent annually, 1960-1965
1.3 percent annually, 1965-1970
9.9 percent annually, 1970-1974

Prices declined for: electricity
fertilizer

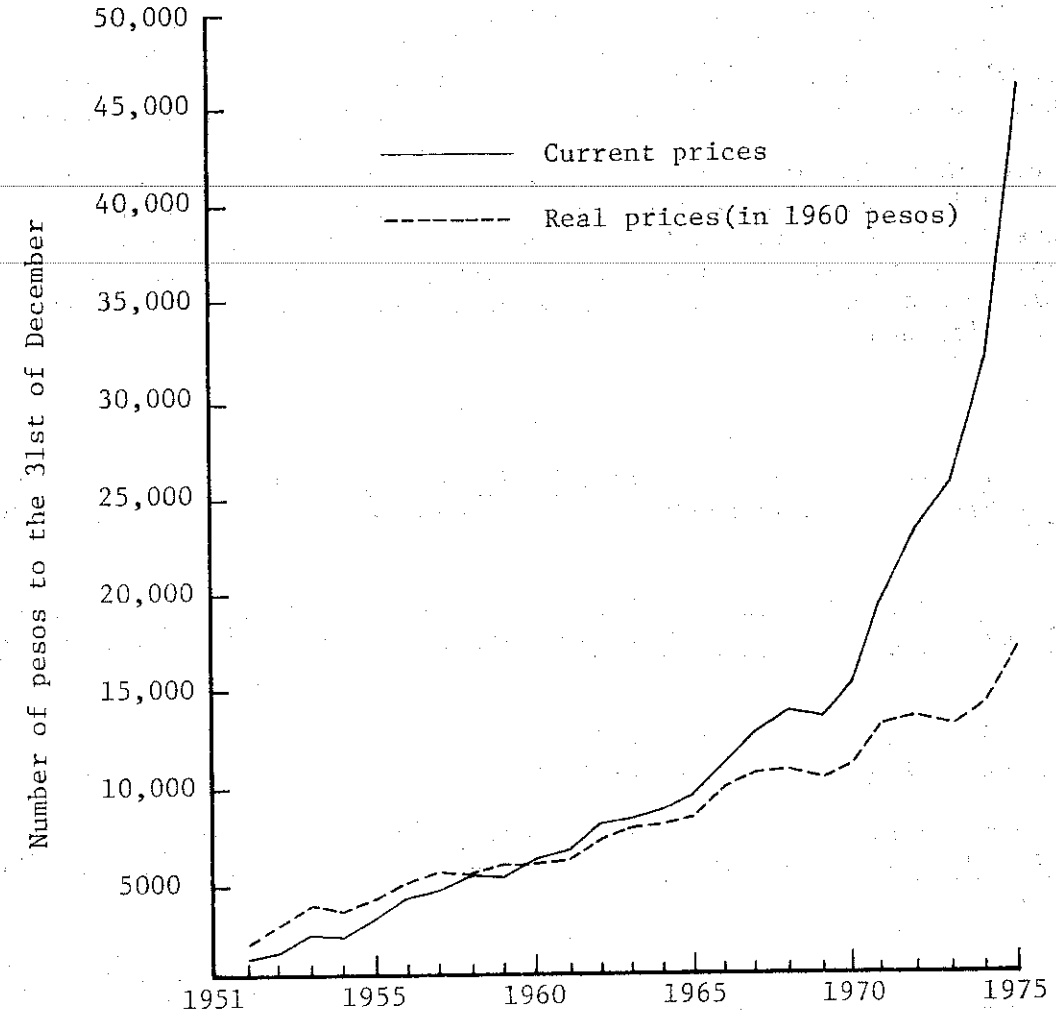
Prices rose for: seed
fuels (49%)
petroleum (50%)
irrigation (50%)
tin plate
packaging

* Mexico, Comercio Exterior, Vol. 25 #5 (Special issue on agriculture), mayo 1975.

GRAPH 1-7. TOTAL FINANCING OF AGRICULTURE AND LIVESTOCK PRODUCTION BY THE MEXICAN BANKING SYSTEM*[a/]

Rate of real increase:

Period	Percent in the period	Annual percent
1951-1960	206.2	11.8
1961-1970	97.0	7.0
1971-1975	28.4	5.1



a/ Besides national and private institutions, we also consider "almacenes de depósito," Federal Government trust funds given as credit, and funds of fiduciary departments.

b/ Index of prices implicit in the Gross Domestic Product.

* 1942-1968: Banco de Mexico, S.A. Informe Anual 1972. 1969-1975: Relación de Responsibilidades de usuarios de crédito bancario.

There was some collectivization of ejidos, and the National Fund for Ejidal Development (FONAFE) was set up to diversify ejidal activities. The tropical river basin commissions were generously refinanced in the first part of the sexenio. The first semblance of agricultural planning appeared, in the form of CONACOSA (National Coordinating Committee for Agriculture) and SRH's National Hydraulic Plan (PNH).

Direct efforts to help farms on rainfed lands were made through the Puebla Plan, the Maize Plan and the Tlaxcala Plan. Outside groups helped to finance PIDER (Integral Plan of Rural Development) and PRONDAAT (National Plan for Rainfed Agriculture). Rainfed Agriculture Districts are being set up. After the new President Jose Lopez Portillo took office in 1976, the SRH and SAG were combined to form one ministry for the rural areas--the Ministry of Agriculture and Hydraulic Resources (SARH). An attempt has also been made to decentralize industry somewhat.

Presently this multitude of programs is without direction, or a common policy, and resources are probably spread too thinly among them. But their successful interaction in parts of the Papaloapan Basin is an optimistic sign. The following study attempts to analyze the specific factors behind such success, and suggest a general policy for rural "growth with equity."

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CHAPTER 2. THE PAPALOAPAN BASIN

The Papaloapan Basin on Mexico's Gulf Coast is the closest tropical river basin to the Central Plateau. It includes parts of the states of Veracruz, Oaxaca and Puebla, and has over two million inhabitants.

The Papaloapan is primarily a rural area, with nearly a third of its land in agricultural production. Most of this is on the flat plains of the Lower Basin, and in a few fertile valleys in the mountains of the Sierra Madre Oriental that make up the Upper Basin.

The region is extremely diverse, as can be noted in the photographs on the following page. The hot dry coastal plain is covered with savannah. Moving to the foothills of the Sierra, rainfall increases and the land is covered by luxuriant tropical vegetation. In the high, cold mountains, pine trees predominate; in the rain shadow to the east, the land is nearly barren.

The alluvial soils along the rivers are rich as are the volcanic soils around Orizaba and the Tuxtlas, but most of the lowland soils are more suitable to pasture than crops, due to the high prevalence of laterites, severe weathering, low organic matter and difficult drainage problems.

Maps 2-1 through 2-6 illustrate the major geographic variables.

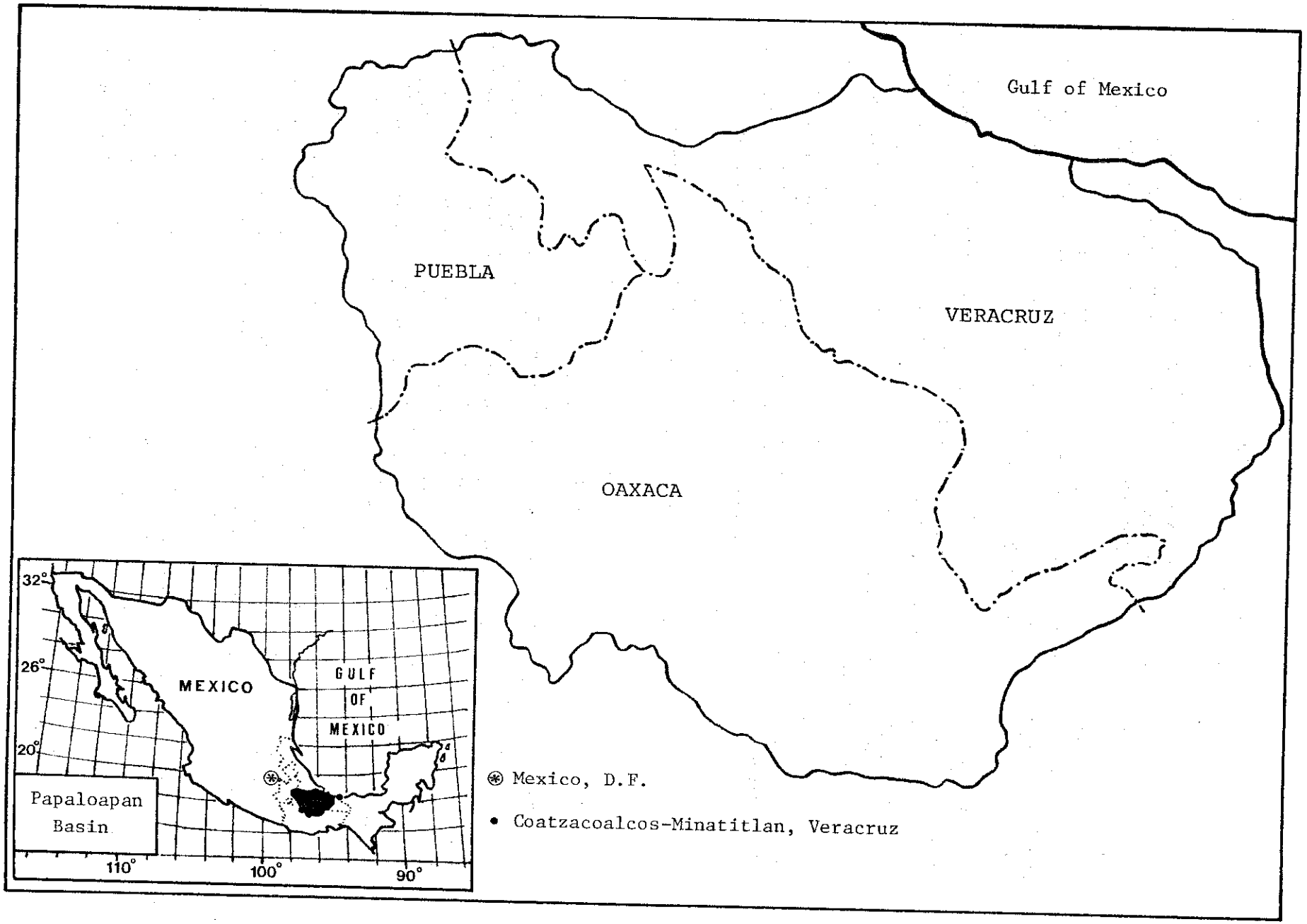
Settlement and History

The Basin has a long history of settlement and resettlement. There has been much speculation on the role of the various indigenous groups in the Papaloapan Basin in the prehistoric development of Mexico. Excavations in the Tehuacan Valley and other arid zones showed that man was living there before 7200 B.C. and began cultivating maize between 3500 and 2300 B.C. Squashes, chiles, avocados, "quelite," fava beans, sapota and string beans were all part of the diet during this period. The first maize with tripsicum was found there, dating between 1500 and 900 B.C. (8, pp. 14-15).

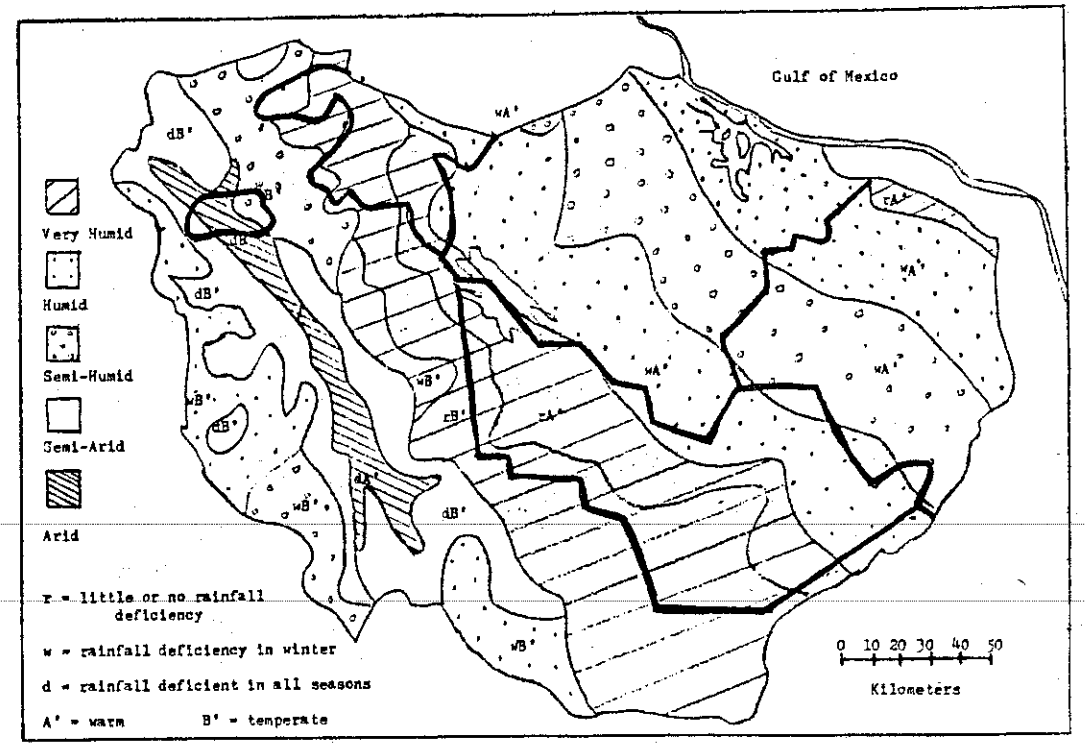
There was a possible Mayan influence in the Basin from 5000 to 2700 B.C., but it appears that the Mayans were thrown out eventually by the Huastecos (the direct descendants of the Olmecs), the Totonacs and the Popolucas, groups native to the area. It was the Mayans who first introduced pineapple to the region (8, p. 16).

From 1500 to 600 B.C., the Totonacs inhabited the left bank of the Papaloapan River and the right bank near Angel R. Cabada and the Tres Zapotes. The rest of the right and the left banks near Cosamaloapan was inhabited by the Popolocas. It has been suggested that first populations

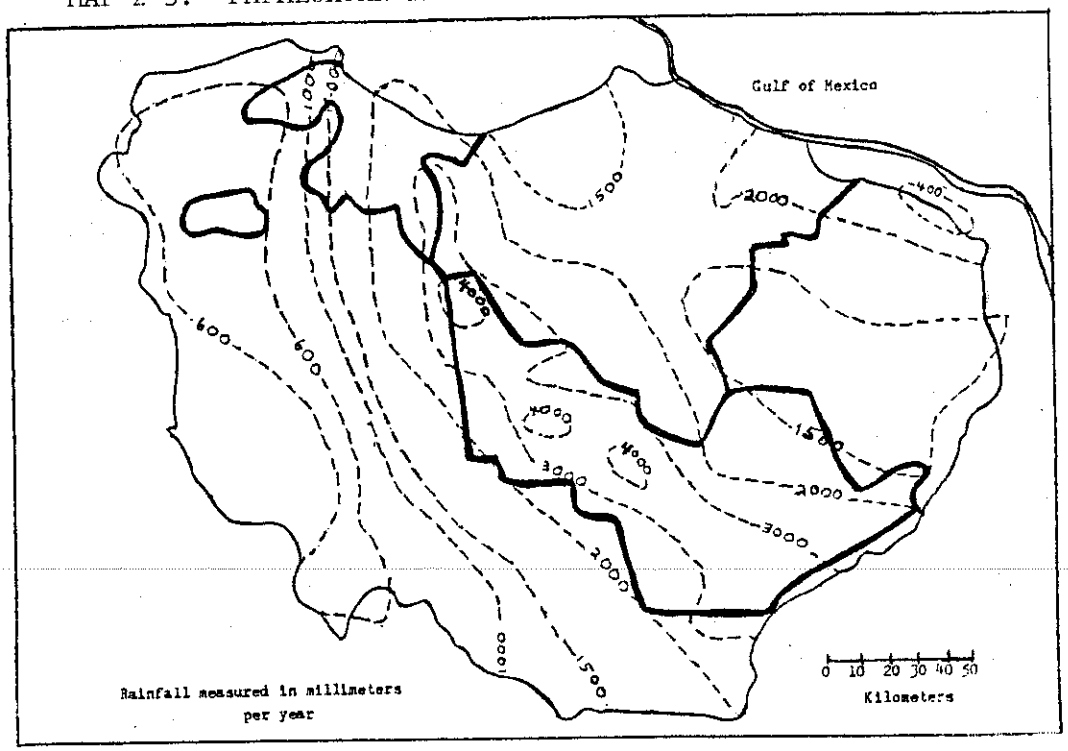
MAP 2-1. LOCATION OF THE PAPALOAPAN BASIN



MAP 2-2. PAPALOAPAN BASIN: CLIMATIC ZONES (THORNTHWAITE CLASSIFICATION)*

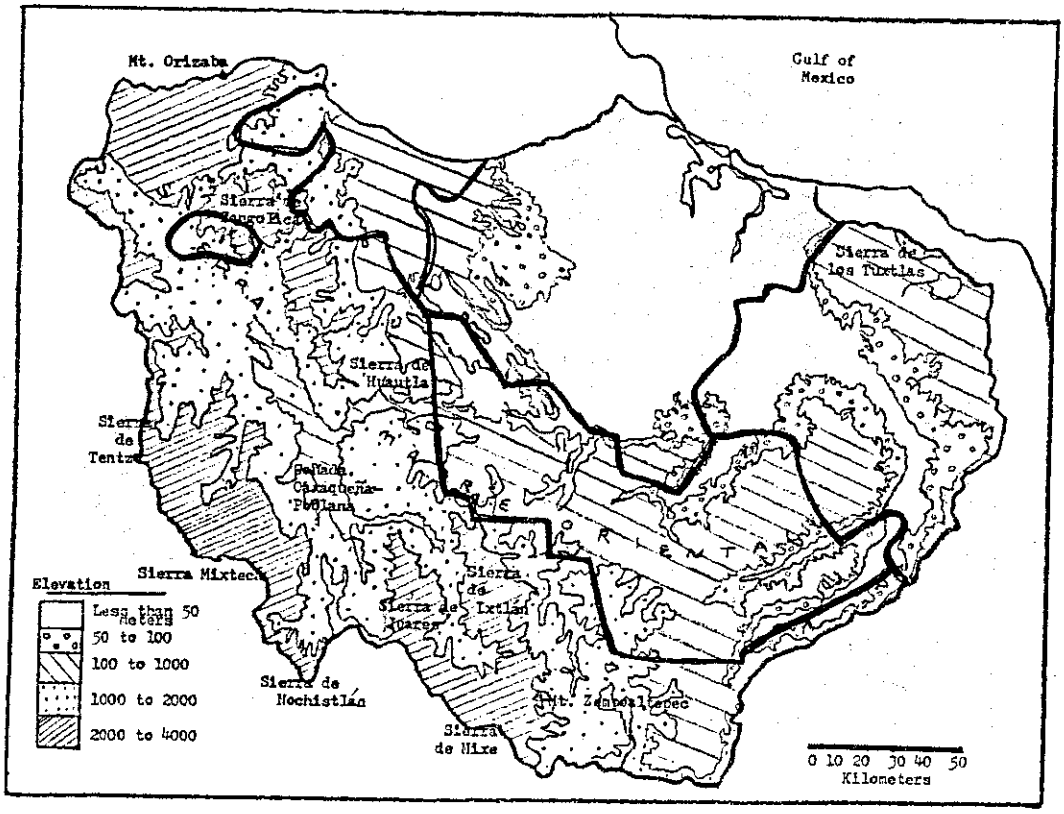


MAP 2-3. PAPALOAPAN BASIN: RAINFALL PATTERNS

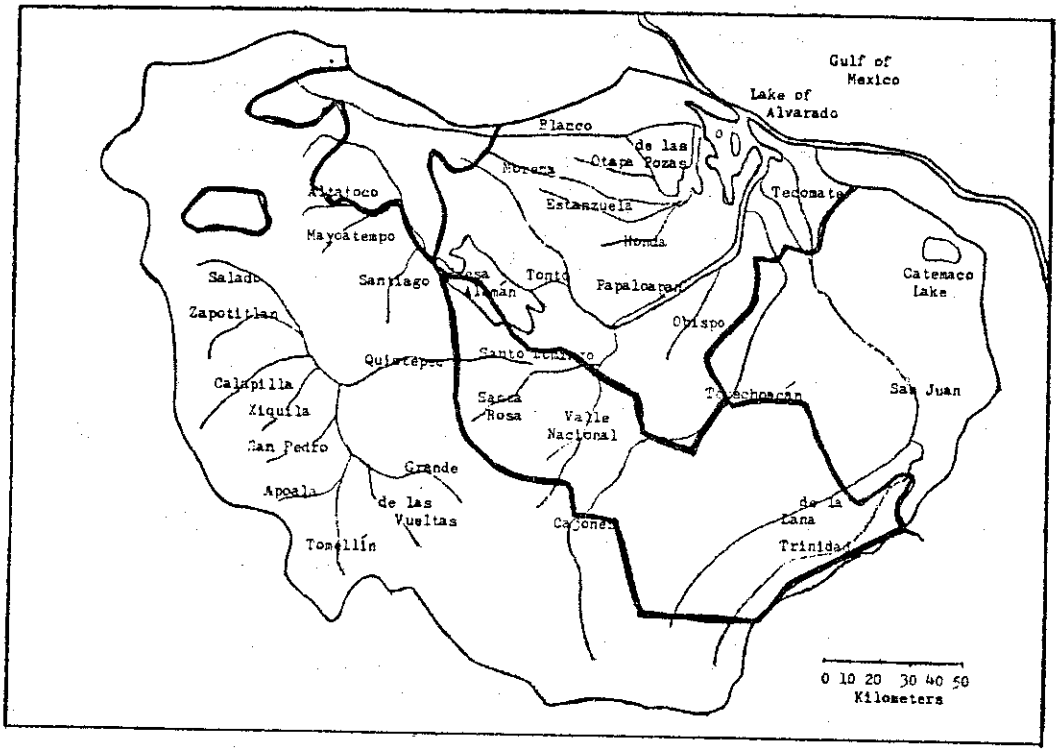


*Adapted from: Sec. Rec. Hidr., Comm. Pap., Atlas Climatológico e Hidrológico de la Cuenca del Papaloapan (Mexico, 1975), Lamina XVIII, XIX-B.

MAP 2-4. TOPOGRAPHY OF THE PAPALOAPAN BASIN*



MAP 2-5. RIVER SYSTEMS OF THE PAPALOAPAN BASIN†



*Sec. Rec. Hidr., Comm. Pap., Basic Map of the Papaloapan Basin.

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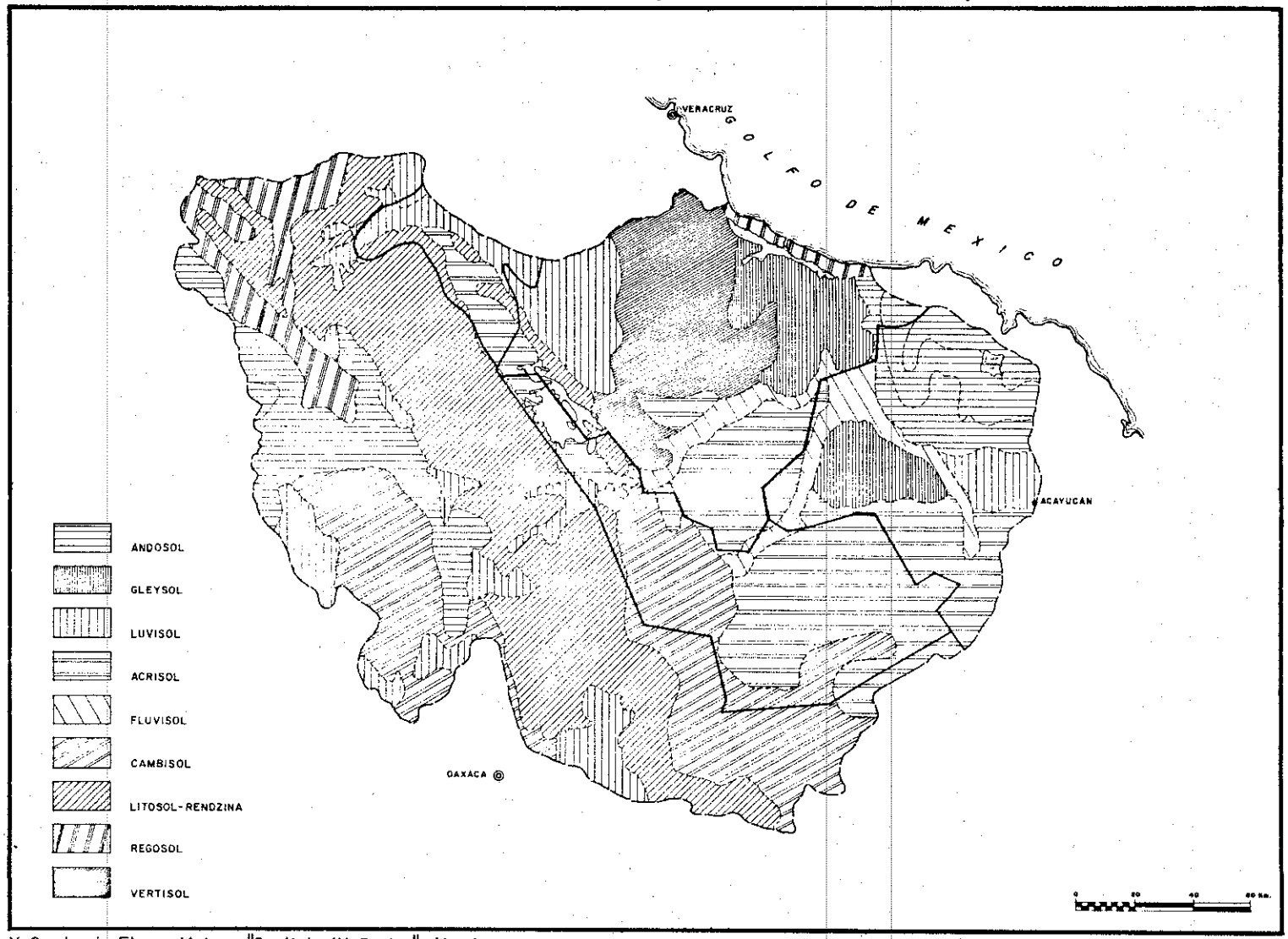
MAP 2-6. SOILS OF THE PAPALOAPAN BASIN (FAO CLASSIFICATION) *



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of the Central Plateau came from the Gulf Coast, particularly from the Mixtequilla within the Basin (8, p. 16).

The Empire of Mexico had a major effect in the 1400s on the Lower Basin and the Upper Mixteca, as considerable tribute was extracted from these areas. The Olmecs had learned to use rubber, and this product was included in the tribute given by Tuxtepec to the Mexican Empire, along with cotton. Major cotton production before the 16th century centered around Tlalixcoyan, Soyaltepec, Ixcatlan, Tuxtepec and Teotitlan in the Canada (8, p. 18).

The Coming of the Spaniards

At the time the Spaniards came, there were no roads anywhere in the Basin, only a vast system of foot paths. As they had for centuries, settlements located mostly along the navigable rivers, where the soils were more fertile and where communication was possible to outside areas via launches. The most important towns were Tlacotalpan, Chacaltianguis, Cosamaloapan, Otatitlan, Tuxtepec and Playa Vicente.

Since nearby Veracruz was the principal port for the Spaniards, the Basin was one of the first places to be settled by them. The river towns--Tlalixcoyan, Tlacotalpan, Cosamaloapan and Amatitlan were the main towns chosen. These, along with Orizaba, the Tuxtlas, Zongolica and Playa Vicente, would be the zones of development in the Basin for the next few centuries.

It was the Spaniards who first opened up the area. By the 17th century, a road had been built to Veracruz through Cotaxtle, Cordoba, Orizaba, Maltrata and Puebla, and in the 18th century, a route from Tlalixcoyan to Cotaxtle was added. These opened up commerce to the interior.

Their effect on agriculture was significant. They introduced wheat, barley, rice, sugar cane, apples, grapes, olives, pears, quince, oranges and a number of vegetables (8, p. 19). Wheat grew to be an important crop in Esperanza and the Valley of Tehuacan in Puebla.

Tobacco became important in Cordoba, Orizaba and Zongolica in the 18th century, until 1764, when the Spanish Crown banned future production. It was not important again until the end of the century (8, p. 27). 1860-1870 marked the first real pioneer colonization in the Basin, when Cuban and Spanish planters came (after the 1868 revolt) to Valle Nacional.

Native production of cotton grew; by the late 1700s, the Basin was a major producer in the country. A few small mills were opened in the early 1800s, then in 1845 a credit program was set up which expanded the cotton industry in Orizaba to take third place nationally, after Mexico City and Puebla (8, p. 26)

Livestock was introduced and, by 1600, occupied most of the open land in the Lower Basin. Sugar cane was introduced by Cortes himself in 1524 in Santiago Tuxtla, where the first "trepiche" in Mexico was built to produce raw sugar. The 16th century saw the rapid spread of cane, even into the Canada. Competition from the Caribbean caused a decline in production at the end of the 18th and beginning of the 19th centuries. But after the Negro Rebellion in Haiti and Santo Domingo, the export market opened up and there was a big increase in production. It was at this time that many blacks came to work in the cane fields. They mixed with the indigenous peoples to form the "jarocho" typical of Veracruz (8, P.26).

The "sombrero" hat was introduced by the Spanish in 1580 and was quickly accepted by the natives. The famous Mixtec weaving dates from about that time. Coffee (coffea arabica) was brought to the Huasteco --still an important coffee-growing area--in 1812. Mango was brought from Manila to Cordoba in 1826 (8).

Brought also by the Spaniards were a number of illnesses, especially viruela and yellow fever, that rapidly decimated the coastal population. As a result of this, and the retreating of many coastal tribes into the Sierra during the Spanish conquest, the coastal plain was left relatively depopulated.

Mexican Independence

Independence after 1821 brought few important changes to the Basin. Prime among these was the building of the railroad in 1873, which provided the first opportunity for many inland areas to begin commercial agricultural production. Yet because of the development of the steamship, until the 20th century most produce was still moved to Port Alvarado by river, then by lighter to Veracruz. Cotton and tobacco were the principal commercial crops at this time.

Cotton became more and more important, especially with the United States crisis occasioned by the Civil War. Playa Vicente and Tuxtepec were major productive areas. New factories were put up in Nogales, Orizaba, Necontala, Rio Blanco, San Andres Tuxtla and Alvarado. By the late 1870's, the Basin produced almost half the cotton in the country. This continued until the turn of the century, when there was a drastic decline in production as much lower cost producers in the north began to expand on a large scale (8, p. 24).

During this era, the new laws of "terrenos baldios"[1/] encouraged Veracruz hacendados to settle peons on their lands. The land was

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1/Under this law, state land was distributed for sale to private individuals, with the intention of populating unoccupied lands. In practice, much of the land was acquired by private land companies who sold off little for settlement.

repopulated, primarily under a latifundio/plantation structure based on extensive ranching and cash plantation crops, including rubber. These holdings dominated the riverbanks and land along the railways. Scarcity of labor remained their biggest problem.

After 1875, coffee and tobacco leaped to importance. In 1896, the giant San Cristobal sugar mill was erected in Cosamaloapan--the beginning of the pervasive importance of cane in the Papaloapan. Its private owners, along with other large-scale business interests, markedly influenced local politics through the first half of the 20th century.

In order to attract outside labor to the underpopulated zone, they began to offer wages which, while still low, were for many peons the first opportunity to earn outside income. Migrants came from all over the Sierra. The Chinantec, Mixe and Mixtec Indians began to descend regularly from the hills for harvest of sugar cane, tobacco and coffee.

Coffee remained important near the urban northwest and the windward slopes of the Sierra. The banana was cultivated in the Basin in the mid-'20s, and the '30s was a time of the banana export "boom." Along with the Grijalva area further south of the Basin, the Lower Papaloapan produced most of Mexico's bananas. The boom collapsed in the latter half of the decade, though, when the Panama disease set in and could not be economically controlled. Most of the foreign planters left Mexico.

Zebu cattle were introduced in the 1920s, along with new pastures--Guinea grass for the hills and Para for the flooded areas. The livestock coefficient increased three to four times with the new grasses; 2.5 head per hectare could be supported by Para (10, p. 126)

In general, the ejios received the marginal lands of the Haciendas. Their most important production was for subsistence, the major exception being cane production from the mills. In the Cosamaloapan and San Cristobal areas, 74 ejidos were born between 1921 and 1950 and their population grew from 45,000 to 80,000. Cane production grew from 1500 hectares at the turn of the century to 27,000 hectares in 1953, of which 18,000 hectares were on ejidos (10).

By 1950, one-third of the land in the Lower Papaloapan was owned by ejidos and up to two-thirds of the cultivable land. Some 700 ejidos had been set up and distributed to about 50,000 ejidatarios. This had a major negative effect on livestock production, as most of the land was turned to subsistence farming (1, p. 76).

There was much less effect on the Upper Basin, where there had been few large landholdings before the war and in which the traditional landholding village form predominated through the present time.

Conditions in the Papaloapan Basin in the 1940s

In 1947, when the Papaloapan Commission was created, the Basin was still one of the most backward areas in Mexico, with the exception of

the Cordoba-Orizaba-Tehuacan zone which was well-communicated with Veracruz and the Central Plateau, and had begun to industrialize. The first labor movements in Mexico took place in Orizaba.

The rest of the Basin had no first-class roads at all. Scattered sugar mills were the only industry in the region. Rivers provided the only major form of transportation with most important settlements near them, but declining navigability was becoming a problem. The burden was shifting to the railroad, which had very inadequate equipment and management. See Map 2-7 for a view of communications and settlement in the Basin around this time.

There were no warehouses for production inputs or harvest storage, which also greatly limited commercial agricultural exploitation. In 1945, only 5 percent of the land was being cultivated (8, Chart 3).

There were very few services, and the lack of sanitary and medical facilities was critical. Because of isolation, the tropical climate and poor nutrition, inhabitants of the region fell prey to numerous diseases and infections. Malaria was endemic; nearly everyone had gastro-intestinal parasites. Tuberculosis, onchocercosis (a filarial worm infestation) infected large segments of the population, especially in the Papaloapan Valley and to the east of the Santo Domingo River.

Illiteracy in 1950 was around 58 percent. Fifty percent of the school-age population had no educational facilities at all. Secondary schooling was available in only a few urban centers, and no schools for technical or higher education were available at all in the Basin.

One third of the population spoke no Spanish. The nine major Indian languages had 180 subdialects among them which were mutually incomprehensible.2/

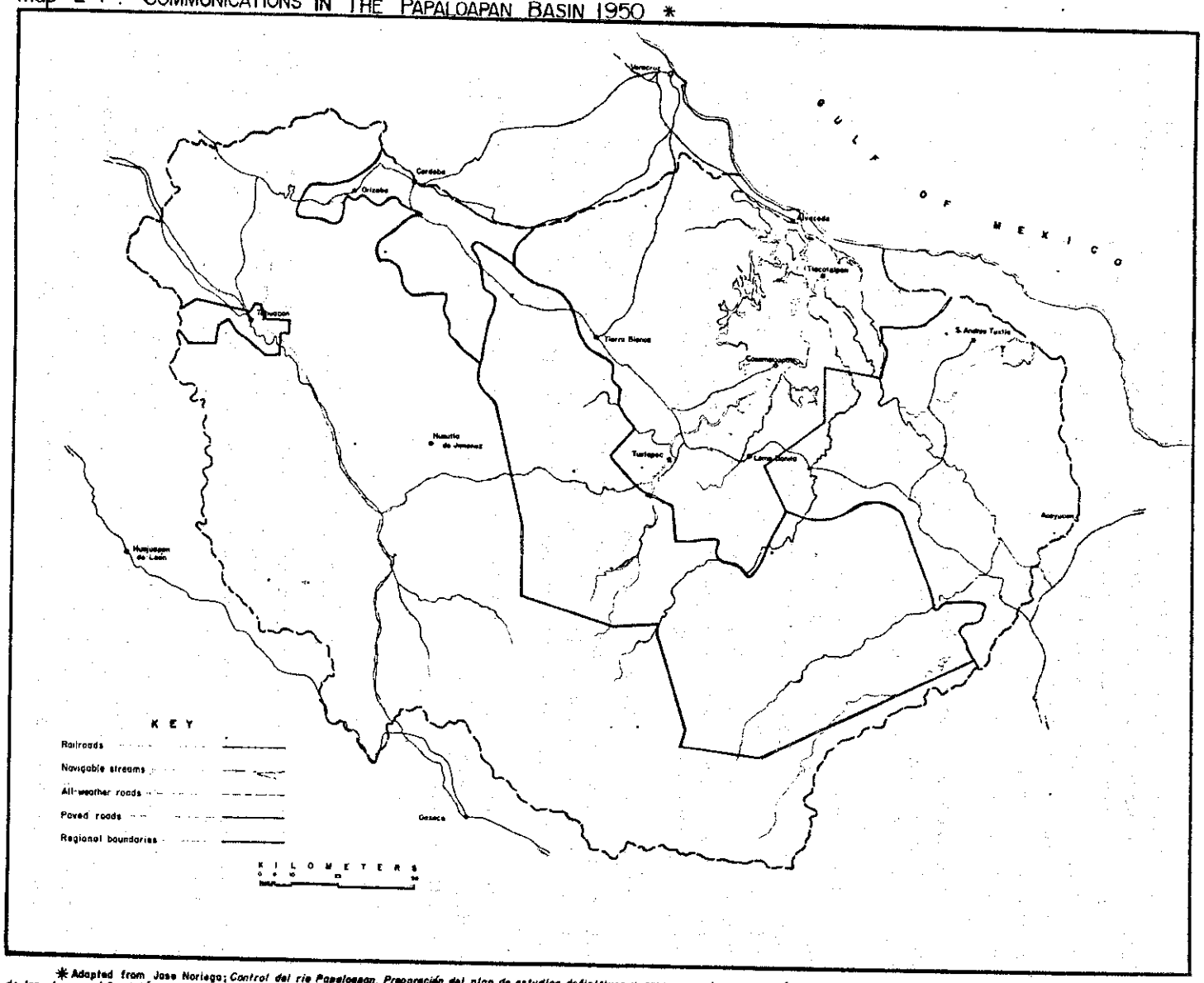
Regional Differences

The Basin was not then--and is not now--homogeneous. For purposes of more careful analysis, we can divide it into the five subregions which were marked on the above maps and in Map 2-8, which have more or less distinct physical and socioeconomic characteristics.

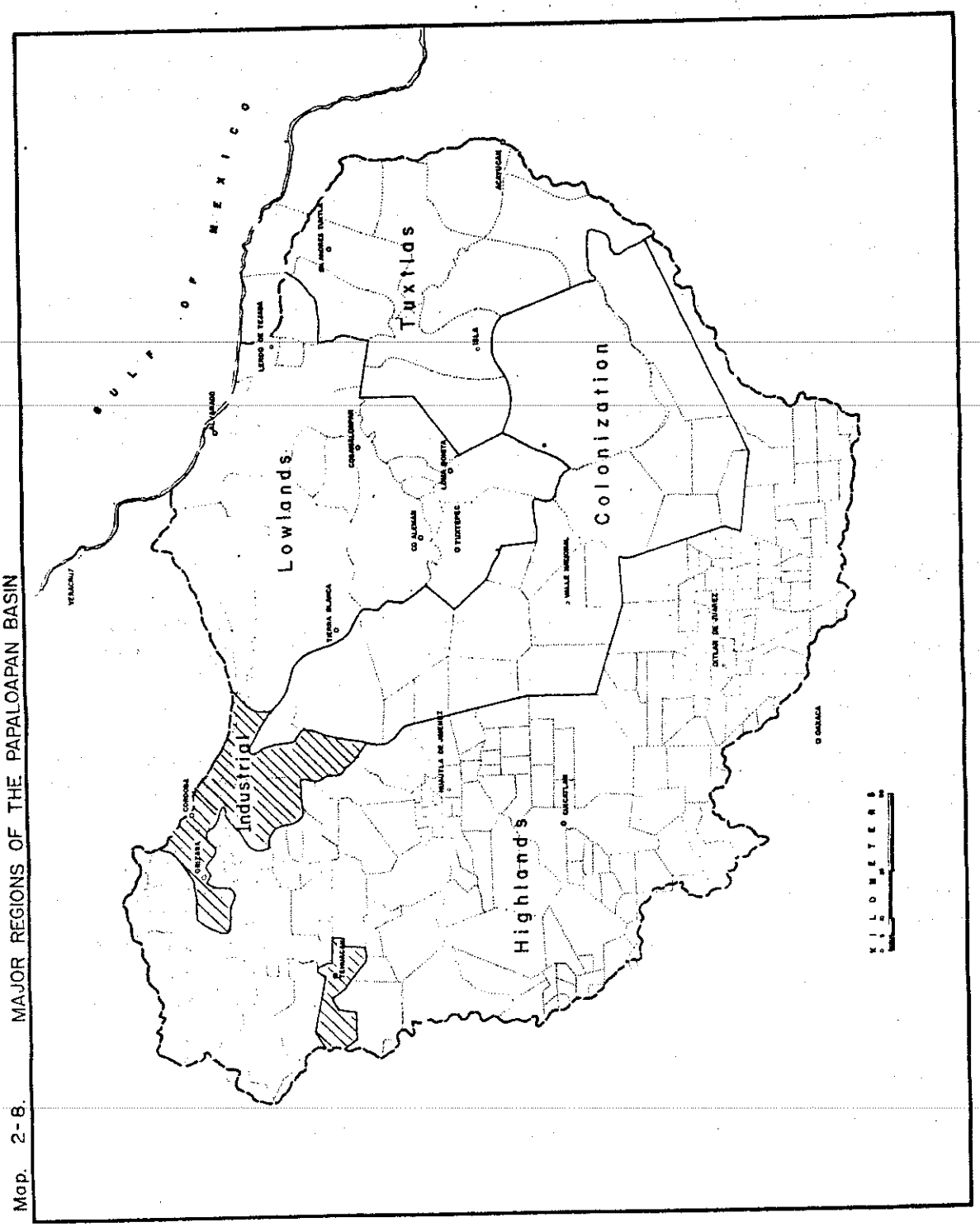
The "Industrial Region" is in the northwestern corner of the Basin and includes the major cities of Cordoba, Orizaba, Ciudad Mendoza, and Tehuacan in Puebla. This area has followed a pattern of development distinct from the rest of the Basin. It has long been part of the national economy and is presently quite urbanized and industrialized.

2/Major Indian languages included: Mixtec, Zapotec, Nahuatl, Chinantec, Popoluca, Popoloca, Ixcatec, Cuicatec, Mazatec.

Map 2-7. COMMUNICATIONS IN THE PAPALOAPAN BASIN 1950 *



* Adapted from Jose Noriega; *Control del rio Papaloapan, Preparación del plan de estudios definitivos y programas de construcción de las obras (Comisión del Papaloapan 1952)*.



Map. 2-8. MAJOR REGIONS OF THE PAPALOAPAN BASIN

The "Lowlands Region" comprises the major floodplain area of the Basin. This is the region that the Papaloapan Commission has emphasized in its programs, and that has experienced most economic growth in the last few decades (outside the Industrial Zone).

The "Tuxtlas Region" in the eastern Basin is dominated by a small volcanic mountain range called the Tuxtlas. It is a long-settled area which has nevertheless been fairly isolated and less affected by major government investment.

The "Colonization Region" is the sparsely populated region at the eastern foothills of the Sierra. This area is just beginning to be integrated with the rest of the country.

The "Highlands Region" comprises most of the Oaxaca highlands. This is a zone of centuries-old settlement by numerous indigenous populations who have generally lived in extreme isolation and poverty.

The general characteristics of these five regions are described below, to familiarize the reader with the potential and the constraints of each of the zones for long-term development.

Industrial Region

This has long been the center for economic activity in the Basin, as the major market, service center and source of inputs. Long on the overland route from the Central Plateau to Veracruz, the first railroad in Mexico also passed through here.

The region is highly urbanized: Cordoba and Orizaba have more than 75,000 inhabitants; Tehuacan has more than 40,000. There are four towns with over 15,000 people.

Tehuacan was first a tourist center due to its famous mineral baths. Recently it has become a center for soft drinks, livestock feed (mostly alfalfa) and poultry production. It lies in a very low rainfall area (less than 600 millimeters per year), located at 1000 to 2000 meters altitude in the fertile region of the Valley of Tehuacan in Puebla. The valley is fed by the Salado River, which has been used for irrigation since the earliest settlements in the very arid region.

Soils there are primarily Regosols--sandy and heavy and there is a lot of flat agricultural land in the valley. Clay for construction, fine white pottery clay for porcelain and onyx for artistry are mined in the area.

Orizaba first began as a textile center due to its water power and climate, and proximity to early cotton production. Beer is also important today and other industries have moved into the area. The town of Orizaba sits at the foot of the mountain of Mount Orizaba--or the Indian-named Citlaltepetl--5750 meters high. The northwest region has a very humid climate with 1000-1500 millimeters rainfall per year, with

little or no deficiency any time during the year. The more mountainous parts have a temperate climate. The eastern slope drops abruptly to 100 meters and has a definitely tropical climate.

Right near Orizaba are some very fertile volcanic soils, but the area is dominated by fine textured vertic luvisols with their considerable erosion problems, and orthic acrisols with low fertility and excess water problems in the rainy season. Pasture is the best use for this land, particularly where it is sloping, but on flat land with good management, a wide range of row and tree crops can be grown. Today its major commercial crops are cane, coffee and fruit trees. There is some mining locally for stone, limestone and clay for cement, and artesanry.

Lowlands Region

The Lowlands area has received the most attention from the Papaloapan Commission, particularly as regards flood control and communication works. After the Industrial region, this is the richest zone of the Basin. The northern part is mainly used for extensive cattle production, but the central part is one of the most densely populated zones in the Basin.

As of 1976, there were three towns with over 30,000 inhabitants and four others with over 10,000. There is a growing percentage of the population in nonagricultural activities.

In the Cosamaloapan and Tierra Blanca areas, there is important oil drilling. There are nine wells in operation and several more being explored. In 1970, 467,000 barrels of crude were pumped, 12,000 barrels of condensed oil and 393 million cubic meters of natural gas (5).

The Papaloapan Commission planners intended to create a commercial center for the Basin in the Lowlands--and the emergence of Tuxtepec as a vital town is fulfilling this goal.

The Lowlands all lie below 50 meters. The plains are covered with open savannah with scattered trees. There are gallery forests near the foothills of the Sierra and around Tuxtepec, Playa Vicente, Acayucan and Sayula. The littoral has numerous mangrove forests.

It is very humid along the coast and in the Oaxacan part, and semi-humid between. The weather is tropical with a marked dry season from December to May, but a very small seasonal variation in temperature. Rainfall is 1500 to 2000 millimeters per year, increasing to 3000 millimeters toward Tuxtepec and the Sierra foothills.

The soils present many constraints for agricultural production. For much of the land, optimum use is in pasture. Under good management, crops can be grown profitably on some parts. Rice production in the Irrigation District and around Tuxtepec today is an example. Loma Bonita specializes in pineapple, and there is a considerable amount of fruit tree production. A major problem with trees is damage from high wind velocities which are often experienced throughout the coastal plain.

Dominating the Lowlands are the nine rivers which run through it, draining into the lake of Alvarado. The flow of the Tonto is presently regulated by the President Miguel Aleman Dam and its reservoir.

The Flood Problem

The Lowlands of the Papaloapan Basin have been subject to flooding at least since the 16th century, when first written records are available. Evidence suggests, however, that their intensity has been increasing over time and hence the disasters they bring. According to registered information, floods occurred in 1787, 1888, 1921, 1922, 1935, 1941, and 1944, to a level of at least two meters above the streets. In 1931, 1935 and 1941, water was on the ground for two to three months (2).

Flooding in earlier years was often beneficial for its deposits of fertile alluvium. But when the water covered the land for excessive periods of time, or occurred during the period before harvest, crops were often destroyed. In the 1941 flood, all the cane and one third of the banana crop were lost (2).

Apparently, the Papaloapan River has been changing its course during this century due to both geologic processes--the situation caused by rapidly falling water over steep slopes, and that caused by man-made erosion. Erosion in the Canada was estimated in the 1940s to be around 1,900,000 hectares with the cultivable land there declining and desertification of a significant amount of land occurring.

The Basin is also within one of the three principal hurricane tracks crossing Mexico. When hurricanes occur, winds of over 140 kilometers per hour have been recorded (average wind velocities are 22 kilometers per hour). Hurricanes, because of the huge amount of rain they pour over an area, have historically been a major cause of the flooding problem in the Basin.

Noriega concluded that "preventive medicine" required that an integrated program of soil conservation, overflow reservoirs in the lowlands and defense works along the rivers be initiated to stem both the natural and man-made losses.

Tuxtlas Region

The Sierra de los Tuxtlas, an isolated mountain range in the northeast corner of the Basin, is also considered to be in the Lower Papaloapan, despite peaks averaging 1000, and reaching 3000 meters in the north. The area has long been populated--Cortes himself owned much of the land during his epoch--and is very European in nature, rather than indigenous. But its overall state of development is not high. San Andres Tuxtla and Isla have shown marked progress, but Santiago Tuxtla and Hueyapan del Ocampo are particularly poor. There is some minimal soft drink, tobacco and barbasco processing, and Catemaco Lake is a growing tourist area, but only the Acayucan area has a high percentage of nonagricultural workers.

San Andres Tuxtla and Acayucan are center for the region, each has about 30,000 inhabitants and there are five additional towns with 5000 to 15,000 inhabitants. Furthermore, there has been a rapid population increase in the last few years in these areas, similar to the Lowlands.

Climate in the Tuxtlas ranges from humid near the coast to semi-humid in the southern part. Rainfall declines to 2000 millimeters in the San Andres area and to 1500 millimeters in the south. There is a winter rainfall deficiency except in the northern peaks, which receive up to 4000 millimeters per year of rain. The major bodies of water are Catemaco Lake and the rivers San Juan and Tesechoacan.3/

There are some very fertile soils in the northeast part, due to its volcanic nature, but in the south the soil quality is poor.

Cane, maize and tobacco are the predominant crops around San Andres, and Isla has some pineapple, but most of the land area is used for cattle. The area around Rodriguez Clara has flood problems in the rainy season, as does much of the land around the Tesechoacan and San Juan Rivers, but "tonalmil" (winter) maize production is so good that the zone has become the maize belt of the Basin. The railroad track essentially demarcates the zone of the iron-bearing nonflooded soils of the region.

Colonization Region

The fourth region covers the municipios of Playa Vicente, Choapan and the southern part of the Greater District of Tuxtepec. Until very recently, this zone was extremely isolated. There were no towns in 1970 with more than 5000 inhabitants. Little attention was paid to it by the Papaloapan Commission except for their resettlement programs there for the Aleman Dam.

Now, however, two new roads are nearly finished--to Sayula and to Palomares, from Tuxtepec, which are opening up millions of hectares to commercial production. In Choapan, along the Palomares road, a very important network of small ranches has opened up, with growing importance to the livestock industry of the Basin.

This region is populated by indigenous groups, and colonists from other parts of the country. In Playa Vicente the Zapotecs reside; in part of Choapan and Tuxtepec, the Chinantecs, and in the northern tip, the Mazatecs.

Most of the region is at 100 to 1000 meters altitude, rising toward the South. This is the highest rainfall area in the Basin. Moving up

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3/There is some flooding around the Tesechoacan area, and for its physical characteristics, this municipio might well belong in the Lowlands region, but its traditional historical and economic ties were mostly to the east.

the Piedmont and eastern slope of the Sierra Madre, rainfall increases from 2500 to 5000 millimeters as the wet season expands to more than ten months of the year. The high rainfall centers are southwest of the Aleman Reservoir, southern Tuxtepec and northwest Choapan. Average temperatures are 15 to 25° C., with monthly fluctuations increasing with increasing altitude. As rainfall, altitude and wet season length increase, the vegetation turns from gallery forest to tropical rain forest. Toward the crest, at about 1800 meters, this abruptly switches to stands of deciduous hardwoods and conifers.

All over the Basin, rainfall patterns are the result of both convectional activity in the northern movement of the intertropical convergence zone, and of orographic lifting. The latter is the most important: as moisture-laden winds from the Gulf are slowed moving up the eastern slope of the Sierra Madre, high rainfall occurs. The Valle Nacional and Tesechoacan Rivers, originating on the eastern slope of the Sierra de Juarez, pass through the Colonization Region.

There are two major soil types here--the orthic acrisols in Playa Vicente and the eutric cambisols in southern Tuxtepec and western Choapan. The first are acid, infertile soils with excess water in the rainy season and easily erodible. They are best for livestock production, and that is, indeed, the major product of the region, along with rice.

The second soil type is found in the more mountainous areas. There soils are heavy, rocky, erodible, and suggested mainly for forest and pasture use. The major commercial crop here is coffee, with some tobacco in the flatlands of Valle Nacional. Rubber production in Valle Nacional, Tuxtepec and Choapan is increasing.

Highlands Region

The Highlands Region, despite centuries-long habitation, is one of the most backward areas in Mexico today. We consider it here as a homogeneous region, only for reasons of topography, and because we will be doing a less detailed study of it than of the other regions.

The Highlands can be divided into three major subregions.

The Sierra Madre Oriental separates the Gulf Lowlands all along the coast from the interior plateau. Its average elevation is greater than 2000 meters. The south is dominated by 3400-meter Mt. Zempoaltepec and the north by 5750-meter Mt. Orizaba. The eastern range is split by the canyon of the Santo Domingo River into a northern zone with the Sierras Zongolica and Huautla, and a southern zone with the Sierras Juarez, Ixtlan and Mixe. Rainfall here is between 800 and 2000 millimeters, with the higher figure corresponding to the lower slopes. The soils in general are very poor for agriculture, except in the Esperanza-Palmar de Bravo area and scattered fertile valleys.

The Canada Oaxaquena-Poblana lies between the western and eastern ranges to a length of about 150 kilometers. The Canada was formed by the Salado and Grande Rivers. As the rivers merge into the Santo Domingo, the Valley falls from a height of 1500 meters to the coastal plain. In these sheltered valleys, temperatures average 24° C., with wide monthly variations. Rainfall averages only 400 to 600 millimeters per year. After extremely high rainfall in the Colonization zone, and the Eastern Highlands, the moisture-free clouds move over the western mountain zone, leaving this in a classical rain shadow. The dry regions of the Salado basin are the source of 60 percent of the silt flowing into the Papaloapan.

The soils to the north are sandy and alkaline regosols, to the south, acid phosphate-fixing andosols. The Rio Salado has provided irrigation for centuries, and with modern improvements, is one of the most productive areas of the Highlands.

The western range consists of a series of heavily eroded escarpments: the Sierras of Tetzo, Mixteca and Nochixtlan, part of the Mixteca range of southern Mexico. Annual average temperatures are about 16° C. with wide seasonal and diurnal fluctuations. Frosts are common for about four to five months per year. This is a semiarid region, also lying in the rain shadow of the eastern range. The wet season is only two to five months long, with irregular rainfall averaging only 600 millimeters per year. As moisture declines with declining altitude, the vegetative covering becomes sparse and xerophytic. The cambisol soils here are very poor for agriculture. Furthermore, overgrazing and poor agricultural practices have led to severe erosion.

Highlands Economy

As can be surmised from the above, very little of the land in the Highlands is really adequate for agriculture, despite the fact that the majority of the people there are engaged in subsistence maize and beans farming. Coffee is the leading commercial crop, grown primarily in the Sierras of Zongolica, Huautla and southeastern Juarez. Wheat was once a big crop in the Mixteca and the Sierra de Juarez, but production is declining now that there are so many lower-cost producers elsewhere in the country. Wood is the principal product of most of the area--cut for paper, and sawlogs--and the collection of barbasco found in the woods is economically important. Some livestock is kept--primarily goats and sheep in poor condition and overstocked.

Fiber weaving is the most important manufacture of the area, with the Mixteca specializing in palm hats, the Canada in basketry and Villa Alta in hard fibers. There are considerable mineral resources, though few precious metals remain.

The population is still overwhelmingly indigenous, although the Spanish-speaking population has increased a lot in recent decades. This region has greater cultural diversity than anywhere else in Mexico, except possibly the Yucatan Peninsula. The Mixe are found in the south; the Zapotecs in Etla and Ixtlan, the Mixtecs in Nochixtlan and Etla, the Mazatecs in Teotitlan, the Cuicatecs in Cuicatlan, the Popolocas in

eastern Puebla and the Mexica-Nahuas in central Puebla.

The land use system is still the communal landholding village.

Despite major road building there in the last decade, the Highlands remain pretty isolated. During the rainy eason, many of these roads are impassable. The only railway connection is a narrow rail line through the Canada.

In 1973, Huautla was the only town with a population greater than 5000 in all the Oaxaca portion. The Veracruz/Puebla portion had four small towns with 5000 to 15,000. The area as a whole is losing population due to the lack of economic opportunities and social facilities.

Changes of different types have taken place in all these regions since 1947, when the Papaloapan Commission began its work. The following chapter describes the operations of the Commission and the different strategies it has chosen to deal with the multiple problems of poverty, underproduction and isolation in the Basin as a whole.

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CHAPTER 3. THE PAPALOAPAN COMMISSION

History

The first appeal to the federal government from the Papaloapan Basin came in 1941, when severe flood damages spurred leaders in Cosamaloapan to seek outside assistance. In response, in 1943, an Inter-Ministerial Commission made of members from the Departments of Communications, Agriculture and the Navy were sent to study the Basin. They recommended immediate works for the protection of the inhabitants, but due to lack of federal and ministerial interest, these recommendations were ignored.

In 1944, a hurricane hit the region, and the resultant floods caused some $30 million pesos worth of damage (worth $135 million 1974 pesos) to over 470,000 hectares in Tuxtepec, Otatitlan, Novillero, Cosamaloapan and Tlacotalpan municipios. One hundred lives were lost (2, p. 91).

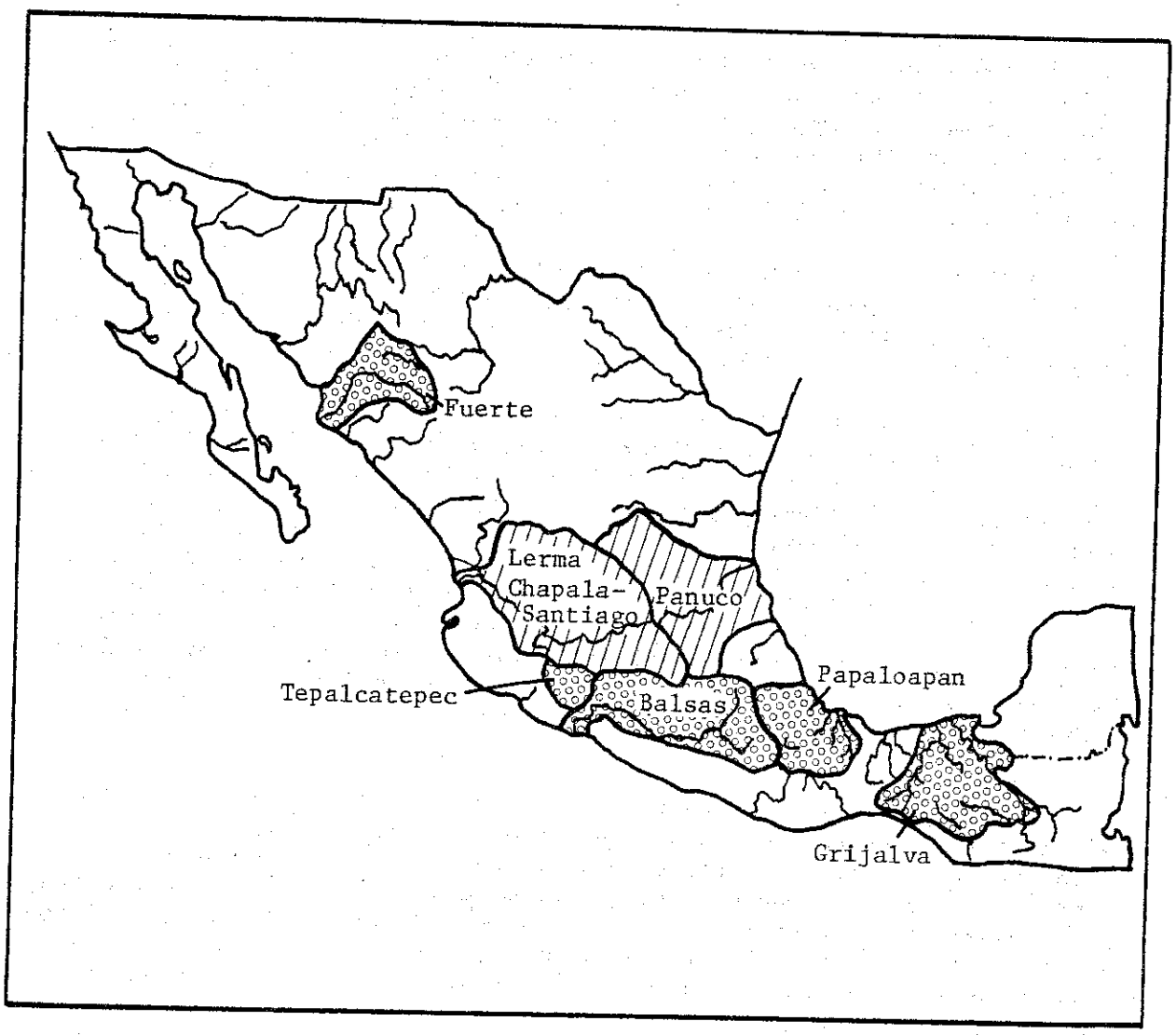
Forced to react by the size of the catastrophe, President Avila Camacho issued a decree in October of that year to authorize the National Irrigation Commission (CNI) and the Ministry of Maritime Works and Riverways to study the hydrologic problems of the Basin. Miguel Aleman, who became President of Mexico in 1947, had made as one of his campaign pledges the promotion of development in Veracruz, his native region. In spring of 1947 he created by Presidential Accord the Papaloapan Commission (henceforth called the Commission)--the first regional and first tropical development scheme in Mexico. The Accord was made law by the Mexican Congress in December 1951. The CNI had been made into a separate ministry, that of Hydraulic Resources (SRH) in December of 1946 (2, pp. 92-96).

It must be noted that at this time, Mexico was undergoing a period of expansion. As part of this, the expanse of tropical lands hitherto untouched was to be made prosperous. If one reads the literature of the time, one notes a strong element of optimism for the coming of a new era, particularly for the tropics. There was no body of knowledge at the time about the tropics, but the mere fact of its copious water supply--in a country whose agriculture had been plagued for centuries by drought--was sufficient cause for hope. The beginning of the Papaloapan Commission was soon followed by regional development commissions elsewhere in the tropics. See Map 3-1.

The Mandate

Although directly under Presidential authority, the Commission is in the Ministry of Hydraulic Resources, one of the most powerful ministries in the Mexican government. Its mission, however, was intended to go beyond hydraulic control. The Commission was to act as a general development authority, modeled after the Tennessee Valley Authority project in

MAP 3-1. RIVER BASIN DEVELOPMENT PROJECTS*



*Richard T. King, River Basin Projects and Regional Development (Dept. of Agricultural Economics at Cornell Univ.: Ithaca, N.Y., 1964), p. 75.

the United States. Its general goals, expressed by Adolfo Orive Alba, then Secretary of the SRH were: flood control, sanitary improvement, agricultural promotion via drainage and irrigation, electric power for industry, improvement of urban centers, improvement of the rivers' navigability and provision of adequate communications (2, pp. 100-101).

Presidential Policies 1947-1970

Jose Noriega was the first engineer to study the Basin, and to make specific guidelines for Papaloapan development goals. Considering the short time he spent analyzing the area, he came up with a very good treatise, which put together most of the known facts, particularly for the Lower Basin. He recommended that ultimately storage dams be built on the Santo Domingo River to avoid floods through the Papaloapan Valley to Cosamaloapan, and that relief basins carry excess water to the Ayutla or Tonto Rivers. Two storage dams on the Papaloapan, Tonto, Tesechoacan or San Juan Rivers were also recommended. The original plan called for expansion of land under cultivation through drainage of 570,000 hectares and irrigation of 220,000 hectares (1).

Noriega emphasized the need for communications improvements and particularly sanitary engineering, pointing to the Panama Canal as a tropical project whose success historically had depended upon creation of healthy living conditions.

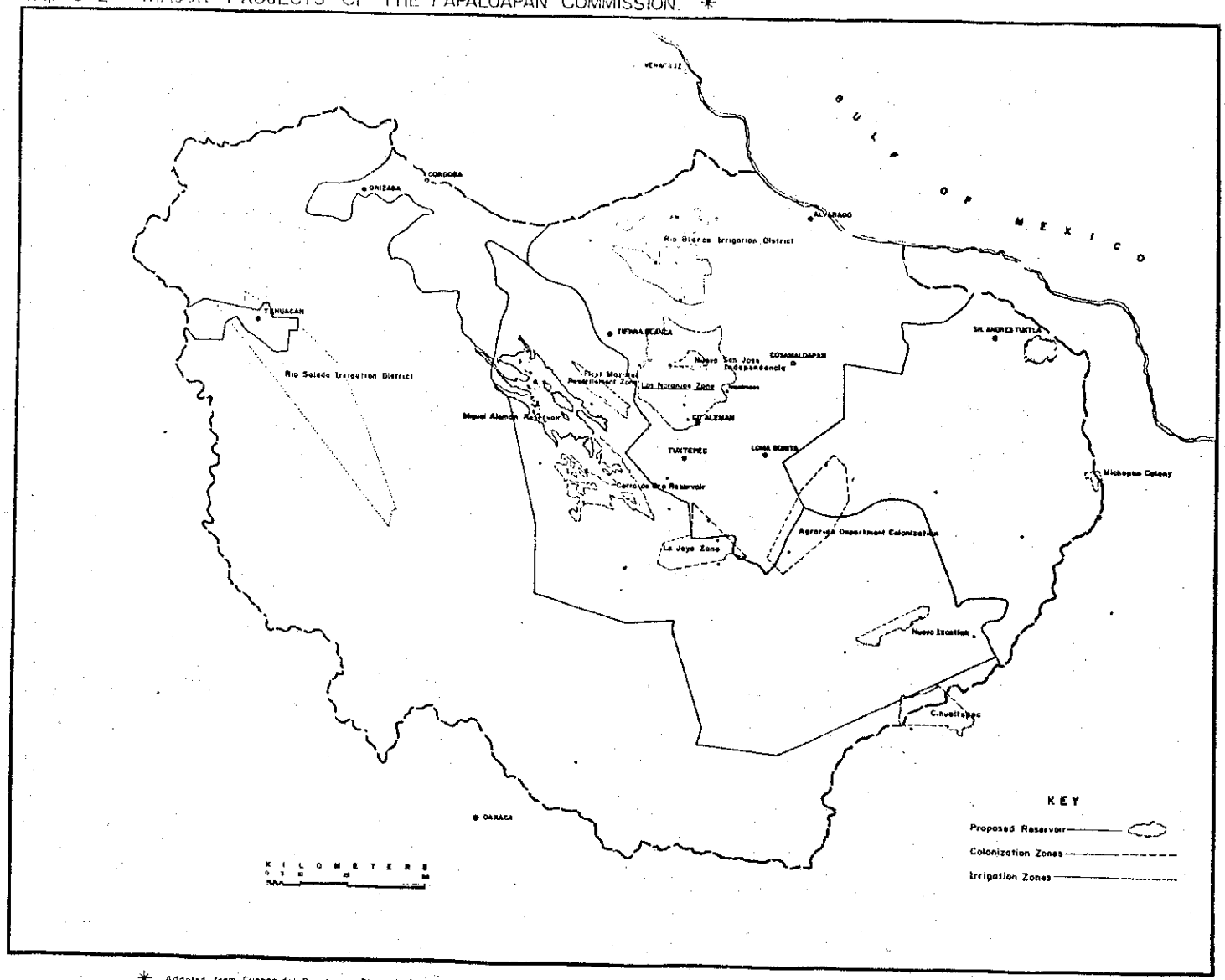
1947-1952

Map 3-2 shows the major projects completed by the Commission through 1976. During the Presidency of Miguel Aleman, the Commission enjoyed a hefty budget and strong support. As the region was of little interest to most ministries, the Commission enjoyed almost unrestricted freedom to take on any type of program it wished.

The program followed Noriega's recommendations rather closely. Graphs 3-1 and 3-2 show the trends of Commission budget and expenditures. In the budget of the first few years, half the money went to flood control, one fourth to roads, the rest mainly to health programs and construction of the Commission headquarters in Ciudad Aleman, Veracruz. These activities had a large impact primarily on the Lowlands Region.

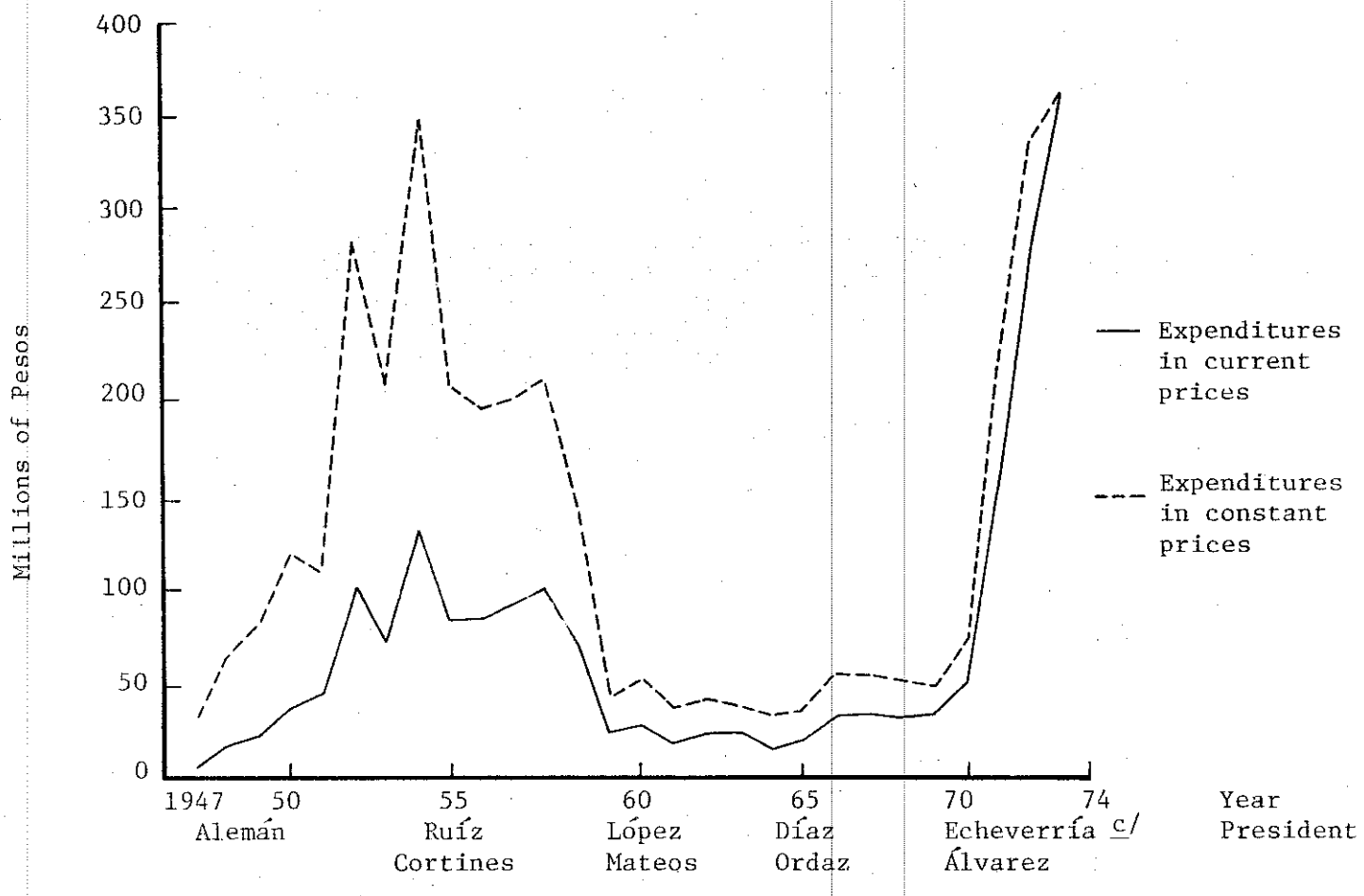
The first investments were all very large-scale, visible projects. Despite the lack of sufficient information for thorough project planning, construction of the Miguel Aleman Dam at Temascal, Oaxaca on the Tonto River was immediately initiated, with its accompanying hydroelectric power station. The first road built from La Tinaja to Ciudad Aleman was three lanes and paved, despite the virtual absence of any connecting roads along its length. The Commission headquarters itself is relatively lavish, with wide, paved streets originally designed for a city of 150,000 people. Today it is always deserted on weekends, as it is still inhabited mostly by Papaloapan Commission employees (2, p. 103).

Map 3-2 MAJOR PROJECTS OF THE PAPALOAPAN COMMISSION. *



* Adapted from Cuenca del Papaloapan Plano de Conjunto, December 1972

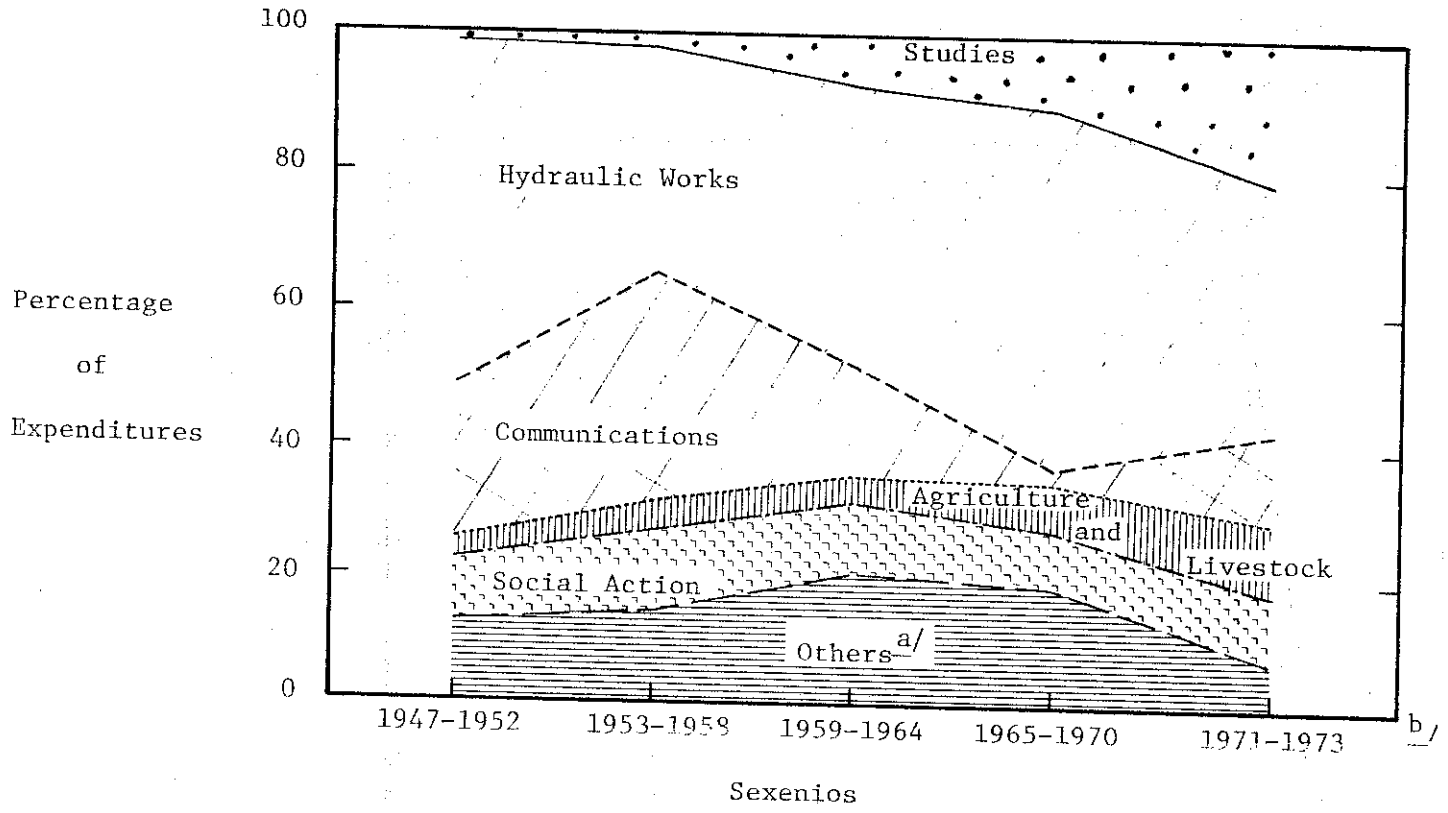
Graph 3-1: Budget of the Papaloapan Commission 1947-1974 (in current and real prices[a/] [b/])



[a/] Derived from price indices of the Banco de Mexico, S.A., with base 1954 = 100 for 1950-1974 data and with base 1957 = 100 for 1929-1957 data.

Continued on following page.

Graph 3-2: Distribution of Expenditures of the Papaloapan Commission 1947-1973*



* Mexico, SRH, Comisión del Papaloapan, Diagnóstico Socioeconómico de la Cuenca del Papaloapan, Febrero 1973, p. 183.

a/ "Others" includes administrative costs, payments for land, financial charges, vehicles.

b/ In 1974 and 1975, 8 and 19 percent of expenditures were used for the Integral Plan.

The health programs were directed mostly against malaria and onchocercosis. Plans were made for the massive resettlement of 22,000 Mazatec Indians from the Temascal area. Smaller projects included an irrigation system for 600 hectares in Michapan, Veracruz, defense works along the rivers and the dragging of Lake Alvarado. There was a big campaign to supply drinking water and sewage systems, mostly in Veracruz. Most of the Basin's small airfields were built in this epoch. In 1950, two agricultural experiment stations were established: La Granja on clay soils, and La Isleta on alluvial soils by the Papaloapan River, both in the Lowlands.

1953-1958

Money was also abundant during the Presidency of Ruiz Cortines. Experimentation in program execution was encouraged, and emphasis began to move away from large infrastructure projects.

In late 1955, a plan was preented for a coordinated approach to development, which was scheduled to be completed by 1970. Its goal was to intensify use of virgin or extensively utilized lands into the tropical areas through colonization and credit programs, and to spread more widely the benefits of education and sanitary engineering. But until 1957, when the dam was finished, only the resettlement program had any budget with which to incorporate the new ideas.

Irrigation works in Rio Blanco, Los Naranjos, Rio Salado and Tepelmeme were constructed and the biggest expenditures ever were made on schools and drinking water facilities.

A good program might have been put together, but in 1957, the Executive Director of the Commission who had been responsible for much of the dynamism of that era, was killed in an airplane crash. This coincided with a growing antagonism toward the Commission from outside ministries who were worried that their "territories" were being invaded. The change of leadership offered a good opportunity for them to make their feelings known and an important cutback in the powers of the Commission came about (2).

In 1957, the agricultural research stations were turned over to the Ministry of Agriculture and Livestock (SAG); in 1958, the health campaign was moved over to the Ministry of Health (SSA). Credit and colonization programs were soon drastically curtailed--with very sad results for the participating campesinos. During the last two years of the Ruiz Cortines administration, over half the budget was devoted exclusively to road construction (2, p. 109).

By contrast with the two prior presidents, Adolfo Lopez Mateos showed little interest in the Papaloapan Commission, in keeping with his general shift to investment in the North and North Pacific. There was a sharp decline in the budget, with very little new investment, and a large cut in staff took place. Much emphasis was put into studies for the time when money would come (6). In 1959, the reearch stations were returned

to the Commission, but little important work was done. In 1962, road construction responsibility shifted to the Ministry of Public Works (SOP) and after 1963, the only roads built by the Commission were those directly related to other projects.

The Commission did some work in promoting rubber production, and irrigation works in Rio Blanco and other small areas were completed.

The administration of Diaz Ordaz brought few new programs. In 1966 the Commission was reorganized, and in 1967, the branch of Rural Development was added to complete the present administrative structure. There was some more work on irrigation and sanitary facilities. A program for the Upper Basin was begun, through a series of small-scale projects (8).

Summary of Works through 1970

The work done by the Papaloapan Commission emphasized development of the Lower Basin, particularly the "Lowlands." Infrastructure works--hydraulic and communication--make up roughly two thirds of total expenditures. Most sanitary facilities, urban works, and most of the irrigation sites were in the Lowlands. The agronomic reearch that was done mainly reflected conditions there.

Other than minimal road-building, little was done in the area of the Tuxtlas. The same was true for the Industrial Region.

The Colonization Region was opened up only by a very poor road system; most of the investments there had to do with colonization. In general, the directed colonization schemes were never completed as planned. Even for the Mazatec resettlement, only half of the families were settled under government programs, and then with many problems.

The Highlands regions were connected by some all-weather roads. The Rio Salado District irrigation was vastly improved, and some small-scale irrigation developed elsewhere. The agronomic research stations managed tree nurseries for the Upper Papaloapan. There were a few reforestation efforts including plantings of nopal and ornamental and fruit trees. Under the soil conservation program, 9000 hectares were affected in Coixtlahuaca, Tepelmeme, Suchiztlahuca and Nochixtlan Oaxaca. In general, floodplain control has been emphasized over siltation control in the highlands.

At no time were direct agricultural programs important except for the very short period during the Ruiz Cortines sexenio, and these were excessively paternalistic and based on no great store of agronomic information. Indeed, probably the greatest lack in the Commission's program over the years was that, while there was a wealth of hydrologic, climatologic and engineering studies, there was very little of the basic reearch on natural resources, soils, etc., that is necessary for adequate long-term economic planning.

One of the most important constraints on Commission activities, however, was the noncontinuity occasioned by the changing administrations, changing budgets and objectives.

Programs of the 1970s

New life came to the Papaloapan Commission with the Presidency of Luis Echeverria Alvarez, who strongly emphasized rural development. The budget during this past sexenio reached the highest ever.

Partly, this was the result of the big flood in 1969: in the Lowlands which illustrated graphically the fact that the Papaloapan Project had not been completed. The flood devastated the left margin of the Papaloapan River. Thus, as the Commission got back to work, their first priority was, again, to build a dam. However, after almost ten years of studies and planning, the program expanded in other directions as well toward integrated rural development and economic diversification.

The Cerro de Oro dam over the Santo Domingo river is expected to be finished in the early 1980s. Its reservoir will join that of the Aleman Dam, to form the largest man-made lake in Latin America, with a 13.38 billion cubic meter capacity. The resettlement program for the 2500 Chinantec families who now live in the Ojitlan reservoir area is quite extensive. 10,000 hectares which were formerly virgin jungle, have been prepared for collective agriculture in Uxpanapa, Veracruz; an equivalent area is being prepared near Los Naranjos, which is to be irrigated.

The Integral Development Plan for the Papaloapan was begun in 1974, with funding from the World Bank. The program is divided into two parts. The rainfed agriculture project has the goal of reaching some 22,000 farmers in the Upper Papaloapan and 78,000 in the Lower Basin, to technify staple food production. In 1975, 4000 farmers participated. The irrigated agriculture program includes work in the Salado and Blanco systems, and wells in Esperanza and Palmar de Bravo. Technical assistance, basic research, access roads and storage warehouses are also included in the project. Social infrastructure--with electricity, drinking water, sewage, schools, medical and community centers--is aimed at improving general welfare in the rural areas. Both the Plan and the Uxpanapa project exhibit an unprecedented degree of interest on the part of the Commission in direct agricultural activities.

The Commission has also begun to focus more on the nonagricultural potential of the Basin, with programs for increasing tourism, fishing, and industry. Among the latter type, the most important has been direct involvement in pineapple and other fruit canning, and coordination with new state- and federally-sponsored manufacturing plants.

Do the present plans reflect an understanding of the forces that have fostered development in the past, and the changes of the present? In the following chapter, we try to describe what kinds of changes have

taken place, what was accomplished--and what was not--by the various policies of the government. A series of case studies follow which examine more closely the instruments, policies and circumstances which were most responsible for local dynamism, as well as patterns of employment and distribution of the benefits from change.

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9 Alfredo Marrón Vimbert, "El Proyecto Cerro de Oro" (draft mimeo report submitted to Comisión del Papaloapan, 1976).

10 Interview, Manager, Complejo Frutícola Industrial, Loma Bonita, Oaxaca, July 1977.

11 Mexico, Secretaría de Recursos Hidraulicos, Dirección General de Estudios, "Estudios sobre proyecto para el control de Río Papaloapan" (mimeo June 1976).

CHAPTER 4. CHANGES IN THE PAPALOAPAN BASIN

Our focus in this study is on four of the most dynamic localities in the Papaloapan Basin, and the details of their development. To provide a background against which their growth could be compared a more general analysis of change in the Basin is necessary.

To quantify the transformation that has taken place is somewhat difficult. Even the Papaloapan Commission has neglected the importance of keeping accurate, meaningful indicators of change. Hence, some of the standard indices are not available. What data has been collected has most often been lumped into categories by state or the Basin as a whole, rather than by smaller more homogeneous regions. Attempts have been made by several Commission economists (Attolini, Duarte, PLANPA designers) to make such a regionalization, but none has come into standard use. Here we use the divisions introduced in Chapter 2. The Tuxtepec case study zone lies in the Lowlands; Isla in the Tuxtlas; Abasolo del Valle in the Colonization zone; and Ixtlan in the Highlands.

The national Population Census has been the primary source of data for this chapter on all social indicators, particularly the Compendia printed by the Commission summarizing data for the Basin (1950, 1960). Historical data for agricultural and livestock production was provided by the Commission's Department of Economics. Further, there was a wealth of disparate sources covering many topics to be found in the Commission archives, if one dug hard enough to find them.

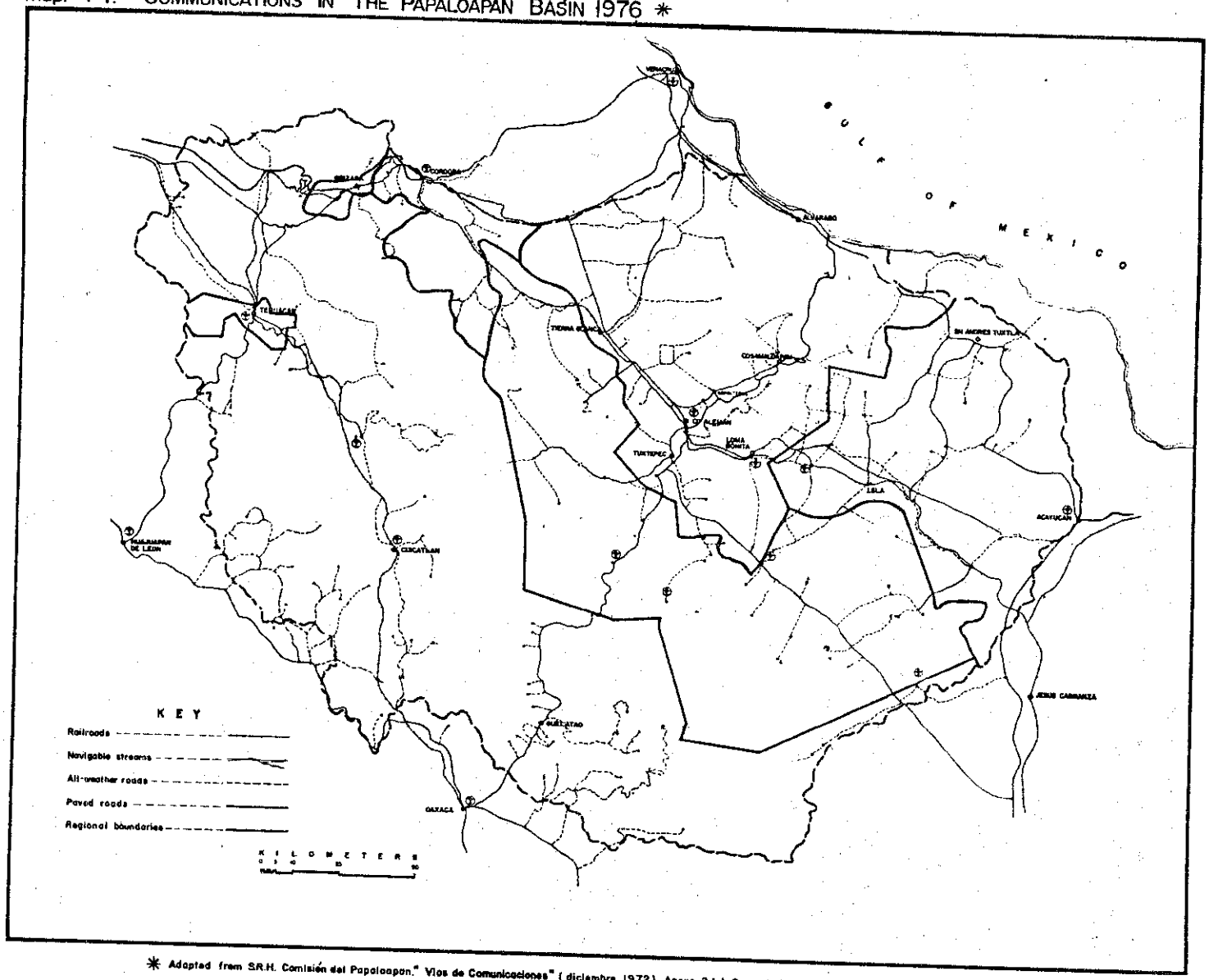
The Bank of Mexico did an Input-Output Matrix for the Basin in 1963 and 1970 which was somewhat useful, but like too many of the economic studies done on the Basin, spent too much effort spewing forth numbers and too little analyzing what happened and why.

Absorption into the National Mainstream

Possibly the single greatest change for the Basin dwellers in the past few decades has been in communications. Every region is now served by at least one major highway and a widening net of telecommunications. Compare Map 4-1 of the Basin 1976 with Map 2-7 on page 26.

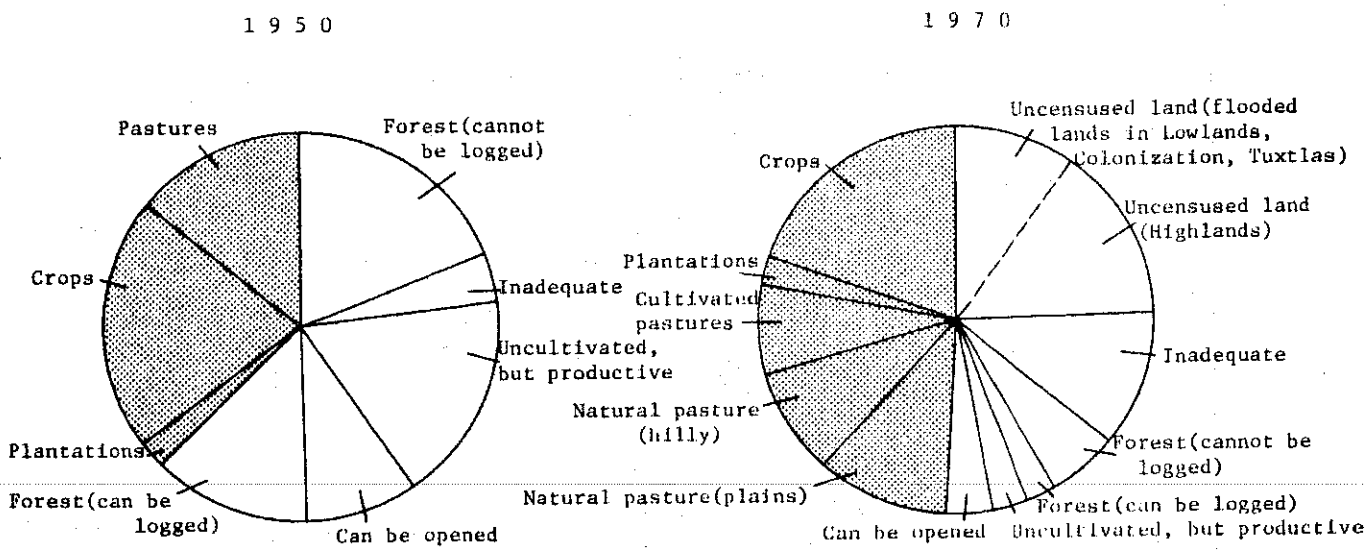
Before 1947, there were no first-class roads at all, only rather inefficient train service. By 1973, over 4000 kilometers of roads had been built, and nearly half had been paved. It is difficult to overemphasize the role that improved communications have made. Where there are roads, there is progress; where there are not, signs of progress are hard to find. Roads have opened markets, allowed farmers to deliver their harvests, permitted extensive inexpensive travel opportunities. The opening of huge tracts of land to commercial production followed the building of roads. For most industrial concerns, they were vital.

Map. 4-1. COMMUNICATIONS IN THE PAPALOAPAN BASIN 1976 *



* Adapted from S.R.H. Comisión del Papaloapan." Vias de Comunicaciones" (diciembre, 1972), Anexo 2.1.1 Corrected to December 1976.

CHART 4-1. CHANGES IN LAND USE IN THE PAPALOAPAN BASIN*

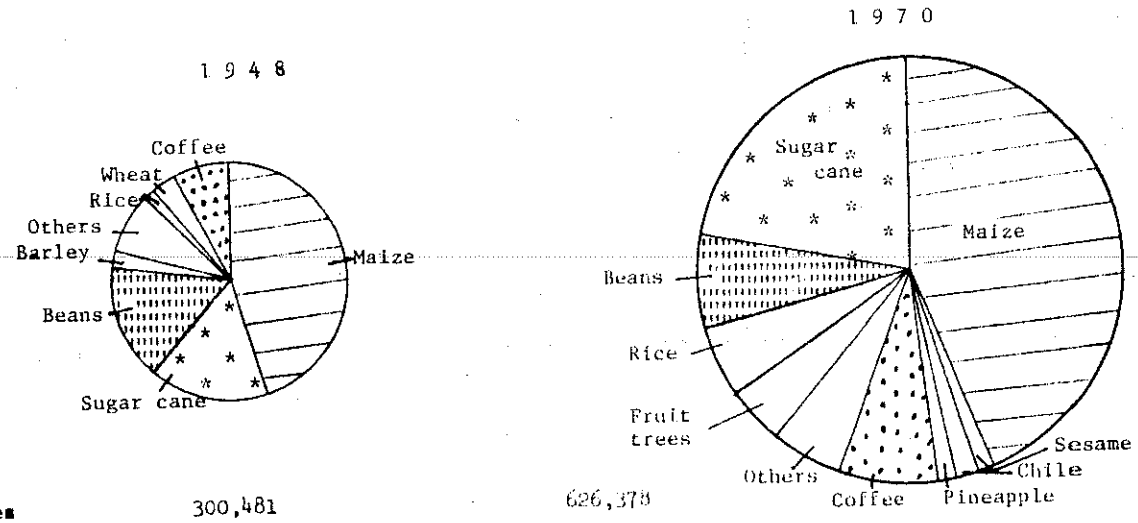


TOTAL: 4,600,000 hectares

Cultivated land

* Mexico, SIC, Censo Agrícola y Ganadera, 1950 and 1970 (published in 1955 and 1975).

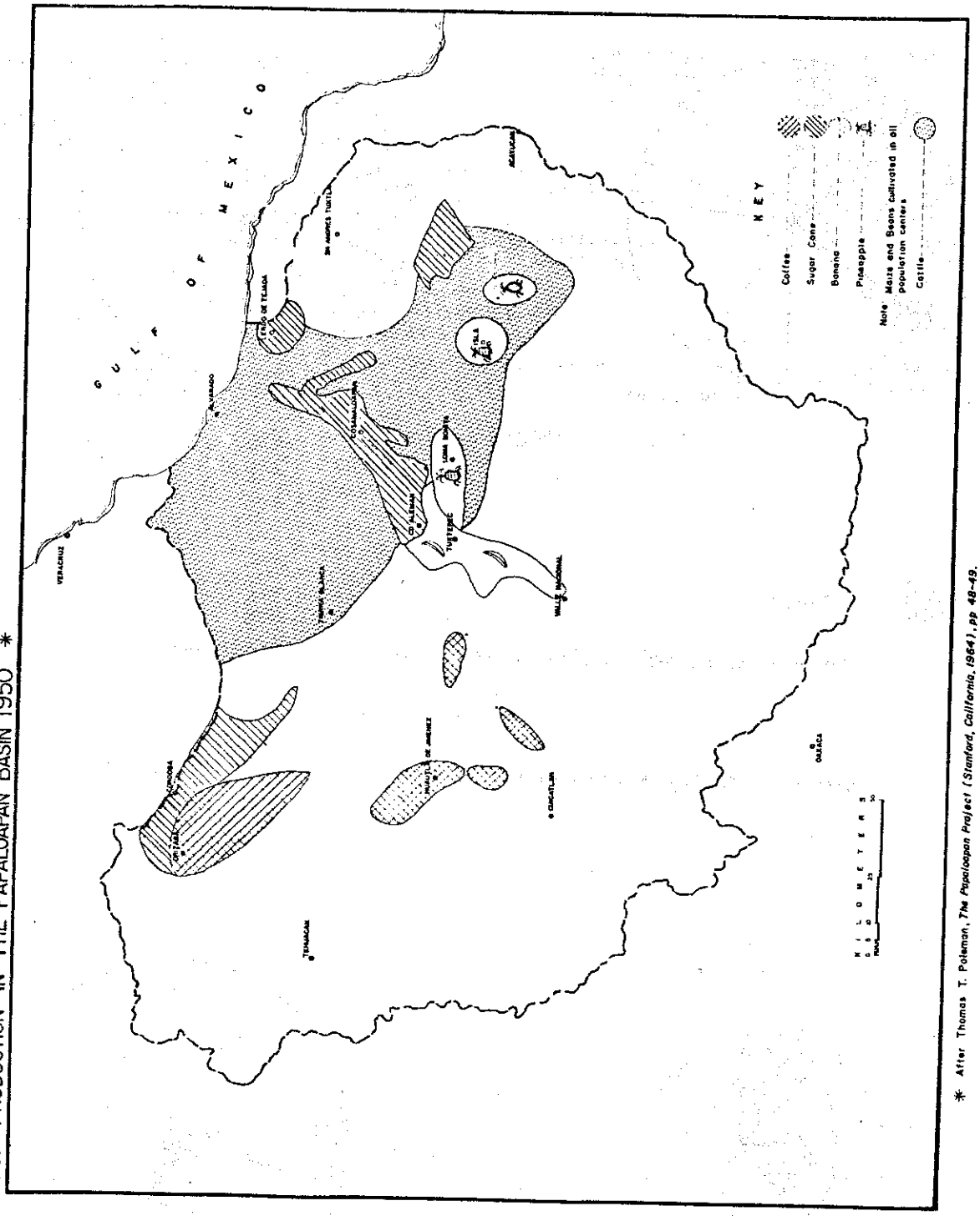
CHART 4-2. CHANGES IN CROP COMPOSITION IN THE PAPALOAPAN BASIN, 1948-1970†



Hectares 300,481 626,378

† Data from SRH, Comisión del Papaloapan, Departamento de Desarrollo Rural, "Cuenca del Río Papaloapan - Superficie, Cantidad y Valor de la Producción Agrícola 1948-1970" (Chart No. 3), 1976.

Map 4-2.
CROP PRODUCTION IN THE PAPALOAPAN BASIN 1950 *



* After Thomas T. Poleman, *The Papaloapan Project* (Stanford, California, 1964), pp. 48-49.

Trade and Services. In 1947, the level of Basin trade with the rest of the country and world was pretty well defined by figures on rail movement and some foreign export by river and sea of tobacco. By 1970, however, the vast majority of exchanges of goods and services involved trade.[1] About two thirds of all trade outside is with the rest of the Republic; the remainder is split between exports and sales to neighboring parts of Veracruz, Puebla and Oaxaca.

Trucking, in particular, has increased with the opening of the roads, and has almost entirely replaced rail, and river transport. Two thirds of all transportation value for 1970 came from the trucking industry; only 13 percent from the railroad.

Expansion of Land Farmed and Production

The Basin's major role in the nation's economy has traditionally been as an agricultural producer. The primary aim of the Papaloapan Commission was to develop its agricultural potential, particularly through flood control works, and indirectly through making the Basin a more attractive place for farmers to live, by inspiring marketing improvements, e.g., roads.

Some statistics of change are fairly impressive. In 1948, only 300,451 hectares were being cultivated (only a third of censused cropland), primarily along river valleys. By 1970, 626,378 were under cultivation--more than double. Charts 4-1 and 4-2 show the general changes in land use and crop composition. About 37 percent of the land area was being exploited in some way in 1950; 50 percent in 1970--an increase of nearly 70,000 hectares, not to mention the fact that production has intensified significantly. There have essentially been no major changes in the type of produce coming out of the Basin. As roads were built--particularly to areas already having significant production--permanent agriculture with more modern technology became feasible and remunerative, replacing subsistence slash-and-burn cultivation. The value of production rose about 4 1/2 times between 1948 and 1970.[2]

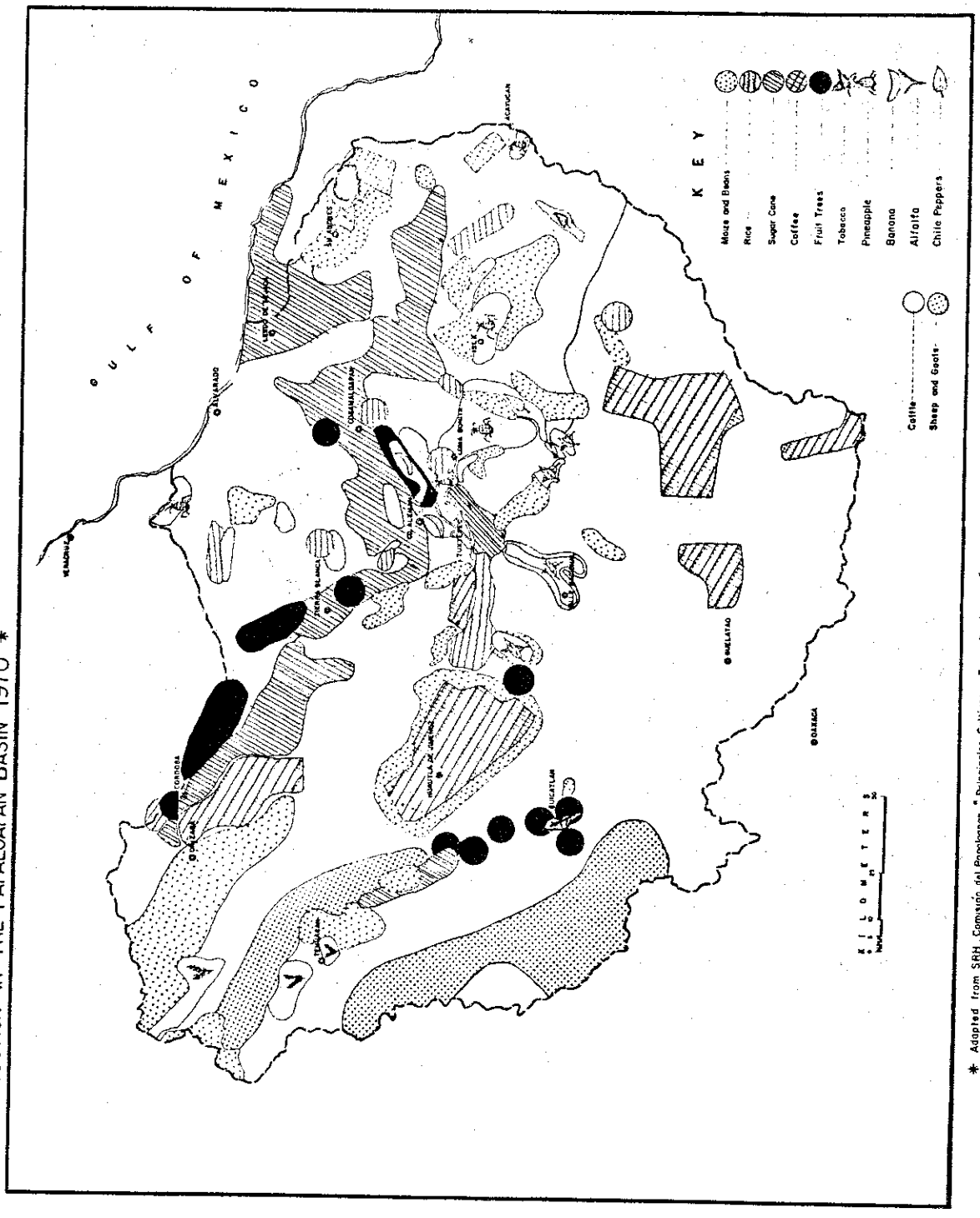
Meanwhile, livestock production has become even more important than it was historically, with the herd size tripling over this time period. Since there was little intensification of livestock production, far more cattle land than cropland was opened for exploitation. Maps 4-2 and 4-3 show the distribution of production in 1950 and 1970.

---

[1] By the Input-Output Matrix, sales and purchases inside the Basin amounted to only $388.5 million in 1970; sales outside were $6882.3 million and purchases outside the Basin $4568 million--leaving a trade surplus of $2354.3 million.

[2] Using 1974 pesos, the 1948 value ($161,491,000) is worth $65,403,855,000; the 1970 value ($1,922,533,000) is worth $290,302,483,000.

Map 4-3.
CROP PRODUCTION IN THE PAPALOAPAN BASIN 1970 *



* Adapted from SRH, Comisión del Papaloapan, "Principales Cultivos y Zonas Productoras" (Diciembre, 1972), Anexos 3.11 and 3.12.

The Industrial Region

In the 1940s, the Industrial region was still highly dependent upon agriculture, and about half of the commercial agricultural production of the Basin--particularly in coffee and sugar cane in the Cordoba/Orizaba zone--was from there. Wheat production was beginning to increase in the drier Tehuacan area. Two thirds of the population there lived in rural areas, deriving subsistence from farming.

There were few changes in the 1950s, but in the 1960s, there was a big increase in population and some important changes did occur. There was a drastic decline in maize production, mostly because of price declines and the marked increase of sugar cane. There was a dramatic increase in coffee production, as the crop was found to be particularly suited to the area. Barley production for the local beer factories remained pretty stable.

Because of the comparative abundance of work opportunities in industry and services, subsistence production in general has declined here. Nevertheless, technology is not particularly advanced. Chart 4-3 shows the major characteristics of the zone.

The Lowlands Region

In the 1940s, that portion of the Lowlands right along the Papaloapan and Valle Nacional rivers was the most important locus of commercial agriculture. Crop production was primarily sugar cane north of Tuxtepec, bananas south of Tuxtepec and pineapple to the east. The northern reaches and the nonalluvial land was in extensive cattle holdings. Most of the commercial crops were grown on large private plantations.

The alluvial area is still the most commercialized zone. It contains over half of total rice and cane area in the Lower Basin, and the major part of the mango and plantain crops.

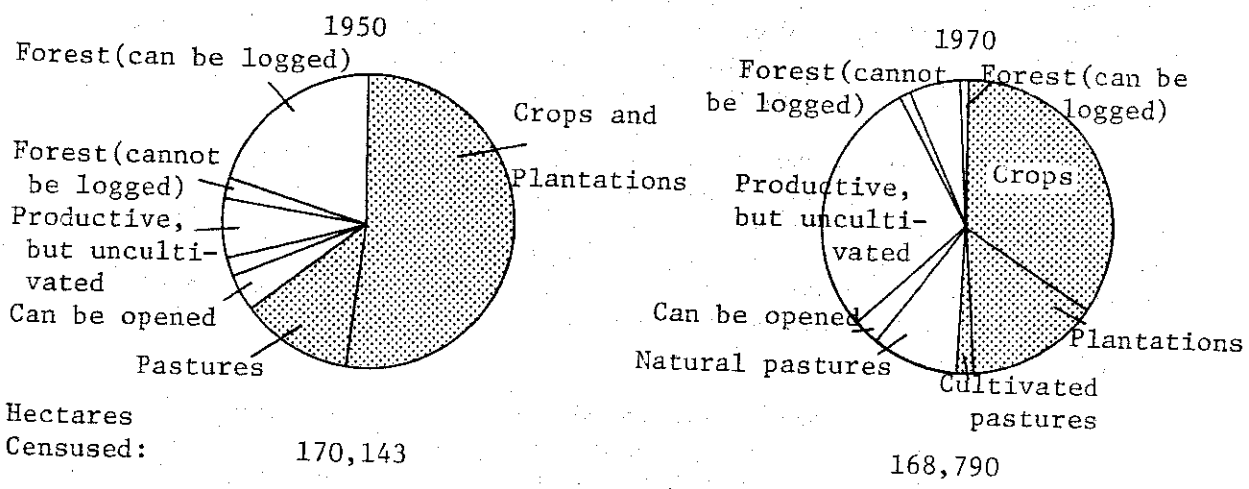
The Lowlands has experienced the most dramatic changes in agriculture. In 1970, half the land was being cultivated, compared with a quarter in 1950, as shown in Chart 4-4. Although maize production increased during the 1950s (mostly on the newly-formed ejidos), commercial maize was significantly replaced by supplies from the Tuxtlas. Production remained stable in the 1960s. Most is tonalmil production; a third of the land is in hybrids.

Rice production has steadily been growing. Highest yields are in the spring/summer cycle, although double cropping and winter cropping are very common.

The most important crop of the Lowlands is sugar cane. The first growth spurt was in the 1950s, as roads opened up Tierra Blanca and Los Naranjos. Lerdo experienced its surge in the 1960s. The peak coincided with increased demand from the United States market after relations were

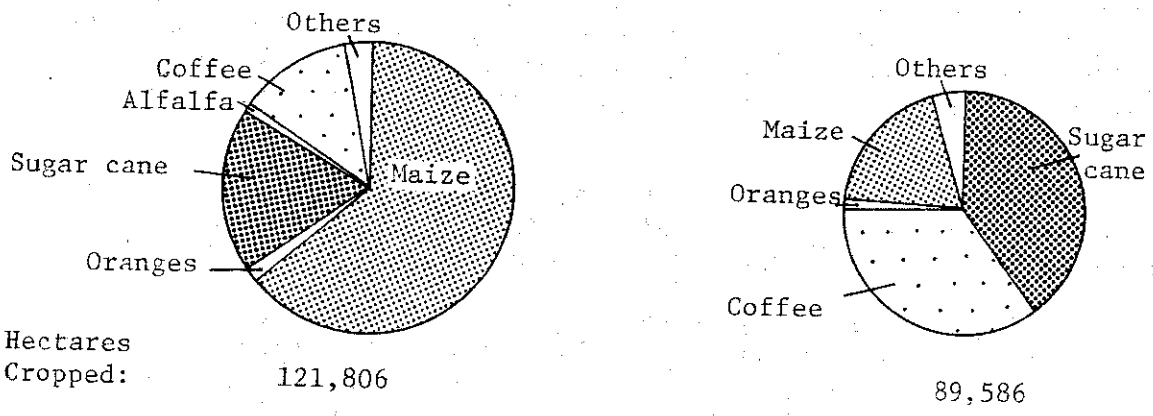
CHART 4.3. CHARACTERISTICS OF AGRICULTURE IN THE INDUSTRIAL REGION*

L A N D U S E



* Mexico, SIC, Censo Agrícola y Ganadero, 1950 and 1970, (published in 1955 and 1975).

C R O P C O M P O S I T I O N

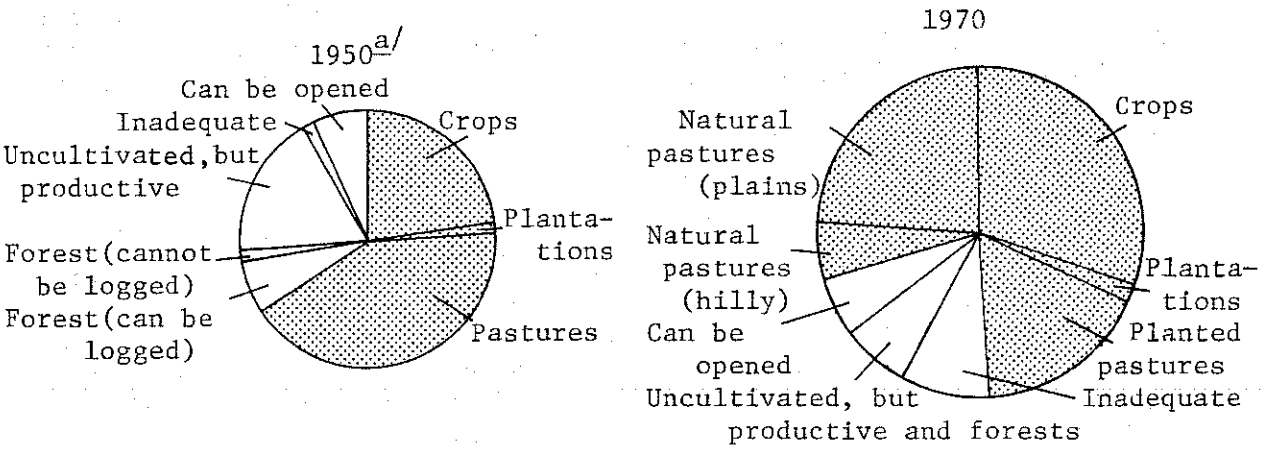


a/Of annual crops harvested in: Winter - 10,268; Spring/Summer - 8589.

* Mexico, SRH, Comisión del Papaloapan, Preliminary Data from the Censo Agrícola y Ganadero, 1970; and "Cultivos, 1961."

CHART 4.4. CHARACTERISTICS OF AGRICULTURE IN THE LOWLANDS REGION*

L A N D U S E

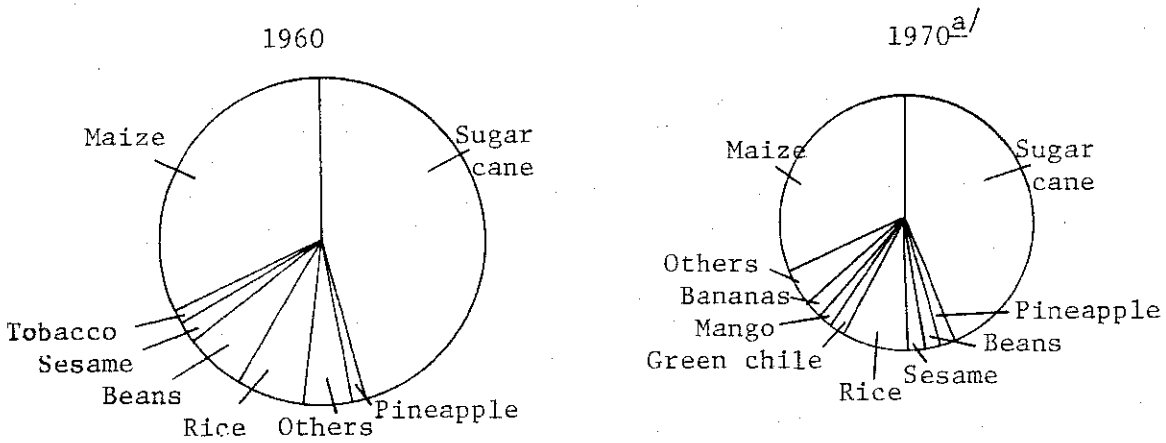


	1950	1970
Hectares Censused:	626,359	791,000

a/ Does not include the municipios of Tuxtepec.

* Mexico, SIC, Censo Agrícola y Ganadero, 1950 and 1970, (published in 1955 and 1975).

C R O P C O M P O S I T I O N



	1960	1970a/
Hectares Cropped:	158,593	140,788

a/ Of annual crops harvested in: Winter - 38,093; Spring/Summer - 30,410 hectares

* Mexico, SRH, Comisión del Papaloapan, Preliminary data from the Censo Agrícola y Ganadero 1970; "Cultivos 1961."

cut off with Cuba. As the economy started to diversify around the Tierra Blanca/Cosamaloapan zone, and cane prices stagnated, many farmers moved land out of cane in the 1960s, to rice, fruit trees or cattle.

Cane is popular for several reasons. It is adaptable to short-term flooding. It is a high security crop because of the close contacts with the mill which provide most management decisions, inputs and credit, and sometimes the producers are eligible for social security benefits. The giant San Cristobal mill was nationalized in 1970.3/ Less than a third of the Basin's mills are now in private hands.

Bananas are produced on nonflooding alluvial soils. Production rebuilt slowly after the disaster of the 1930s, and is now based on varieties. Pineapple in the 1940s was on a very small scale. In the 1950s, the reconstruction of the railroad and use of refrigerated cars to transport the fresh fruit, plus association with American canneries brought a successful epoch. Most production is on ejidos, although during the 1970s, more private ranchers entered into production.

Cattle production was always important to the Lowlands, although it had stagnated with the land reform in the 1930s and 1940s. Herds grew slowly until the 1960s, when total cattle numbers doubled. Production is characterized by problems with a very long dry season on the one hand (Tlalixcoyan, Loma Bonita) and with flooding on the other (Lerdo, Cosamaloapan, Tlacotalpan, Tuxtepec). Many of the larger ranchers have properties in both areas, and move their cattle accordingly. They often rent land not used by ejidatarios, who are at a disadvantage with a single parcel of land. Rearing operations predominate, but milk and beef production has gained in importance recently.

Fishing activities have expanded in the last decade. Eight thousand tons of seafood were produced in 1973. There are four fishing co-ops in Alvarado4/ with 400 members, plus three around the Aleman Reservoir, and one in Tlacotalpan for the Papaloapan River. There are several thousand free fishermen as well. Aquaculture stations are found in Temascal and Tlacotalpan.

Water Control. Flooding has been a problem in the region, particularly on the right margin of the Papaloapan river. Taking two annual seasons together, there is a one-in-five chance of a zero crop because of flooding. The Commission's flood control program did much to stabilize river bank agriculture and replace part-time grazing land with crops. The Miguel Aleman Dam prevented major flooding in the high rainfall years of 1954 and 1955.

3/The mill had financial difficulties. But with $750 million pesos in capital, 1000 employees, 8000 farmers, and 20,000 canecutters involved, the government could not allow it to fold.

4/In 1976 there were over 1000 private fishing boats in Alvarado. Productos Pesqueros Mexicano had 135 small modern fishing vessels.

Despite these works, the total damages from the 1958 and 1969 floods were far more serious than before the flood control works. In 1969, 340,000 square kilometers were flooded, with damages (in real terms) reaching M$443 million, compared to $123 million on 470,000 hectares of the 1944 flood.5/ Without the dam it is estimated that there would have been severe floods every six to ten years. However, increased production has not yet brought high returns to the investment.

Irrigation works were undertaken in the Rio Blanco area of the Lowlands on 13,000 hectares in 1954. Seven thousand hectares of the district are now operating; in 1970 it was hardly in use at all. Presently, the district, with its double-cropping of rice is adding significantly to production, although much of its resources are being wasted on pasture for extensive cattle operations.

Irrigation has been planned for years for 1000 hectares in the Los Naranjos area, but so far there have been no results. The initial plan was dropped in 1957 after experimentation with 350 hectares. An attempt was made in 1957 to carry out a drainage project of 3000 hectares near Tlacotalpan, but it was abandoned as noneconomical. There are presently some pilot projects for drainage going on in anticipation of the Cerro de Oro project.

Colonization. As mentioned before, most of the population growth in the Lowlands came about through substantial spontaneous colonization in the earlier years. There was only one important directed colonization scheme, in Los Naranjos, for resettlement of Mazatecs from the Aleman Reservoir area (shown in Map 3-2, on p. 38). A practically uninhabited and uncultivated area of 22,000 hectares was expropriated. The first colonists arrived in 1952 (417 families on 3300 hectares), and by 1954, five colonies were set up--Zapata, Oaxaca, Los Naranjos, Resumidero and Independencia. The program involved complete land clearing and preparation, housebuilding, a directed credit program and mechanization, except in Resumidero, a religious-based colony which was provided only with land.

By 1956, however, almost half the families had left or been expelled, and the majority of loans were left unpaid. In mid-1957, the Commission's credit program was drastically curtailed. Unable to pay off their accumulated indebtedness, most colonists were forced to leave. The land was resold to Veracruz cattlemen. A second colonization attempt was made soon after with 35 families from Durango, of which 20 left the first year. Today, only Resumidero and small parts of the others are operating. The land is intended now for resettlement of the Chinantecs from Cerro de Oro.

5/The current value of damages was $30 million. The real value is in 1969 pesos, according to Commission conversion tables. Of the 1969 losses, 40 percent were in agriculture, 20 percent in cattle. Over 8000 ejidatarios and 2000 small property owners were affected.

Land Tenure. Land tenure is still a big problem in the Lowlands. Particularly much land around Cosamaloapan, and Tlalixcoyan is still in very large cattle holdings. In the Tuxtepec area, holdings are individually smaller, but many ranchers own a number of them. In order for cattlemen to go into farming, they must divide their land into two plots and get separate inaffectability certificates for each. There were, however, a number of ejidos created during the 1960s, and today the area around Loma Bonita and Lerdo particularly have a preponderance of ejidos.

Technology. Crop technology in the Basin is probably most advanced in the Lowlands, where there is highest use of outside inputs. While in 1949/50, there were fewer than 250 tractors in the lowlands--used mostly to haul cane during harvest, by 1970, there were nearer 2000. Technology in livestock production is still fairly limited to changes in pasture varieties, simple health care and some improved breeding.

The Tuxtlas Region

Chart 4-5 describes Tuxtlas agriculture. Back in the late 1940s this region had only a few spots of commercial cane production around Hueyapan, with pineapple in Isla and Rodriguez Clara. By 1970, the area had become the Basin's maize granary and center for beans and chile production, and as important as Loma Bonita in pineapple. Almost all the beans are intercropped with maize. The tonalmil season production of maize is most important. Crop composition in the area has diversified over the years with rice, coffee, sesame and tobacco.

Over half of the land is now worked, compared to a third in 1950. Slightly more land is in crops than in cultivated pastures. Of all the regions except the Colonization region, the Tuxtlas is the most agricultural, with about half of its gross product and personal income from this sector.

Cattle production in the Tuxtlas is growing steadily, and where there is water, the land is particularly opt for it. From 1960 to 1970, cattle land increased about 60 percent. The zone has neither flood nor drought problems for the most part. Milk production is more common here than in the other regions.

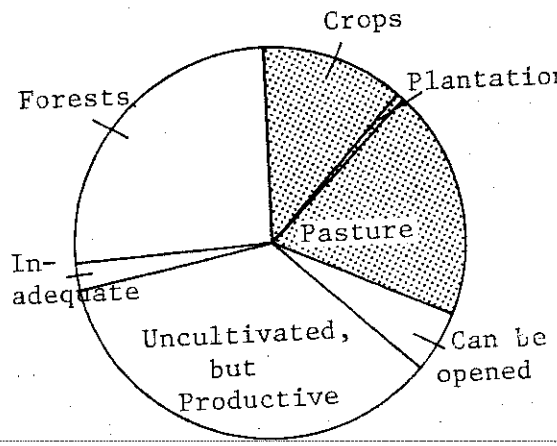
Until recently, there were very few government programs involving the Tuxtlas. Perhaps because of this, recent agricultural programs have met with more success here than in most other parts of the Basin.

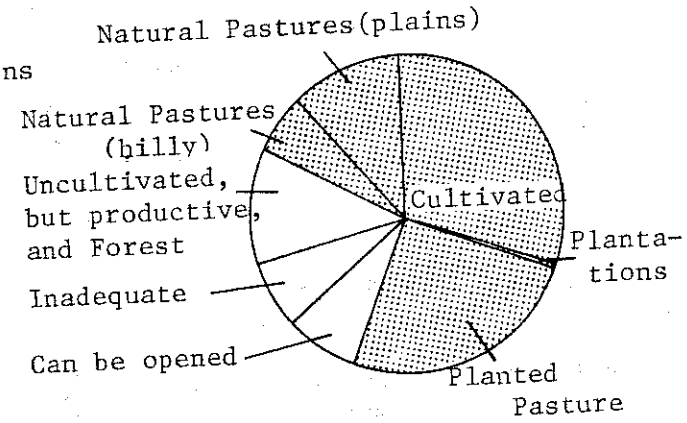
Apart from traditional agricultural production, there is a growing fishing center at Lake Catemaco, and barbasco collection plays an important role in local incomes.

Almost all new settlement of the Tuxtlas area since the 1930s has been spontaneous and, as will be mentioned in the section on demography, amazingly rapid. The only direct colonization program here was in Michapan, an area of about 1400 hectares north of Acayucan. It was

CHART 4.5. CHARACTERISTICS OF AGRICULTURE IN THE TUXTLAS REGION*

L A N D U S E

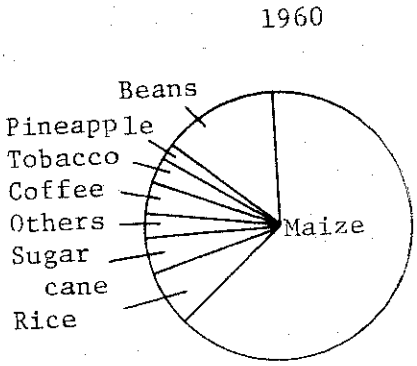


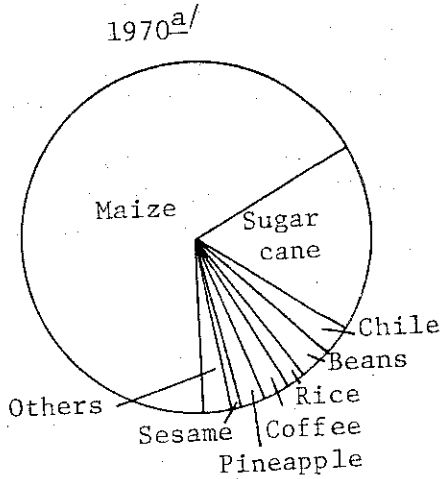


Hectares Censused: 747,359 608,684

* Mexico, SIC, Censo Agrícola y Ganadero, 1950 y 1970, (published in 1955 and 1975).

C R O P C O M P O S I T I O N





Hectares Cropped: 93,658 106,618

a/ Of annual crops: Winter cycle - 38,592 hectares; Spring/ Summer - 57,320 hectares.

* Mexico, SRH, Comisión del Papaloapan, Preliminary Data of the Censo Agrícola y Ganadero 1970; and "Cultivos, 1961."

destined for five percent of the resettled Indians of the Aleman Reservoir, and also originally had an irrigation program which was dropped. By 1956, 80 families in a single colony were cultivating almost 900 hectares. Roughly the same program as in Los Naranjos for clearing, setting up urban centers, credit and mechanization was in effect. But the credit situation here was also difficult, with only fifty families considered decent credit risks for the following year.

The level of technology in the Tuxtlas is still quite low, although mechanization and use of fertilizers has gained momentum in the 1970s. This is one of the major foci of the PLANPA program and so far Commission technicians are quite excited about its agricultural potential.

The Colonization Region

In 1950, the Colonization region was very sparsely populated and was served by no permanent type of communications system. There was almost no commercial agriculture here. As the area has been colonized and some roads built, there has been a notable rise in production of both subsistence and commercial crops, shown in Chart 4-6.

A little over a third of all the land was being cultivated in 1970. Two thirds of this was cropland in 1970, but apparently by 1976, ranching had gained in importance. Cattle numbers increased 2 1/2 times between 1960 and 1970. About three fourths of personal income still comes from the agricultural sector, and there has been only a minor decline in this percentage since 1960.

The major crops are maize, coffee, rice, sesame and tobacco. Particularly rice and coffee have shot upwards in importance. The '60s was a period of relatively important diversification of products, however. Maize and beans intercropped are predominantly found in tonalmil production. Rice is grown in both agricultural cycles.

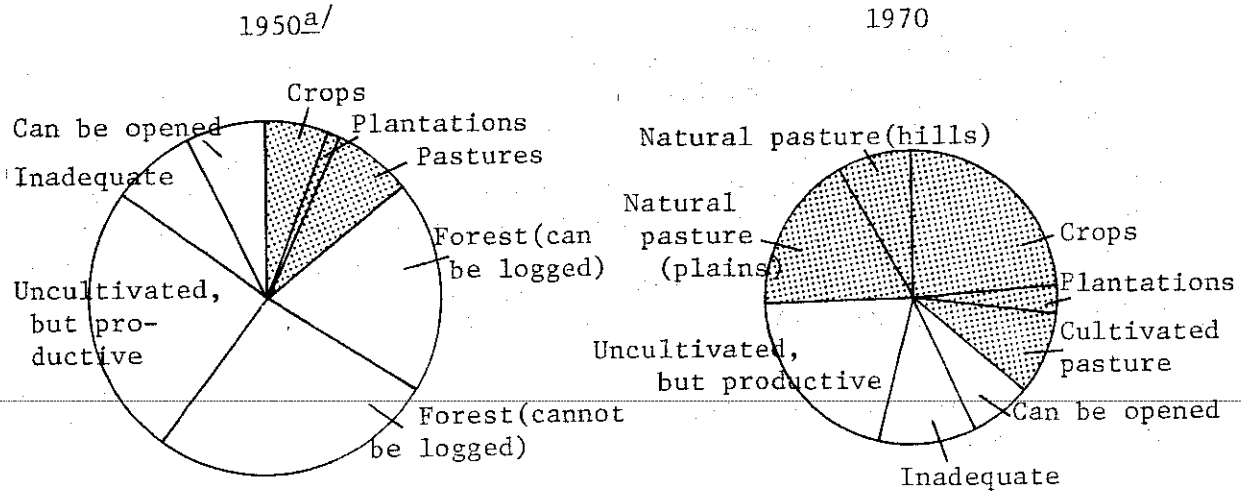
Technology is very limited here, because little experimentation has been done, the people are very poor (the poorest in the Lower Basin) and poor communications increase the cost of most inputs beyond profitability. The only remaining slash-and-burn agriculture in the Basin is in this region.

Five percent of the land is marked by the Census as a zone of gathered products, and gathering is an important enterprise here, both for commercial purposes--as in barbasco collection--and for subsistence.

Most of the land in the Colonization Region was once in large private holdings of land companies--foreign investors and individuals--unexploited except for extraction of fine timber in the early part of this century. The main forms of land tenure are now ejidos and colonies. Colonies were at one time particularly important to the zone, as a form midway between ejido and private property, with controlled selling of land. Due to problems of excessive land concentration, no further colonies were approved. Those fully titled remained; those without title were changed to the status of ejido.

CHART 4-6. CHARACTERISTICS OF AGRICULTURE IN THE COLONIZATION REGION*

L A N D U S E

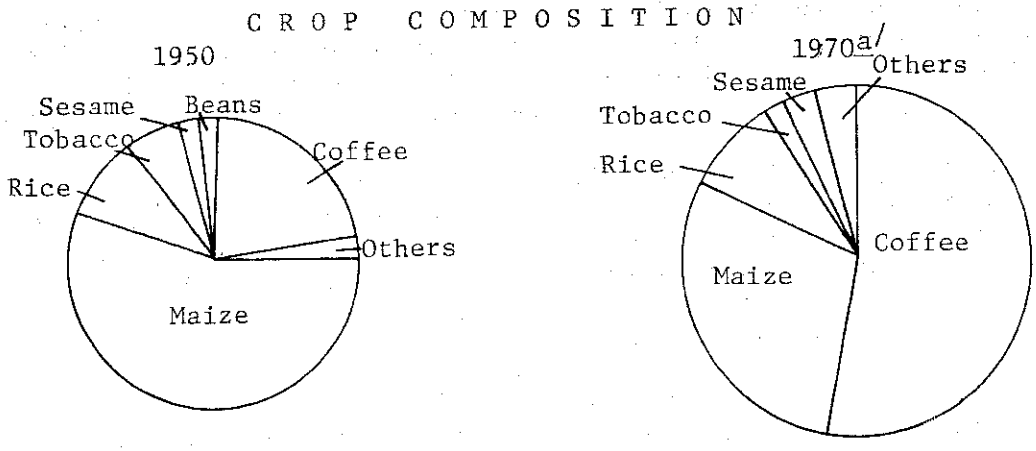


Hectares Censused:	406,014	347,814

a/ This does not include the municipios of Tuxtepec.

* Mexico, SIC, Censo Agrícola y Ganadero, 1950 and 1970, (published in 1955 and 1975).

C R O P C O M P O S I T I O N



Hectares	57,787	148,192

a/ Of annual crops: harvested in Winter - 34,673; in Spring/Summer - 31,745.

* Mexico, SRH, Papaloapan Commission, Preliminary data of the Censo Agrícola y Ganadero 1970; "Cultivos 1961."

Most of the few collective ejidos in the Basin are here. None has been particularly successful, although they have only been operating collectively a very few years. In general, they use salaried workers (mostly sons of ejidatarios), while the Bank giving credit makes the administrative decisions. Most still keep a large part of the land in private plots.

Directed Colonization. During the years of Miguel Aleman, the Commission was very optimistic about the prospect of moving large numbers of people into the tropical lowlands. It was generally held that assistance should be given to such pioneering colonists to ensure successful farming on a commercial scale. It seemed likely--and indeed the experience of spontaneous settlements bears this out--that new settlers would fall into traditional subsistence patterns in the face of the numerous technical and social difficulties of moving into the "jungle". Thus when the need arose to resettle 3000 Mazatec Indians and some 500 other colonists, the Commission tried out its philosophy.

Unfortunately, the programs were fraught with difficulties, and the results were to foster traditional subsistence farming units after all, at a very high cost.

A number of problems were common to all the programs. Choice of site was made hastily, with insufficient research. There were no preliminary agronomic investigations of test crops, varieties, or management practices in any of the colonies. Hence timetables devised for the colonists were completely experimental in nature, and yet gave the colonist no flexibility for devising his own. All the fast-profit crop programs for tobacco, rice, and peanuts failed.

Mechanization introduced yet another known variable into the projects. The excessive paternalism required by such high-risk programs left colonists unprepared for the brusque suspension of services that frequently occurred. The infrastructure built was excessive, and was poorly maintained, while crucial matters like land titling were never completed.

Spontaneous Colonization. In contrast to these poor results, is the comparative ease of the spontaneous colonization here, which predominated. Many of the colonies of Playa Vicente were settled this way, as was much of the La Lana-la Trinidad Basin, where land of economic size was opened with no expense at all to the government other than normal road maintenance and land titling costs.

Whereas the new colonists who settled in the Lowlands tended to come from out of the Basin, those who came to this zone with its extremely primitive conditions tended to come primarily from within the Basin. In 1949/50, average holding size in the Lower Basin was less than ten hectares. With increasing population pressure, small groups broke off from ejidos and formed the growing numbers of landless workers in the search for new lands.

In Nuevo Cosoltepec, a group of Indians from the impoverished Alta Mixteca petitioned for about 500 hectares in Soyaltepec, because the Temascal-La Granja road cut through it. Some colonies spontaneously

settled by Mazatecs had notably more successful results than the directed projects. These included the ejido El Carmen in the Soyaltepec resettlement zone, and the colonies of Arroyo Leon and Vegas de Jobal in Nuevo Ixcatlan. Spontaneous settlement is a major force along the newly-built road to Palomares, as a series of small, but prosperous ranchers are already a force in regional cattle production.

The key features in the success of the spontaneous colonies are: automatic choice of the most appropriate agricultural lands, strong individual initiative, support of a cohesive social group, and full awareness by the settlers of the facts of living in isolated areas. The existence of a road seems to be the single biggest attraction for settlers, as it assures escape from isolation and adequate marketing opportunities.

The Highlands Region

In the Highlands, only a fourth of the land is cultivated, and this almost entirely with crops. Typical of the really mountainous areas, in the Sierra de Juarez as little as five percent of the land is cropped. Agriculture is restricted in most parts of the region to the rainy season. While most production is for subsistence, there are several zones of important commercial production.

In the late 1940s, only coffee grown around Huautla was important commercially. By 1970, the Canada was much more developed, particularly with cane, maize, beans and fruit tree production. The Rio Salado irrigation district in the Canada has been there since people first moved to the area, since the land is so arid that agriculture is impossible without it. Since the 1800s there have been individual systems and associations. The system is made with infiltration wells or springs and small dams. Between 1960-1969, the Commission made it into a district and built a more sophisticated water control system.

There are small irrigation systems elsewhere, such as the Sierra de Juarez, where almost 1500 hectares in five areas are covered. The major crop is still maize, however, and technology is extremely primitive.

There are important new coffee centers around Villa Alta, and commercial production of basic foodstuffs in Esperanza and Palmarde Bravo. Maize production over the entire Highlands rose greatly, while bean production was replaced in great part by dry peas.

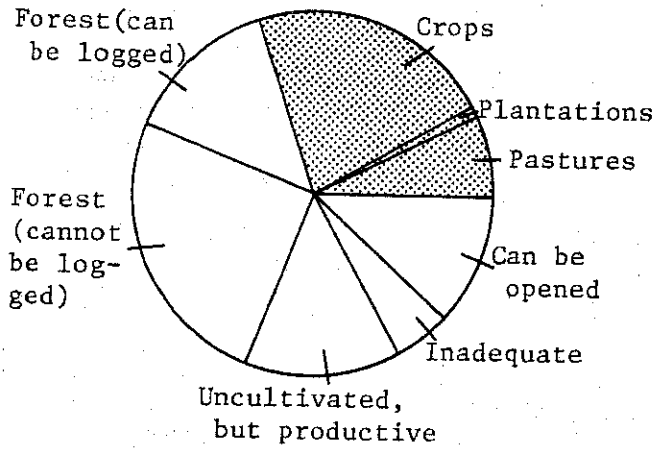
The 1960s was a very difficult time for much of the Highlands. The north of Mexico easily outcompeted them for wheat, and there was a period of bad weather. Although the land area exploited changed little, there was a 40 percent decline in actual production from 1960 to 1970. Chart 4-7 provides data on production and land use.

There was an increase overall of only three quarters between 1950 and 1970 in livestock. This is primarily due to a marked reduction in herds during the hoof-and-mouth epidemic, which were slow to build up again.

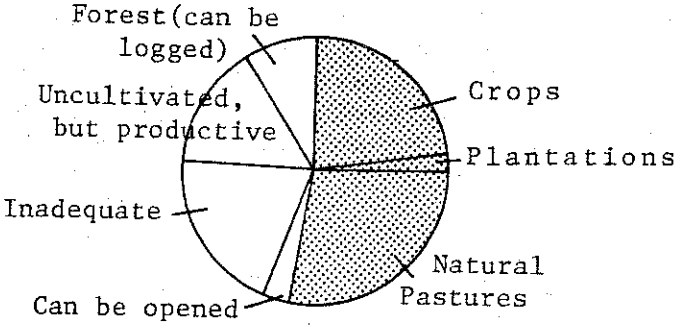
CHART 4-7. CHARACTERISTICS OF AGRICULTURE IN THE HIGHLANDS*

L A N D U S E

1950



1970

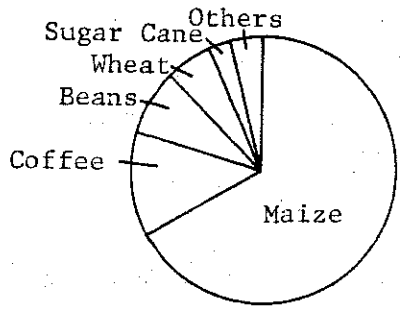


Hectares Censused: 2,147,117 1,466,804

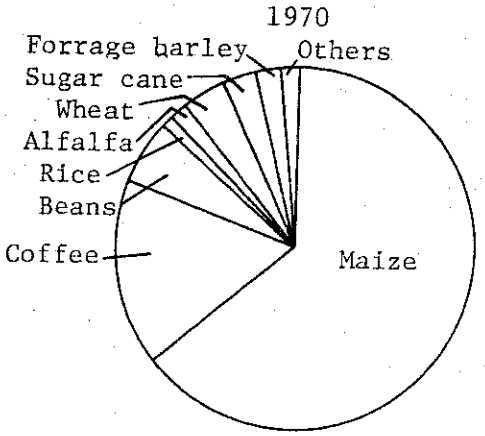
* Mexico, SIC, Censo Agrícola y Ganadero, 1950 y 1970 (published in 1955 and 1975).

C R O P C O M P O S I T I O N

1950



1970



Hectares Cropped: 153,793 228,549

a/ Of annual crops: Winter - 70,268 hectares; Spring/Summer - 112,933 hectares.

* Mexico, SRH, Comisión del Papaloapan, Preliminary Data from the Censo Agrícola y Ganadero 1970, and "Cultivos, 1961."

Forestry is successfully competing with agriculture in the southern Highlands around Juarez, Villa Alta, and Mixe. Sheep and goat production remain important in the western Highlands, but the inappropriate technology is having severe ecological consequences in the mountainous parts.

The typical form of land tenure is still the centuries-old community, which operates on the basis of individual plots, with pastureland, forest land and boundary control communally operated. Because of uneconomical yields, technology is quite poor--except in the Canada, and in Palmar de Bravo-Esperanza, where PLANPA has recently been working. In these places there were perhaps 100 to 200 tractors in 1970. It is interesting that although two thirds of personal income in the region comes from agriculture, only a quarter of its gross product does.

Assistance to Agriculture in the Basin

Effective agricultural extension by either the SAG, the Commission, or sugar mills has been notably lacking, and yields of most crops are still far below their potential. Agricultural investigation has had little foresight. The center in Cotaxtle, Veracruz has overemphasized maize, which is certainly not the crop of the future for tropical areas. Also, their soils are considerably different than those common in the Basin. El Palmar in Tezonapa has done some interesting research on tropical fruits, trees and spices, but has participated in no practical application of results. Some livestock research in La Posta de Paso del Toro, Veracruz and Playa Vicente, Veracruz has been done with new feed sources, but local ranchers are slow to adopt them.

The PLANPA program appears to be filling a vacuum. There have been very few projects aimed directly at increasing commercial production among small farmers. Credit for agricultural production was almost nil until the late 1960s, except for sporadic attempts by government banks, which often failed. The Commission's credit projects in the Colonization Zone were also unsuccessful. Credit has vastly expanded, however, in the 1970s from both the private and public sectors.

The National Clearing Commission worked in the past sexenio to open up unused lands via mechanized clearing. The Livestock Commission is giving credit to introduce livestock production on ejidos.

In 1976, a major national reorganization of sugar production took place, that--besides increasing the price of sugar cane--tried to introduce incentives for better technology. A prior technical assistance program had failed, but a new extension system is being tried out.

Meanwhile, the national level Maize Plan--an emergency type of operation to raise production of basic foodstuffs--has promoted improved technology for maize, beans and rice, but has stifled the much-needed diversification of tropical lands out of maize.

Until the 1970s CONASUPO played a very minor role in the Basin. With notable increases of national minimum prices in the past few years, they have won a larger part of farmers' business. Although private marketing remains a difficult problem for small-scale producers, CONASUPO's quality control standards pose a major obstacle for their participation. Local production credit arrangements usually involve receipt of a part, or all of the crop by the creditor, which also reduces supplies for CONASUPO.

Economic Diversification and Employment

Agro-industry has always played an important role in the Basin's economy and this is increasing. Diversification has further strengthened the service sector.

Indeed, the Input-Output Matrix showed very little total growth in the primary sector from 1963 to 1970 (see Charts 4-8 and 4-9), except for fishing. Meanwhile industry grew at 6.7 percent and services 3.8 percent annually. Although construction--with a national growth rate of 9 percent annually--grew only 2.5 percent per annum, this rate rose markedly after 1970, with Commission projects and other investments.

During 1950 to 1970, the number of primary workers declined from about three fourths to about two thirds of all workers. Yet, surprisingly, the percentage of transformation industry workers did not change, although there were minor increases in construction, extraction and electricity. Nor did the percentage in commerce or transportation change. The big increases were in services and government work, as seen in Chart 4-9.[6/]

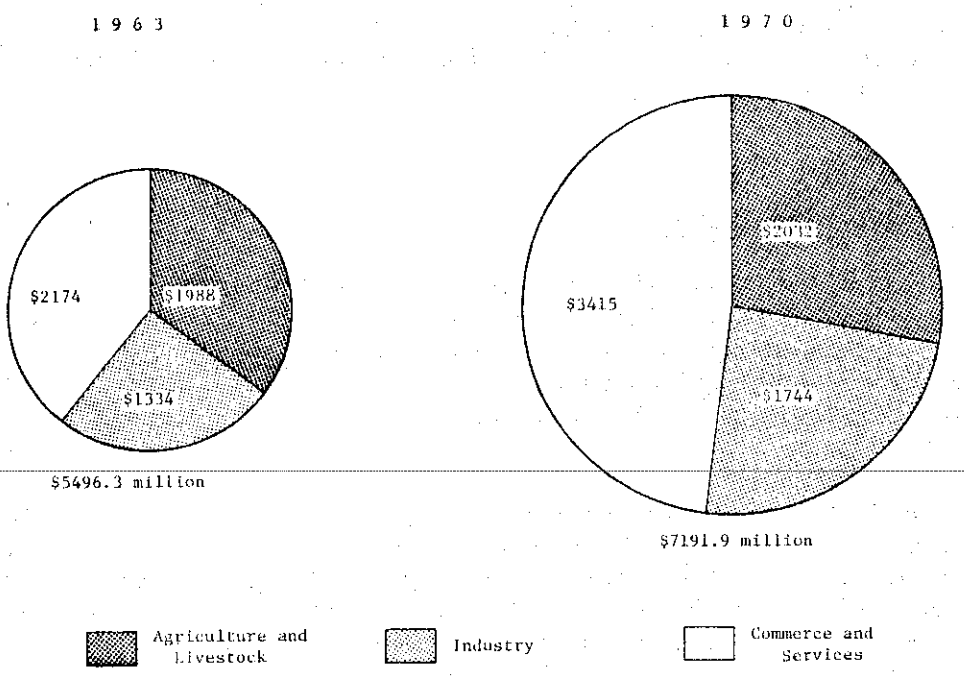
But by 1970, industry provided 47 percent of total income. The relation between the growth of industry and services and employment is very complex. During 1963 to 1970, primary workers were leaving faster than incomes in the sector were rising. In the industrial sector, incomes rose three times as fast as employment in an already high income per worker sector. Only in the subsector construction did both indices rise at the same time. In services, increases in employment were greater than increased product, which suggests there are a lot of marginal workers.

Textiles, sugar milling, beer and electricity were the major early industries; later cane processing took the lead and coffee milling and oil extraction became important. Except for the sugar mills and some oil wells, and weaving in the Highlands, all industry was located in the Industrial region. Of total industrial employment censused in 1944--including small auto shops, tortilla mills, etc.--77 percent was concentrated in the Industrial region, 13 percent in the Lowlands, 3 percent in the Tuxtlas and 7 percent in the Colonization Zone.

[6/] Of course, the large number of "unspecified" workers in the 1970 Census makes these statistics less than conclusive.

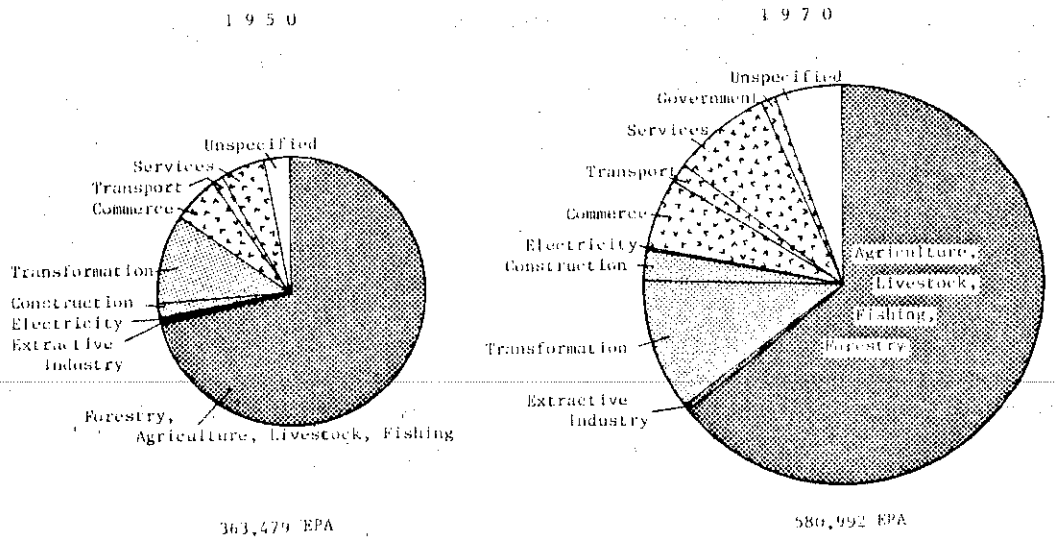
CHART 4.8. DISTRIBUTION OF THE VALUE OF PRODUCTION IN THE PAPALOAPAN BASIN*

(pesos)



* Mexico, SRH, Comisión del Papaloapan, Diagnóstico Socioeconómico de la Cuenca, 1973. (See Appendix 4-G.)

CHART 4.9. SECTORAL DISTRIBUTION OF THE WORK FORCE IN THE PAPALOAPAN BASIN*



*Mexico, SIC, Séptimo y Noveno Censo de Población, 1950 y 1970 (published in 1952 and 1972).

In 1970, more than a quarter of industrial value came from "dynamic" industries with complex technology, such as chemical products, paper and electrical equipment. Maps 4-4 and 4-5 show the change in the spatial distribution of industries, notably its concentration in the Lowlands. This contributes to its higher standard of living: while average product per person working in the Basin in 1970 was $5378, industrial production per worker was $52,542.

The Industrial Region

Chart 4-10 describes the changing EAP by region. The only major change in the Industrial region was an increase in service workers. Industry has always played an important role there. In 1945 the two beer factories were expanding, as were the six sugar mills. Textiles were still strong.[7] Tehuacan was famous for its mineral waters at the time.

As of 1970, there has been a huge expansion and diversification into all types of industries including a paper mill, chemical plants, rubber packing plants, grain mills in Orizaba/Cordoba; and animal feed, soft drinks and cement factores in Tehuacan. Still, a slowdown in the economy has led to a shortage of jobs. This was the most likely reason for the drop in the rate of demographic increase there.

The Lowlands Region

The Lowlands in 1950 had nearly three-quarters primary workers, although it still had a higher percentage of workers in other sectors than did the three less developed regions. Sugar mills had been in the area since 1892, two each in Tlacotalpan, Tlalicoyan and Amatitlan, and three in Cosamaloapan. Later one was built in Alvarado. Almost all other industry was very small-scale. Other than the more important ones shown in Map 4-4, there were various traditional raw sugar mills, iron works, carpentry mills for nixtamal (pre-cooked maize for tortillas) and bakeries.[8]

By 1970, both the scale and diversity of industry had changed. The region had less than two-thirds primary workers, and had nearly doubled its proportion of industrial workers, while a quarter of the EAP was in services. These trends had obviously intensified in the 1970s.

The main sources of industrial employment were still the sugar mills--eight of them, with another ready for operation in 1977. Apart from the Tuxtepec paper mill, and a new paper mill MEXPAPER to be finished around Tres Valles, these are all transformation industries.

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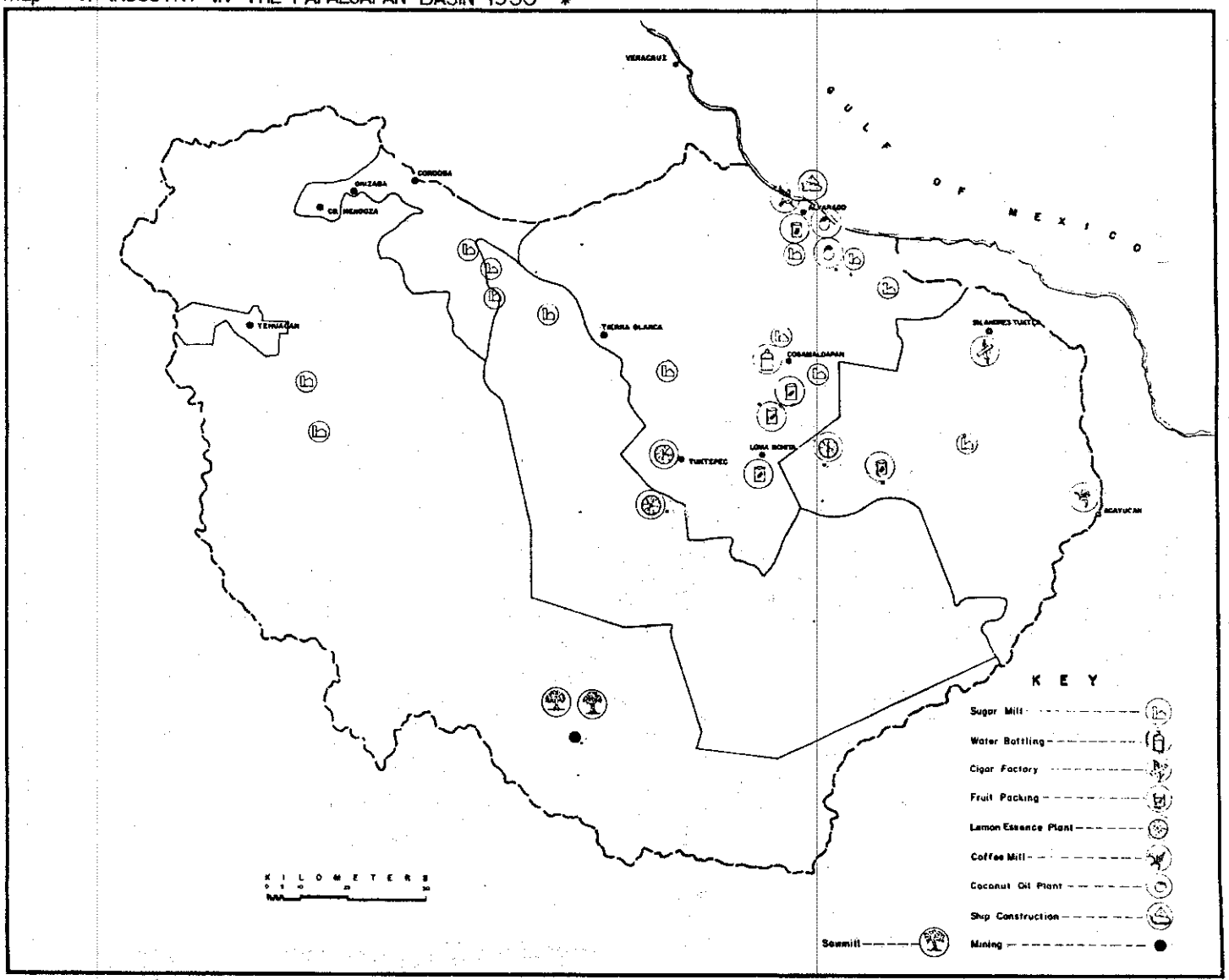
[7] The first mill in Orizaba was established in 1836; three nearby plants in 1882; one in Rio Blanco in 1892 and in Santa Rosa in 1898.

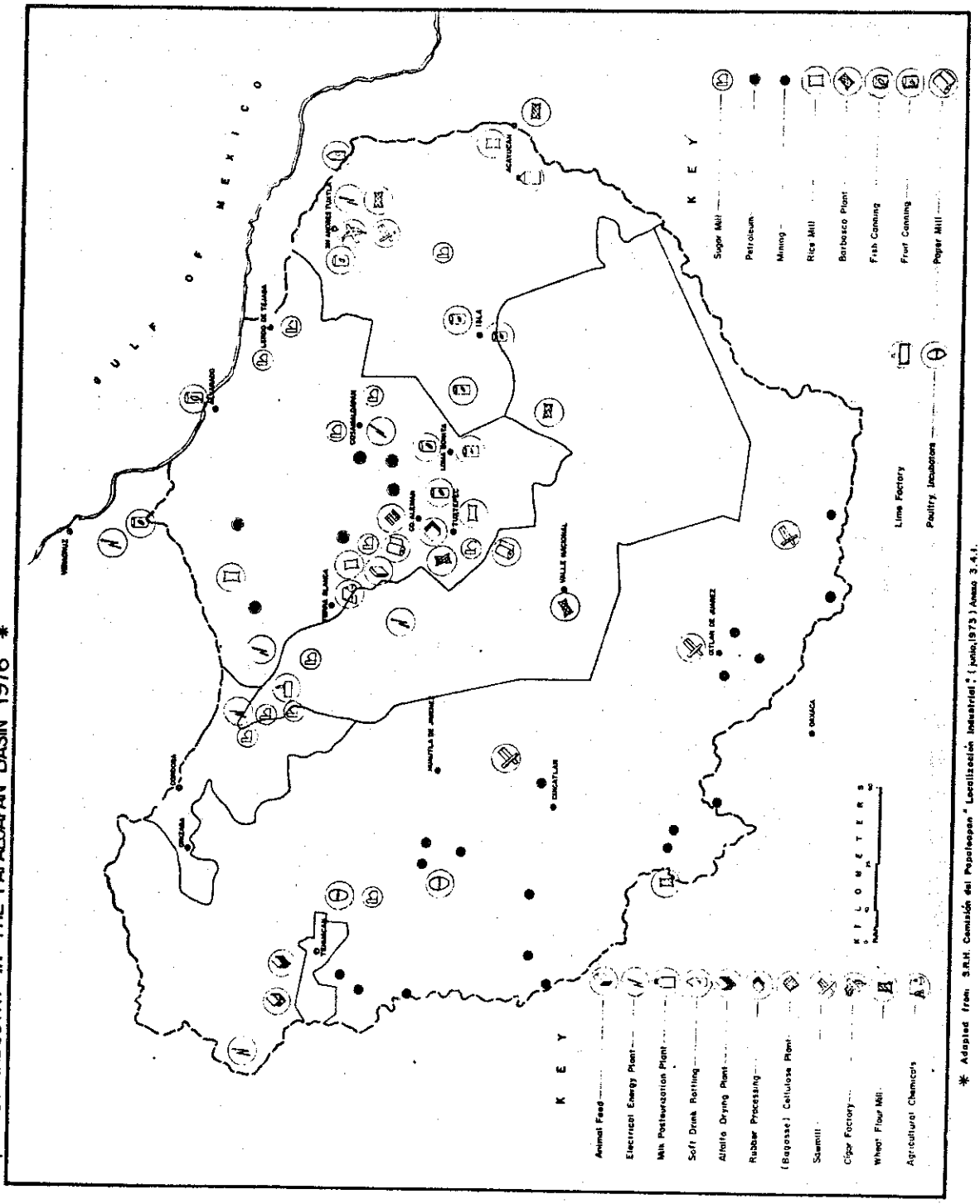
[8] To give an idea of scale: Cosamaloapan municipio with a population of 17,000, supported 21 mixtamal mills and 22 bakeries.

Map 4-4. INDUSTRY IN THE PAPALOAPAN BASIN 1950 *



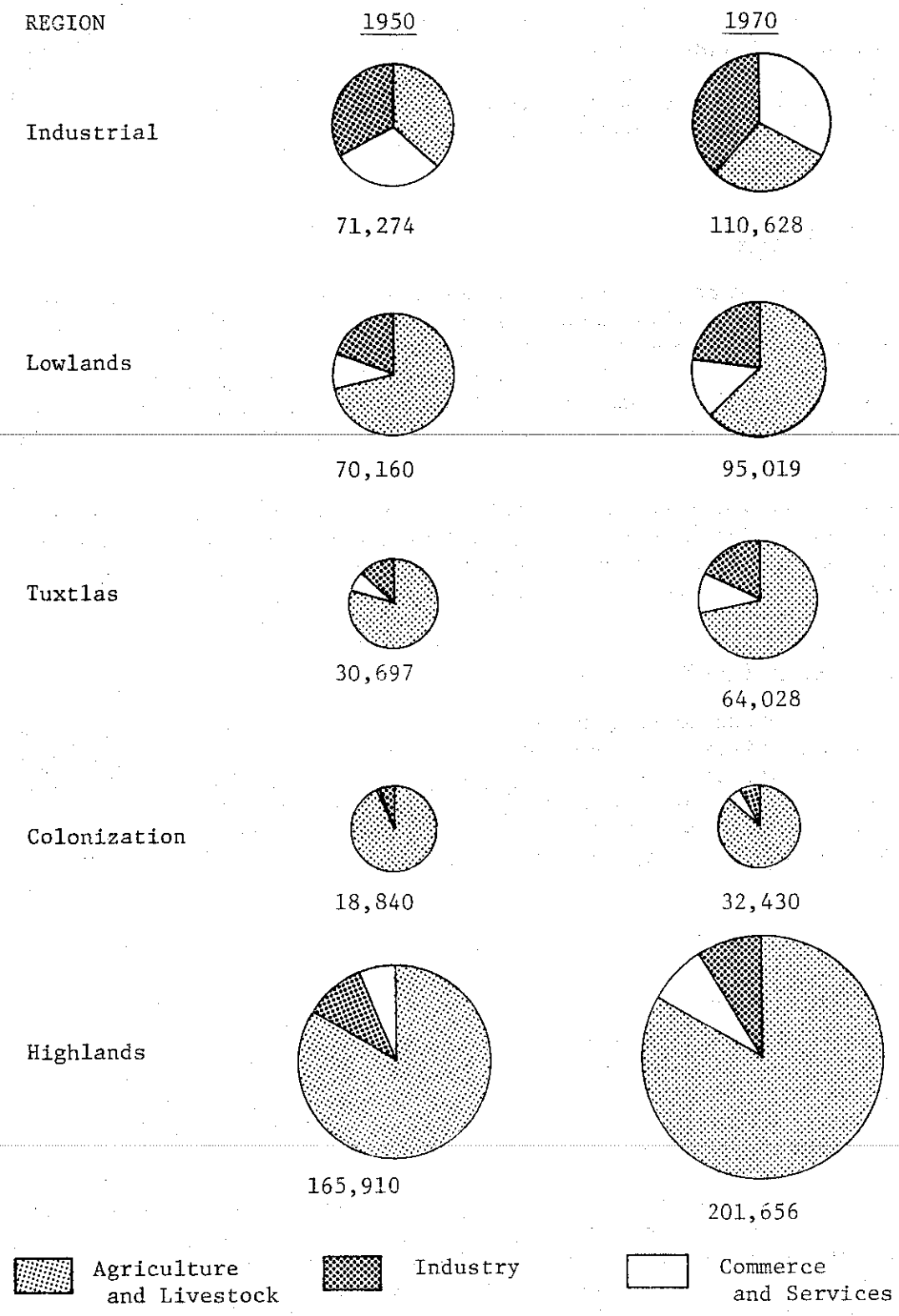
* Data from S.R.H., Comisión del Papaloapan, Jose Attolini, "Economia de la Cuenca del Papaloapan," 1950, pp 168-178.

Map 4-5. INDUSTRY IN THE PAPALOAPAN BASIN 1976 *



* Adapted from S.R.H. Comisión del Papaloapan "Localización Industrial" (junio, 1973) Anexo 3.4.1.

CHART 4-10. CHANGES IN THE ECONOMICALLY ACTIVE POPULATION BY REGION IN THE PAPALOAPAN BASIN*



* Mexico, SIC, Séptimo y Noveno Censo de Población, 1950 y 1970 (published in 1952 and 1972).

In addition, the increase in population and urbanization have multiplied many times the demand for local grain mills and other such small-scale industry. The zone within 30 miles of Tuxtepec is really beginning to take on an industrial flavor. Industrialization has attracted many outsiders to the area; reflected by a marked increase in the urban population. Meanwhile, the increase in agricultural work available has induced a nearly comparable permanent rural migration. The cane harvest remains the major focus for seasonal migration.

The Tuxtlas Region

The Tuxtlas region is still primarily agricultural, with about three fourths of its EAP in that sector, even now. In 1892, there were three sugar mills--one in Acayucan and two in San Juan Evangelista. Another was set up in 1905 in Cuatotalpan, which was the only early established one remaining in 1950. A handful of other small-scale transformation industries completed the list. Only cigar and pineapple processing were important.

By 1970, an important soft drink and water bottling center had developed in the Catemaco area. San Andres had several new investments, as did Acayucan. Fruit packing had grown in importance in Isla and Tesechoacan. Despite rapid immigration, there is still a shortage of agricultural laborers.

The Colonization Region

In the Colonization region there is really no "industry" as we speak of it in modern times. The percent of "industrial" workers changed from 1950 to 1970 from less than two to eight percent. Besides a small lemon essence plant in Chiltepec, the activities in 1950 included primarily native craft production, textiles, pottery, coffee milling. Today, some barbasco processing--which uses very simple technology--has been added to the list.

The Highlands Region

Like the Colonization zone, the Highlands remain little affected by modern technological industries. Yet, because of the scarcity of good agricultural land, there has always been a relatively large and constant portion of the EAP doing other types of work. The lack of jobs in this region is chronic.

Back in the 1940s, there were three sugar mills--two in Puebla and one in Oaxaca--today there is only one. Ixtlan had several small sawmills, which closed in the 1950s. Handicrafts--particularly textiles, weaving and ceramics--have always been important. Coixtlahuaca is the principal producer of palm hats. In 1950, it was estimated that most of the adult population of this district were involved. Leatherwork is important in Teotitlan; ceramics in the Mixe; huipiles (a type of woman's

dress) in Jalapa de Diaz and San Jose Miahuatlan; ixtle (weaving fiber from the maguey) in San Francisco Cajonos; basketry in the Canada.

Logging and sawmill operations have become a notable source of employment and income particularly in the greater districts of Ixtlan, Etla and Cuicatlan. And mining has been and continues to be to a lesser degree, an important occupation. The principal metals are gold, silver, lead and copper. Of nonmetallic mining, almost half is for cement and lime.

Demographic Changes

The population of the Basin between the Census years 1950 and 1970 increased about 70 percent, somewhat less in the first decade than in the second, but still less than for Mexico as a whole. By 1976, it must have had nearly 2 1/2 million inhabitants. The regional economic changes that have taken place are reflected by demographic indicators of growth and urbanization. Maps 4-6, 4-7 and 4-8 illustrate these changes over time.

The 1950s. In the decade of the 1950s, the fastest-growing regions were the Lowlands and the Tuxtlas, both at around 4.4 percent annually.9/ The Colonization zone--then being colonized by the Aleman Reservoir resettlement programs and other groups, such as the colonists of Abasolo, lagged slightly behind at 3.7 percent. Annual growth in the Industrial Region (2.5 percent) was around the national average. The Highlands, including case study Ixtlan, experienced several natural disasters, leading to large-scale emigration and only 1.7 percent yearly increase. There is good evidence that much of that emigration was to other parts of the Basin.

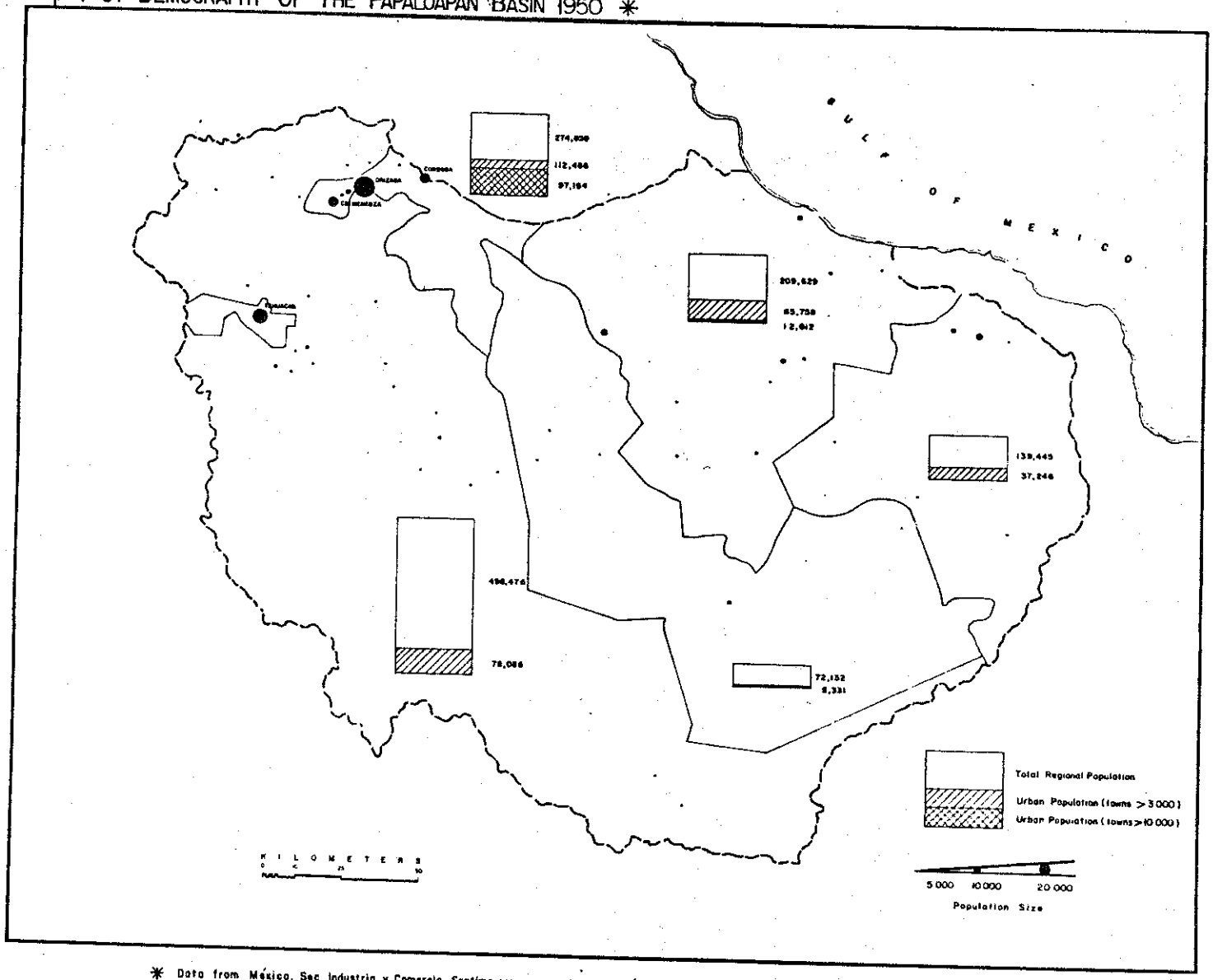
Nevertheless, while the census showed a 49 percent increase in the number of people originating from outside the Basin, there was a 65 percent increase in those originating in the Basin but living outside it. And by 1960, only eight percent of the Basin's inhabitants had come from outside.10/

Most emigrants went to Mexico City. Veracruz received many emigrants from the Puebla and Oaxaca portions of the Basin. The major immigration centers were the case study zones of Tuxtepec, Tehuacan, Orizaba, Cordoba and Cosamaloapan. Most newcomers were from other tropical areas.

9/ Tuxtepec, Playa Vicente and Acayucan all registered net immigration rates in these years greater than 50 percent. The Tuxtlas and the region east of Playa Vicente had net immigration of 5 to 50 percent. The total population of Playa Vicente, San Juan Evangelista and Tres Valles increased 100 percent; Acayucan 75 to 90 percent, and in Hueyapan, Catemaco and Acula, 50 to 75 percent.

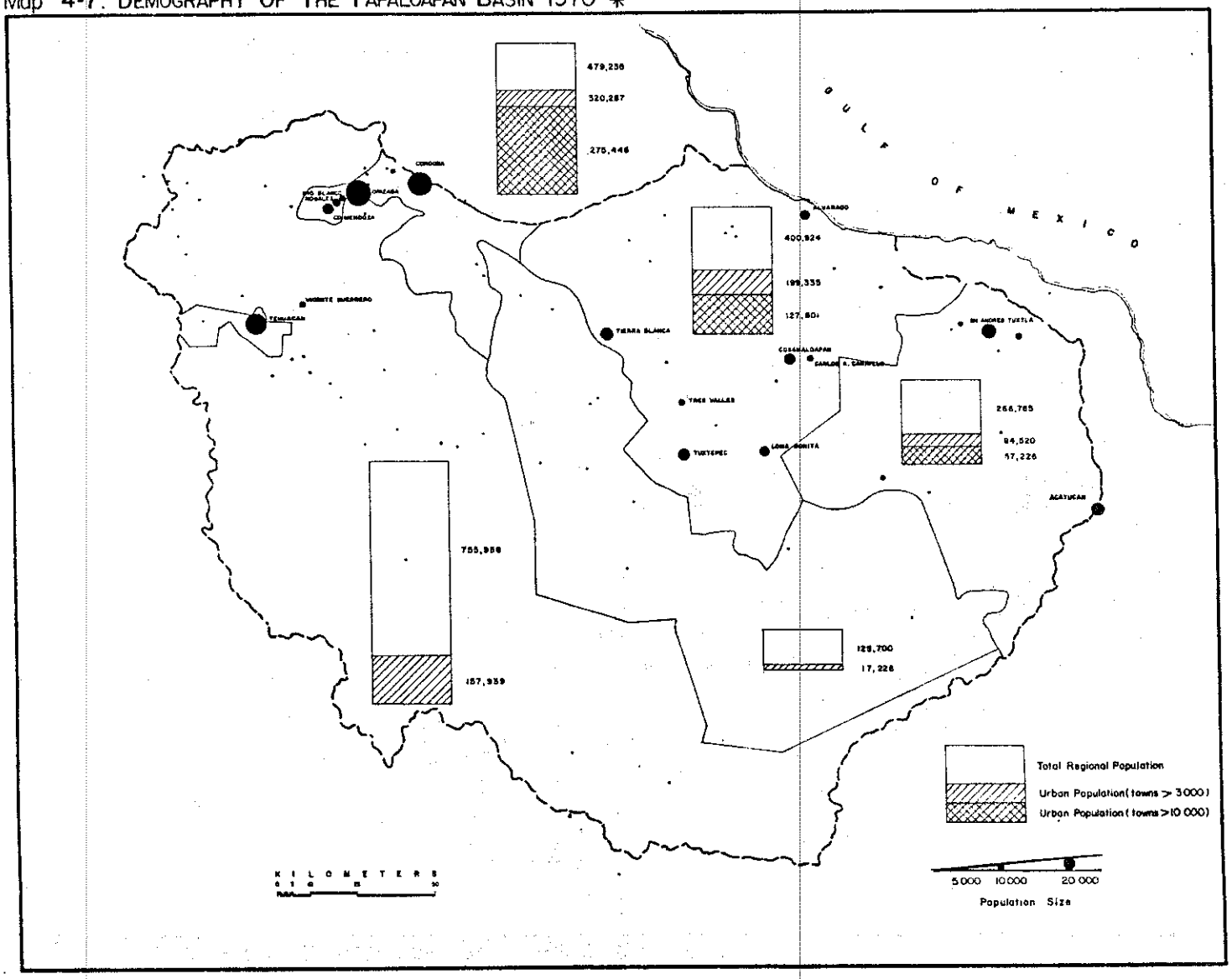
10/ Playa Vicente had the greatest number from out of State--over 25 percent, due to immigration from neighboring Oaxaca. Tierra Blanca, Tres Valles and Sayula had 10 to 15 percent from out of state.

Map 4-6. DEMOGRAPHY OF THE PAPALOAPAN BASIN 1950 *



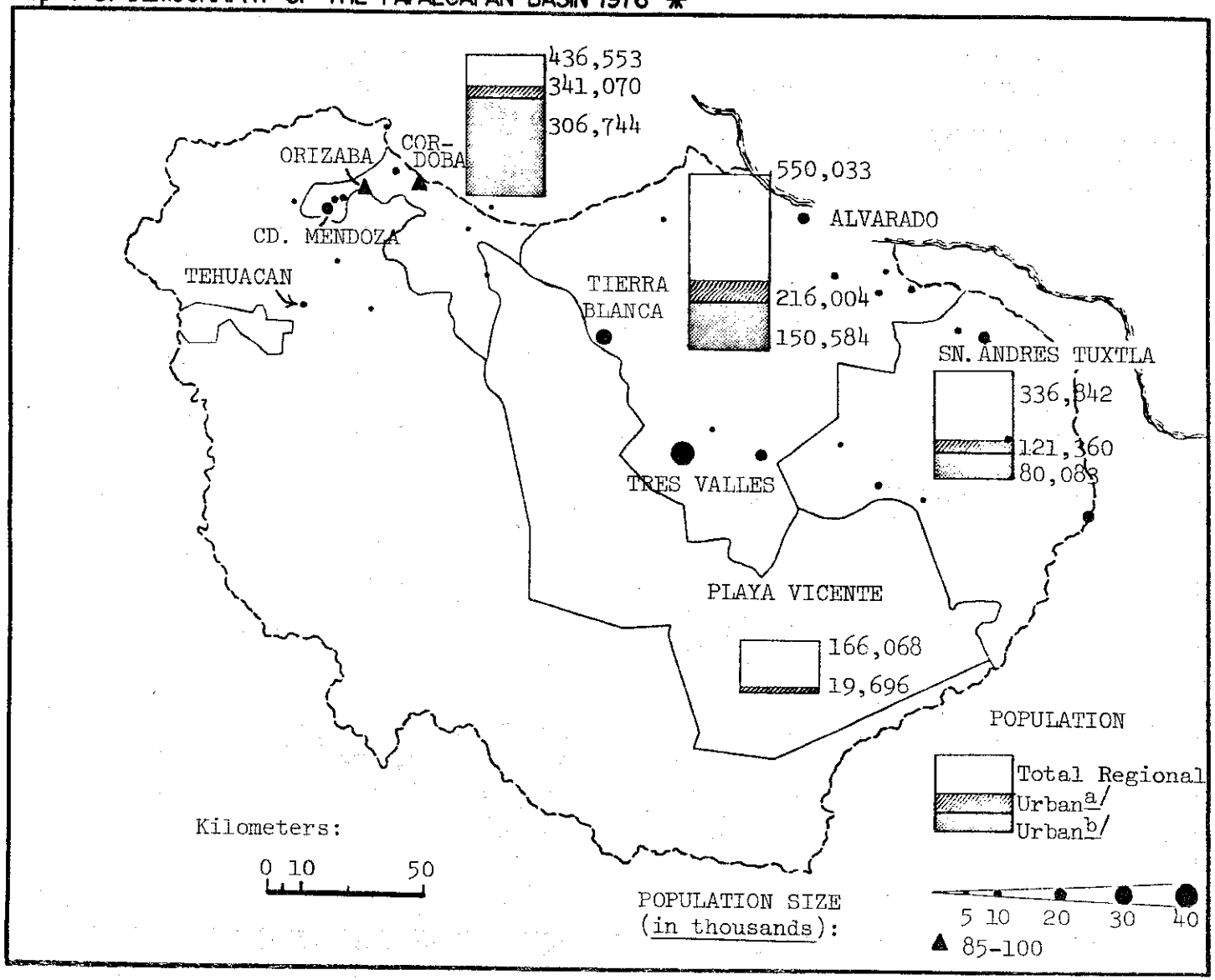
* Data from México, Sec. Industria y Comercio, *Septimo censo general de población, Estados de Oaxaca, Veracruz y Puebla (1953)*.

Map 4-7. DEMOGRAPHY OF THE PAPALOAPAN BASIN 1970 *



* Data from Mexico, Sec. Industria y Comercio, *Noveno censo general de población, Estados de Oaxaca, Veracruz y Puebla (1973)*

Map 4-8. DEMOGRAPHY OF THE PAPALOAPAN BASIN 1976 *



a/ towns > 5,000 b/ towns > 10,000.

The 1960s. During 1960 to 1970, the major growth region was the Industrial, with a 39 percent increase because of new industrial jobs. The first flush of immigration over, growth rates declined in the Lowlands and Tuxtlas to around 3.3 percent, and in the Colonization zone to 2.7 percent, due to the decline in Commission activities and general agricultural stagnation. The Highlands region, on the other hand, recovered somewhat, mainly through local population increase.

The 1970s. During the first half of the 1970s, population growth in the Industrial Region was very slow. By contrast, in the Lowlands, population grew about 40 percent in those six years--more than six percent annually. Over half of the new inhabitants there were located in the towns. Tuxtepec was a major destination for immigrants, with the Tierra Blanca zone in second place.

In the Tuxtlas, growth was between 25 and 30 percent, or four percent yearly. Here, over two thirds of the new settlers are found in the countryside, with the relative level of urbanization remaining about the same. Contrary to this trend, total population in the Isla zone began to stabilize at this time, with urban in-migration predominant.

In the Colonization Zone, population grew between 30 and 35 percent, about 5 percent yearly. This also reflected a flow to the countryside, since the relative level of urbanization actually went down. Abasolo's experience followed the general trend.

Urbanization and New Zones of Influence

The most important demographic change was its marked urban character. In 1950, only 29 percent of the Basin's population was urban. The major cities of the Industrial zone were the undisputed economic centers of the Basin--the major source of inputs and consumer goods, and the major market for production. Orizaba had over 55,000 inhabitants; Tehuacan 23,000; Cordoba, Mendoza and Tierra Blanca had over 10,000.

By 1970, 39 percent of the population was urban. Over 60 percent of the increase in population over the two decades had gone to towns. Cordoba and Orizaba had grown to 78,500 and 92,000 respectively. There were very large increases in people living in towns over 10,000 in the Lowlands area. In 1976, there were 19 towns over 10,000 in size, of which at least 9 had over 20,000 inhabitants.11/

Thus, although Cordoba, Orizaba and Tehuacan continue as the major urban areas, they are no longer the only important sources of inputs and markets. Several "zones of influence" have grown up, particularly in the Lowlands. Tierra Blanca (30,000), originally a railroad center, is the center for the northeastern lowlands. Cosamaloapan (30,000), an old

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11/These town population figures are estimates by the Malana Eradication Commission and municipal authorities.

commercial and sugar town, influences the middle plains. Tuxtepec (50,000) is, next to the city of Oaxaca, the most important commercial confluence for the Oaxacan highlands and much of the Colonization zone. Furthermore, its central location in the Basin's system of roads has made it a commercial center for the entire Basin.

Loma Bonita (22,000), a pineapple and industrial center, has a smaller zone of influence in the southeastern lowlands that extends into much of the lower Tuxtlas area. Lerdo (12,000) is a sugar cane center in the northeastern Lowlands. San Andres Tuxtla (30,000) is the commercial center of the Tuxtlas, with Acayucan (30,000) somewhat less important, but with strong links to the southeast.

From 1970 to 1976, the most notable urban growth was seen in Tuxtepec, Isla, and Tres Valles (in Cosamaloapan).

It is the growth of these urban centers which has led to the rapid development of the region. The existence of a sizable population center attracts skilled personnel, provides more economical services and absorbs a great deal of manpower particularly in the service sectors. Availability of services and a fairly large labor supply are important attractions for industry. Since most land resources in the Basin have been laid title to, and there is rapid natural population increase, only the growth of towns is warding off a minifundia or landless labor problem. Further, the emergence in the Lower Basin of several smaller-scale centers rather than one or two larger centers has provided a less erratic transition to urban life for the inhabitants. There is an ease in rural-urban relations not found in Mexico's very large cities.

Welfare Improvements

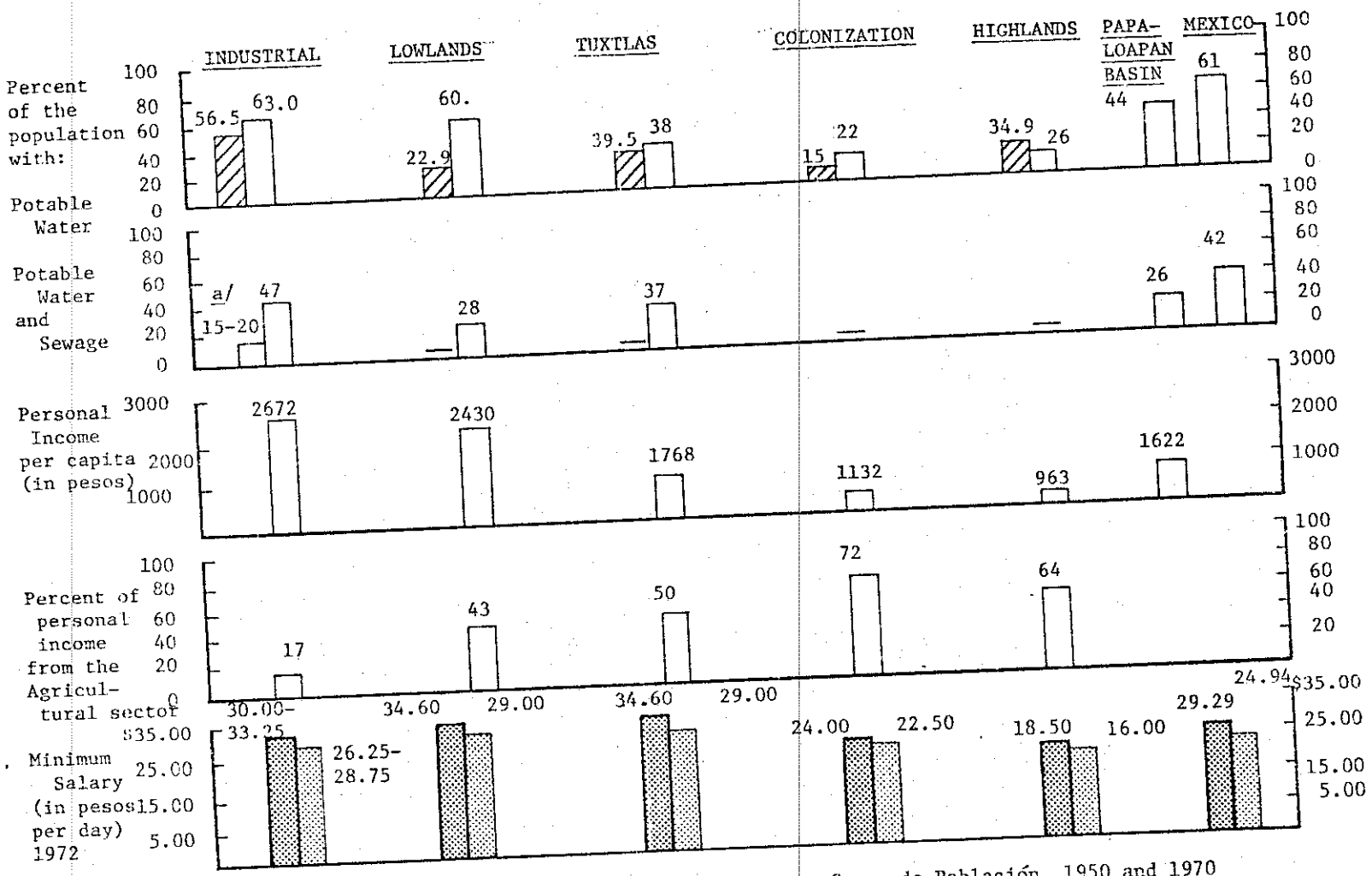
Urbanization, total production increases, and communication in themselves do not ensure improvements in welfare. It is apparent, however, that there have been important advances, particularly in the Lower Basin, as shown in Chart 4-11.

Housing. There has been a comparatively small improvement in housing conditions in the past twenty years. In the Lowlands, the standard home is still a large hut with unsealed walls and a palm roof. These homes, however, are increasingly well-furnished. Beds or cots are now very common, as are nonearthen floors. Stoves are used, although many women prefer to cook the majority of their food on the traditional wood fire in the back yard.

In the Highlands, however, most of the native housing types of adobe or wood still provide inadequate protection against the cold, and here the lack of improvement is a notable failure of development efforts.

Increasingly, in the urban areas or more prosperous rural ones, houses of plaster and cement are being constructed, with several rooms and plumbing. Clothing all over the Lower Basin is quite modern in style. In the Highlands there are still some areas where the native dress is worn, particularly by women.

CHART 4-11. SOME INDICATORS OF LIVING STANDARDS IN THE PAPALOAPAN BASIN*



* Data for Potable water, sewage from: Mexico, SIC, Septímo y Noveno Censo de Población, 1950 and 1970 (published in 1952 and 1972); data for Personal Income from: Banco de Mexico, S.A., data on production and income by municipio in the Papaloapan Basin for 1963 and 1970; data on Minimum Salary from: Mexico, SRH, Comisión del Papaloapan, Anexo #8, Cuaderno de Planos, Vloumen No. II, Febrero de 1973.

Nutrition. Maize and beans remain the basic staples of the diet in the Basin, and the commercial consumption of meat remains fairly low for most of the population. Household fowl and pigs, and meat served on festive days maintain the protein requirement sufficiently in most of the Lowlands. In many places, the increase in national meat prices has led to less local slaughtering, with meat shipped out instead. Milk consumption is very low. Local availability and consumption of fruits and vegetables is falling, especially in urban areas. Nevertheless, with the overall successful fight against intestinal parasites and improved food marketing, the nutritional status of most of the population at least in the Lower Basin is much improved.

Drinking Water and Sewage. The availability of good drinking water and sewage facilities is increasing, but is by no means universal. It is still far below the national average. By 1970, there was really significant improvement only in the Lowlands, with construction doing just slightly better than population growth.

Sewerage availability in 1950 was almost nil, except in the Industrial Zone. By 1970, the Lowlands and Tuxtlas zones had sewerage for about a third of their inhabitants.

Health Care. Probably the single most successful program in the Basin affecting welfare was that of health improvements. The average life span of a person living in the Basin rose by about 22 years--twice the national average increase. The most severe health problems 30 years ago were malaria, onchocercosis, intestinal disease, tuberculosis and pinta. When the Commission began work, they set up 13 prevention and treatment centers and special brigades against malaria and onchocercosis, with the SSA. By the mid-1950s, morbidity levels of the major diseases had declined to less than ten per thousand inhabitants.

By 1970, mortality had declined to 12.6 per thousand, ranging from 16.4 in the Highlands to 9.7 in the Lowlands.12/ Programs for today's killers are more difficult, as most are caused by contamination of food and water through human and animal feces. Proper sewage and drinking water, plus a change in cultural habits toward sanitation are the most important correctional tools. Infant mortality is still considerably above the national average.13/

In 1945, there were only 12 medical centers in the whole Basin and 39 hospitals or clinics--nearly all in the Industrial Zone, with the

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12/Major causes of mortality, in order of frequency were: gastro-enteritis and colitis; pneumonia, accidents, infancy diseases, measles, colds and whooping cough.

13/The data is still quite poor. The level registered in Veracruz fluctuated between 15/1000 births in 1950, 55/1000 in 1956, 60/1000 in 1965 and 82/1000 in 1970. In Oaxaca, the official level dropped from 100/1000 in 1950 to 70/1000, too low to be realistic. In Puebla the rate moved from 125/1000 in 1950 to 90 in 1965, and to 105 in 1970.

exception of Tierra Blanca, Cosamaloapan and San Andres. By 1970, there were 102 clinics, 16 general hospitals, and 23 private sanatoriums. These are concentrated in the Lower Basin. In the Highlands, only Cuicatlan, Guelatao; and Huautla had hospitals, supported by a few scattered health centers. Most services are provided by SSA, IMSS (Instituto Mexicano de SeguroSocial) and ISSSTE (Institutu de SeguroSocial para Trabajadores del Estado). "Brujas"--witches, and "curanderos" using herbal remedies--are still relied on to a large extent.

One direct result of this has been a change in the age structure of the population. In 1970, two thirds of the population was under 25 years old and nearly half were younger than 14. Consequently, the EAP has declined.

Income Changes

We have very rough income statistics from the Bank of Mexico study. In real value, the changes beteen 1960 and 1970 were not remarkable, but now the Basin compares somewhat better with the rest of the nation. Agriculture is becoming less important as a source of income, suggesting that the highest level of welfare is found among industrial and other workers.

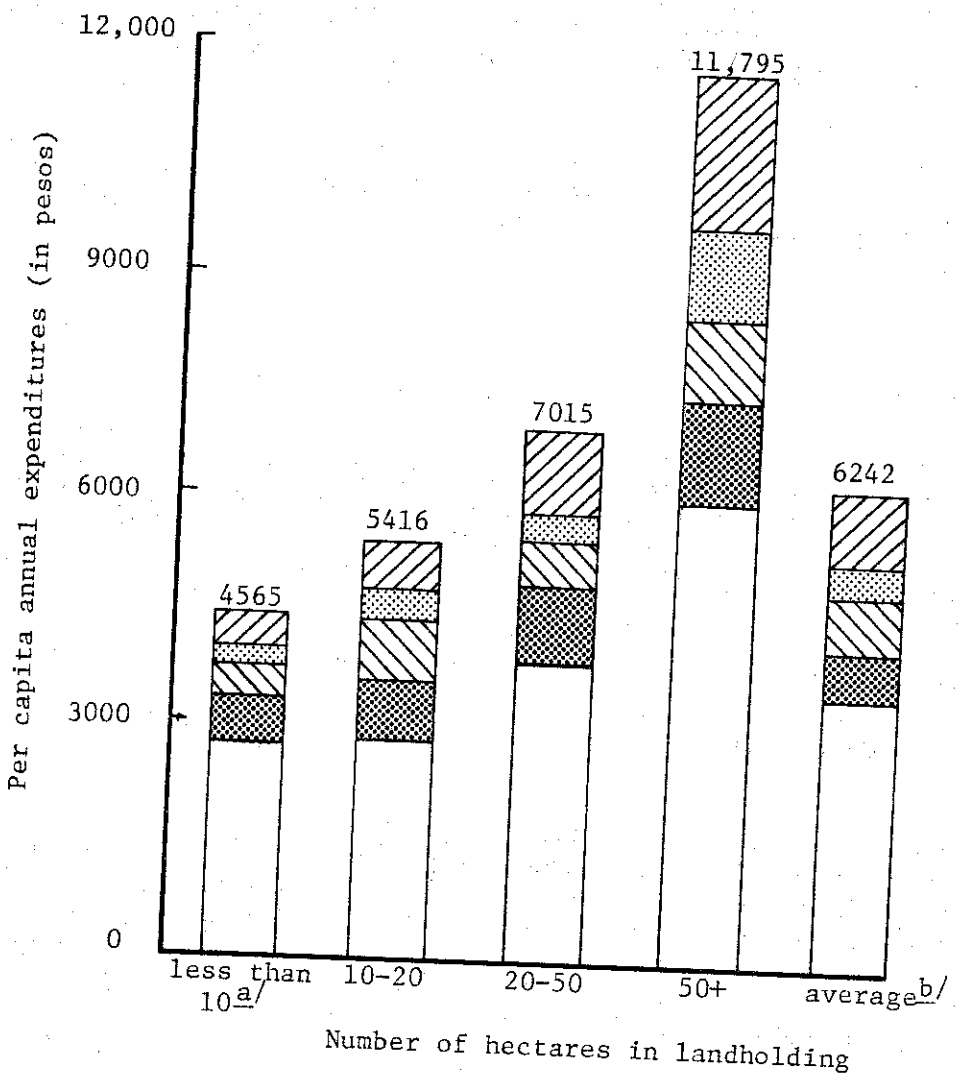
The annual average rural income for the Basin, by official statistics is $10,140 ($US 845). This includes the impoverished Highlanders, and thus underestimates the higher incomes in, for example, the Lowlands region.

Graph 4-1 shows results from a household consumption survey done by the Commission for the Rio Blanco Irrigation District. This area is relatively better off than most agricultural zones in the Lower Basin, but those in the lower income categories are certainly representative. Average expenditures per capita were US$500 per year, or assuming 28 percent EAP, US$1768 average income. Those at the lower end of the scale average about US$1300 yearly income.14/

For Rio Blanco farmers, the percentage of nonagricultural income is about 16 percent, which is very low due to the availability of some year-round cropping. In nearby rainfed areas, the portion is estimated at about 25 percent.

14/Average per capita expenditures in 1976 were $6542, or US$500. For the lower range (those with less than 10 hectares) the figure was $4565, or US$365, which probably represents total income as well as expenditures. If one assumes an EAP of about 28 percent, then this represents an income of about $1300 US, and of $1758 average income. The figures for the upper income range are less valid, since much expenditure was probably not reported, and some income was invested or saved.

GRAPH 4-1. FAMILY EXPENDITURES IN THE RIO BLANCO IRRIGATION DISTRICT, ACCORDING TO FARM SIZE*



a/ This group spends 38% of what the group with 50 hectares or more spends; 50% of clothing, 45% of food expenditures.

b/ If the family has five members, the average income is $5000. We assume that with an EAP of 25%, each worker supports 4 persons.

* Mexico, SRH, Comisión del Papaloapan, "La Capacidad de Pago y Otros Aspectos Socioeconómicos del Districto de Riego No. 82, Río Blanco, Veracruz", 1976.

Educational Improvements

The major changes in education are reflected in Chart 4-12. In 1950, only 44 percent of those over six years of age were literate. At that time, there were about 1000 schools in the Basin. There were only two junior high schools, with a total of 387 students.

Advanced schools begun in the 1950s included a vocational institute in Tenango de Rio Blanco, a teacher's school, a school for chemical sciences and one for technology in Orizaba, a fishing institute in Alvarado, schools for special studies in Cordoba and Nogales, and two boarding schools in Guelatao and Zongolica.

By 1970, literacy had reached 65 percent of citizens over age ten, still under the national average. But the number of schools had risen dramatically. In 1970 there were 2500 primary schools, 85 junior highs, 23 technical and 18 vocational high schools. But even in the Industrial zone, only a fifth of the people had at least completed a primary education, and in the Highlands, this percentage dropped to 5.6.

During the past sexenio, hundreds of schools were built in Tuxtepec. Oaxaca emerged as an important educational center for the entire Basin. There are three new advanced-level schools there and several new junior high and high schools.

Language. The corollary educational problem in the Papaloapan relates to language. In 1950, 15 percent of the population older than five years were monolingual Indians. An additional 16 percent were officially "bilingual," but this was most probably an overstatement, as many who were so categorized could only marginally read and write Spanish. This was principally a problem of the Highlands, where nearly a third were monolingual.

Although by 1970, the percent of non-Spanish speaking individuals had declined to only 8.3, in reality there was an absolute numerical decline of only 10,000, there being 168,700 total due to natural population increase. The major Indian groups are the Maxatecs (31%) and the Mexica-Nahuas (29%). The Mixe, Chinantec, and Zapotec groups comprise about 8 to 10 percent each of the monolingual Indians.

Summary

Although the Papaloapan Basin has opened up and become a focus for tropical migration, it is still not attracting large numbers of immigrants from nontropical regions. There is a long way to go before agriculture is modernized; or any part can be considered truly "industrial" or the inhabitants of the Colonization and Highland zones achieve a repectable levels of well-being.

But the combination of urbanization, economic diversification and increased production helped make the Lower Papalaoapan Basin a relatively successful provider of employment opportunities.

CHART 4-12. EDUCATIONAL INDICATORS IN THE PAPALOAPAN BASIN IN 1970*

	National	Basin	Regions				
			Industrial	Lowlands	Tuxtlas	Colonization	Highlands
Percent of population:							
Older than 10 years that is literate	76	65.2	80.8	66.9	60.4	72.1	58.1
Between 6 and 14 years that attends school			84.3	68.6	57.0	59.0	57.1
			Per thousand population				
That has completed primary	10		20.1	11.1	71.7	?	5.6
That has completed secondary	7.57		7.3	39 a/	25.8	?	18
That has completed more advanced schooling							
That does not speak Spanish	15 in 1950)	8.3	few	few	few	few	?
Number of:							
Secondary, Preparatory and Technical schools		85	10	12	10	3	10
Schools for advanced studies	(23 technical) (18 advanced)		7	4	2	0	0
			4	1	0	-	-

* México, SIC, Noveno Censo de Población 1970 (Published in 1972); Mexico, SRH Comisión del Papaloapan, Diagnóstico Socio-Económico de la Cuenca, 1973 for monolingualism and location of schools.

a/ These data do not include the municipios of Oaxaca.

The standard of living there is not "high" but it is comfortable, and in several areas the benefits of development are widely shared. The basic physical and social infrastructure exists with which to expand the prosperity so evident in some places. The following chapters examine four of these places, in an attempt to isolate the factors which encourage this type of growth.

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CHAPTER 5. ECONOMIC DYNAMISM IN THE BASIN--FOUR CASE STUDIES

In the preceding chapter, we presented a general analysis of "change" in the Papaloapan River Basin--what happened, what didn't happen in the course of 30 years of "development." The mere accumulation of this data, however, gives little explanation of why the changes occurred. Which programs were successful in increasing land under cultivation? Why is labor absorption a relatively minor problem in the Papaloapan? What factors encouraged industrialization? How much of the development was due to careful government planning, how much to luck, how much to private initiative? Have welfare benefits spread evenly through the population?

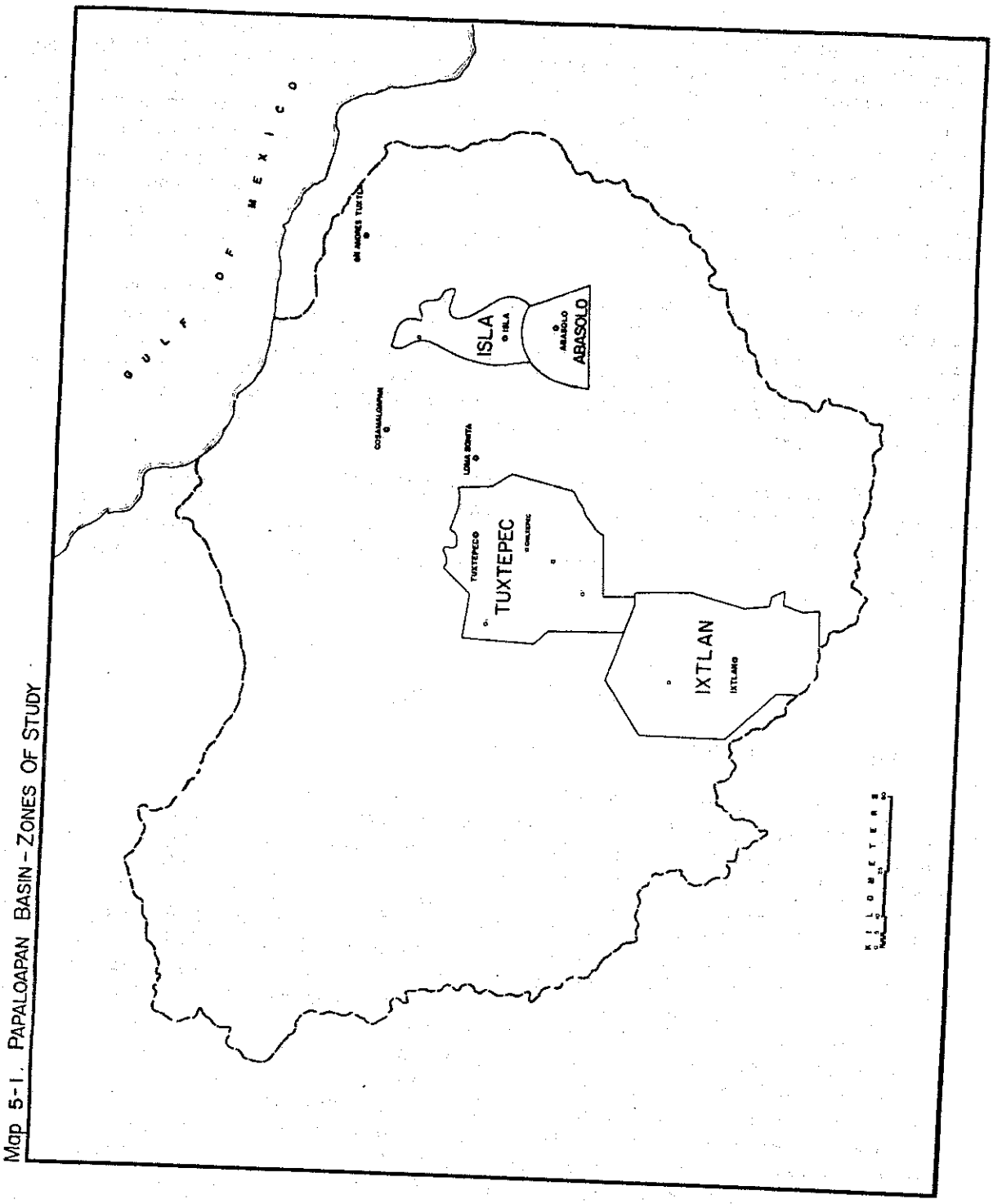
The data is too incomplete, the systems too discontinuous and uncoordinated for formal correlation analysis. Furthermore, as was noted earlier, development has varied greatly between regions and between localities in each region. It is of much greater interest, therefore, to study in depth individual examples of successful development, and to draw conclusions from their combined experiences.

Our definition of successful development meant: 1) a growing economy in terms of production; 2) broad distribution of benefits; and 3) significant increase in the employment of labor and provision of jobs. We chose four areas of particular dynamism in the Basin: Isla, Abasolo del Valle, Tuxtepec and Ixtlan.

The Zones of Study

Map 5-1 shows the location of these zones.

"Tuxtepec" probably provides the most dramatic example of development in the Basin, at least in terms of population increase and radical change of economic base. In 1945, the population of the city of Tuxtepec, Oaxaca had suffered a severe decline, due to the flooding of the year before. The economy was in decline anyway because of the collapse of the banana boom in the 1930s. There were about 40,000 inhabitants in the zone--which comprised five of the municipios in the District of Tuxtepec--Tuxtepec, Chiltepec, Ojitlan, Jacatepec and Valle Nacional. By 1970, the population was 90,000, and by 1976, 130,000. The city of Tuxtepec in 1976 had 50,000 people and a real boom-town atmosphere: construction everywhere, pavement, traffic jams. The city has become the heart of the Papaloapan Basin--its most important commercial and industrial center outside the Industrial Zone. It is the second most important city in the State of Oaxaca and its prospects affect the entire zone. Sugar cane and rubber are the growth crops of the past decade and they cover hundreds of hectares of land that were never in cultivation before. There has been a host of social investments made--dozens of schools, health center, water and sewage systems. There are two large factories, a dozen smaller ones, and several under construction.



Map 5-1. PAPALOAPAN BASIN - ZONES OF STUDY

"Isla" refers to the area within the boundaries of the municipio of Isla, Veracruz, in the Tuxtlas region. Thirty years ago, there were barely 6000 people living there, 2000 in the town of Isla, a small station on the railroad. The area was poorly communicated and only a fraction of the land was cultivated. Most was dedicated to very extensive grazing except for subsistence crops and some minor pineapple production. Now, this is one of the richest and most dynamic areas in the Basin. Its wealth comes from well-managed cattle operations, a real boom in pineapple production, both for processing and the fresh fruit market and an enormous community effort to bring modernity and civilization to the town. There are probably close to 12,000 inhabitants in the town now, and 20,000 in the whole municipio.

The area "Abasolo del Valle" comprises a large colony in the northern part of the municipio of Playa Vicente, in the Colonization Region. At the time the Papaloapan Commission entered the Basin, this colony did not even exist, and the zone, mostly tropical rainforeest, was practically uninhabited. Today, Abasolo del Valle is probably the richest colony in the Papaloapan Basin. This movement into Playa Vicente was almost purely spontaneous and is one of the most successful examples of nondirected colonization movements in Veracruz. Almost all the land in the zone has been cleared--primarily for livestock production and in the past few years a rapid process of technological change has taken place, despite relatively poor communications. In just that one colony today there are 3000 inhabitants, and hundreds come seasonally from nearby colonies to work there.

"Ixtlan" is the zone which refers to the bulk of the Sierra de Juarez in the state of Oaxaca. Its towns, centuries old, are perched on the sides of steep mountains, and its citizens have always struggled hard to make a living. Before the Papaloapan Commission was ever created, they were doing an admirable job of surviving through an assortment of means. But in the two decades that followed the great flood of the lowlands, the Sierra went into decline due to a series of misfortunes and political problems. Emigration by the early 1970s was pronounced and the living conditions of the inhabitants quite bad. In 1972, however, a new forestry program was started in the Sierra by the Tuxtepec Paper Mill, coupled with small-scale investments from other sources. These have suddenly reversed the emigration and have resulted in major improvements in incomes and living standards in Ixtlan. Commerce is on the rise and a number of small-scale industries have been opened. The experience of Ixtlan demonstrates that development programs in the marginal highlands areas can be not only viable, but have very important rewards from the standpoint of employment creation and slowing down the flow of poor, unskilled migrants to the cities.

Data Collection

In order to collect the data for these case studies, various sources were used. Since one of the most important changes to be measured was land use, a study of aerial photographs was undertaken. A series shot for the Papaloapan Commission in 1954 was used as the basis for maps

portraying the "before" picture in each of the four zones. Another series shot in 1972 was used for the "after" maps.

The National Census of Population VI, VII, VIII, and IX were used for demographic data and living standard indices. The National Census of Agriculture and Livestock was used for production figures, as well as the preliminary data collected for these Censuses for information at the municipal level. The Industrial Census of 1950, 1960, and 1970 provided basic data on the industrial sector activities.

Almost all of the detailed information, however, came directly from the producers. For all industries mentioned, information on employment, production, prices, technology came from company files or through interviews with company managers. All information on credit lines, both private and public, came directly from bank personnel. Interviews were carried out with staff members of all the government assistance programs mentioned in the chapters. The various departments of the Papaloapan Commission had invaluable data on all aspects of the economy and on their own programs. The archives of the municipios themselves provided most of the data on history, municipal investment and much of that on population and production. Much of the historical information also came directly from individuals whose lives were spent in those areas. Forty farm families were interviewed in depth.

A great effort was made to corroborate all of these sources of data, because, as can be imagined, they did not always agree. What is presented then is, unless qualified, what the author considers to be the most reliable information.

Particularly important to a discussion of employment were population figures--for which there are no figures anywhere for 1976 that are completely reliable. Once a "best estimate" was chosen, an attempt was made to classify demographic increase into natural increase, immigration to rural areas and immigration to urban areas. The rate of natural increase was assumed to be 3.5 percent yearly--the Mexican average--for all but Ixtlan. It is probable that the true rate is lower, but to avoid overestimating immigration, this figure was used. Local population estimates from the local school census, transport facilities, municipal records, and the Malaria Eradication Census were used to separate rural and urban population figures, as well as obvious sources of new workers such as new industries, for which exact figures were available.

The next step was an attempt to divide the new population by sector of employment. The 1970 figure for percentage of population in the EAP was generally applied to the 1976 population figures. Where there was suspicion of overestimation of the new labor force, a lower rate was applied. The resulting figures for sector employment--taken as they were from impressions of the various persons interviewed, or compiled from available but incomplete information on number of industrial jobs, number of commercial establishments, etc.--are not exact. They are meant to provide an idea of how labor patterns in each zone have changed.

CHAPTER 6. TUXTEPEC: THE NEW CENTER OF THE PAPALOAPAN BASIN

The city of Tuxtepec, Oaxaca is the heart of the Papaloapan Commission's territory. Today, it is the "boom town" of the Basin, and the rich countryside around it is finally revealing its potential.

Traveling down any highway to approach the city, one is greeted by either intense sunlight or intense rainfall, depending upon the season. There are cool plantations of tall rubber trees, bunches of bananas hanging all along the river, and a sea of sugar cane in every direction, that is particularly lovely when in blossom. (Agronomists say that cane should not be allowed to blossom, but maybe they have overlooked its aesthetic value.) The area around the city is fairly flat, but the foothills of the Sierras lie visible to the south, and farther, the tall mountains themselves. Map 6-1 shows the city and its physical relationship to the hinterland municipios upriver.

Entering urban Tuxtepec 1/ one is struck by the traffic, and the bustle of construction crews everywhere. Nearly 50,000 people live there now. The streets of the city center are filled with shoppers in modern and native garb. Enough of the city is new that the bright pastels of the concrete block houses are nearly as pretty as the thatched-roofed homes on the outskirts.

There are great contrasts of wealth. Ducking off the paved streets with their fancy houses, one is likely to be met by a family of pigs or chickens escaping from some poor man's garden or shack.

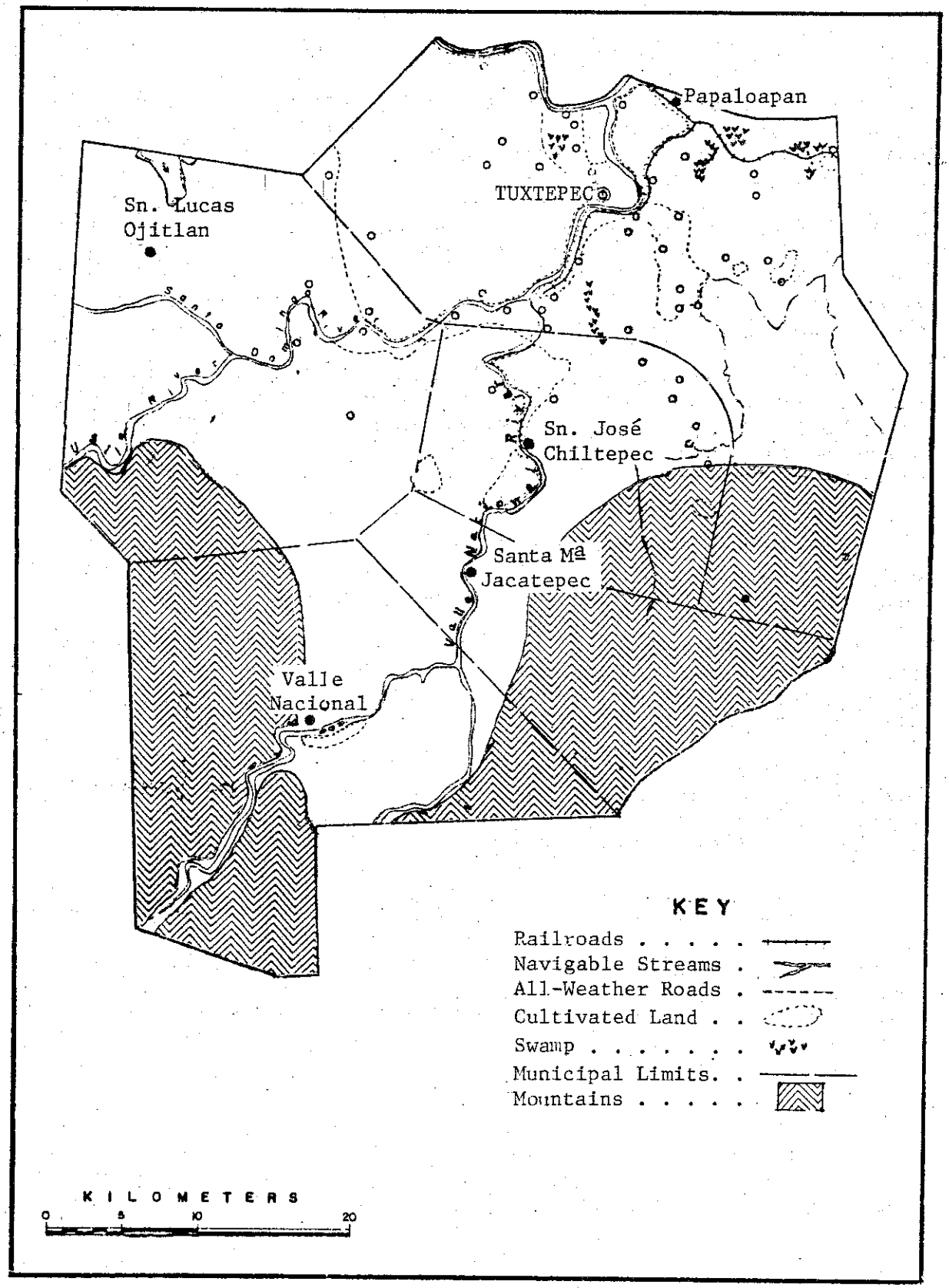
Yet the place clearly reflects its "civilization." Almost no one is left out on the quiet, lighted streets after 9:00 in the evening -- over a third of the families have televisions -- and a city ordinance required the bars to be hidden from public view.

The scenery turns abruptly nonurban upon leaving town. The coastal plain is dotted with bananas, sugar cane, chile and pineapple fields, and herds of cattle. Yet rural Tuxtepec is fairly densely populated. Those living in the rural communities are in close contact with the city.

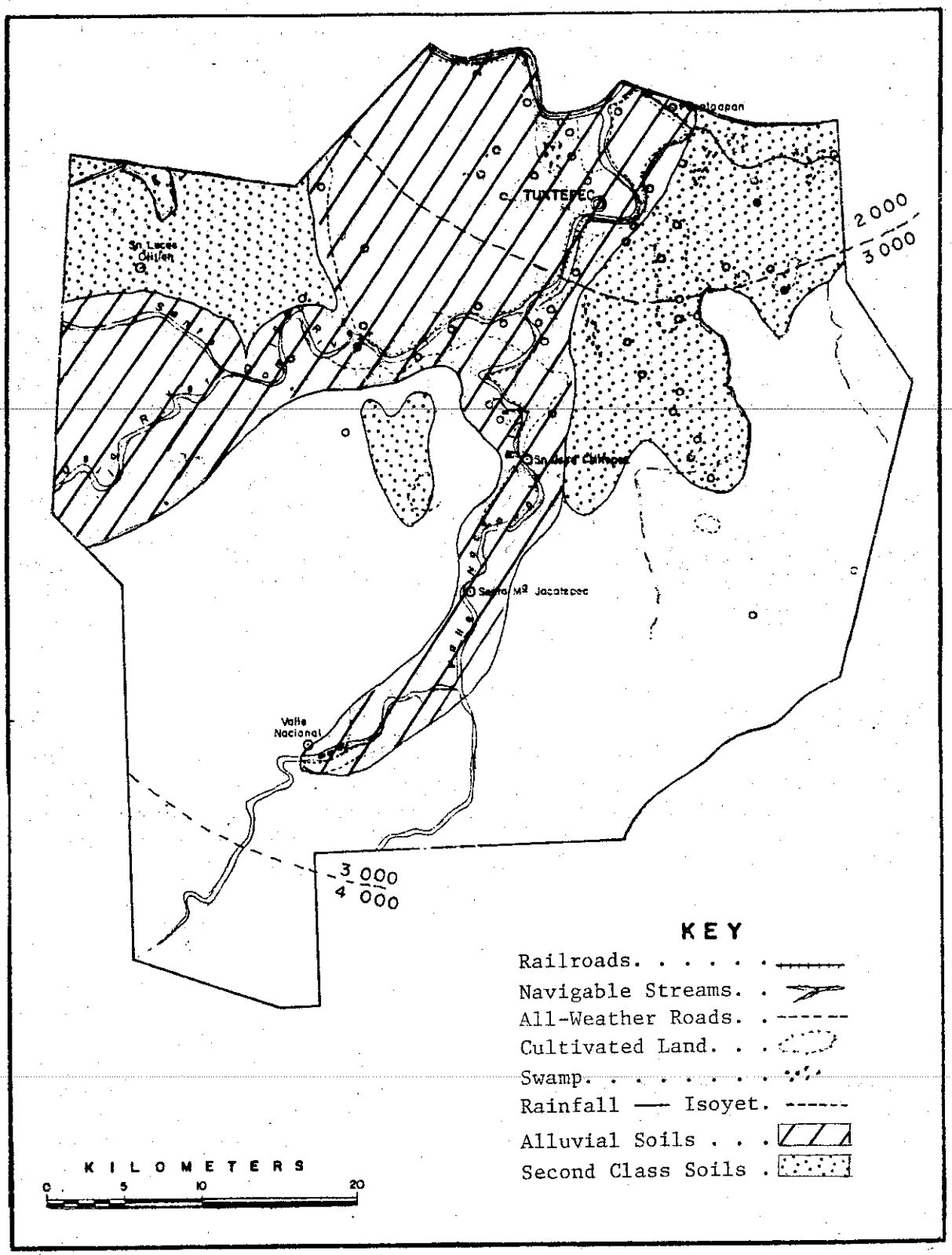
The most fertile agricultural lands in the zone are along the rivers. Moving up the Santo Domingo and Valle Nacional rivers, the terrain becomes more and more rugged outside the narrow river floodplains and nearby rolling hills. Plains change to rain forest. The mountains receive up to 4000 millimeters of rain annually, among the highest in the Basin. To the west there are rice fields, to the south tobacco, to the southeast maize and beans and sugar cane. Map 6-2 gives the location of the main soil types and rainfall patterns.

1/ Henceforth, we will call the city of Tuxtepec "urban Tuxtepec," the rest of the municipio "rural Tuxtepec," and the four upriver municipios collectively the "hinterland." "Tuxtepec" refers to the entire municipio.

MAP 6-1. "TUXTEPEC" ZONE: MUNICIPIOS



MAP 6.2. "TUXTEPEC" ZONE: RAINFALL AND SOILS*



*Comision del Papaloapan, Programa del Bajo Papaloapan (Cd. Aleman, 1974).

Except on large private ranches, there is much more poverty evident here. The mountains are full of Indians living at a near subsistence level. Nonetheless, they too have important interactions with the city, with bus transportation the major link. Many amenities of modern life are visible in the larger hinterland towns.

The Nature of the Changes, 1945-1975

The picture back in 1945 was very different. Only 5000 people then claimed urban Tuxtepec as home, and the 1944 flood had driven most of them out. Although the town was also then the center of the Oaxacan Greater District of Tuxtepec, the outlying municipios had very limited relations with it due to complete absence of any transportation other than the river system. The Chinantec, Mixtec and Zapotec mountain people spoke their own Indian languages and had a fairly closed social system. The large ranchers controlled most of the valleys, used for extensive grazing. Almost all ejidal agriculture, even on the coastal plain, was of the subsistence type, using shifting cultivation techniques.

The extraordinary changes that occurred since then are quantifiable (with confidence) only through 1970, with the national census data. Since the most dramatic developments took place after 1970, we have been forced to use "best estimates" derived from official and unofficial sources to construct a picture of modern Tuxtepec. While the resulting numbers are probably wrong, their magnitudes should reflect accurately the changes that took place.

Communications

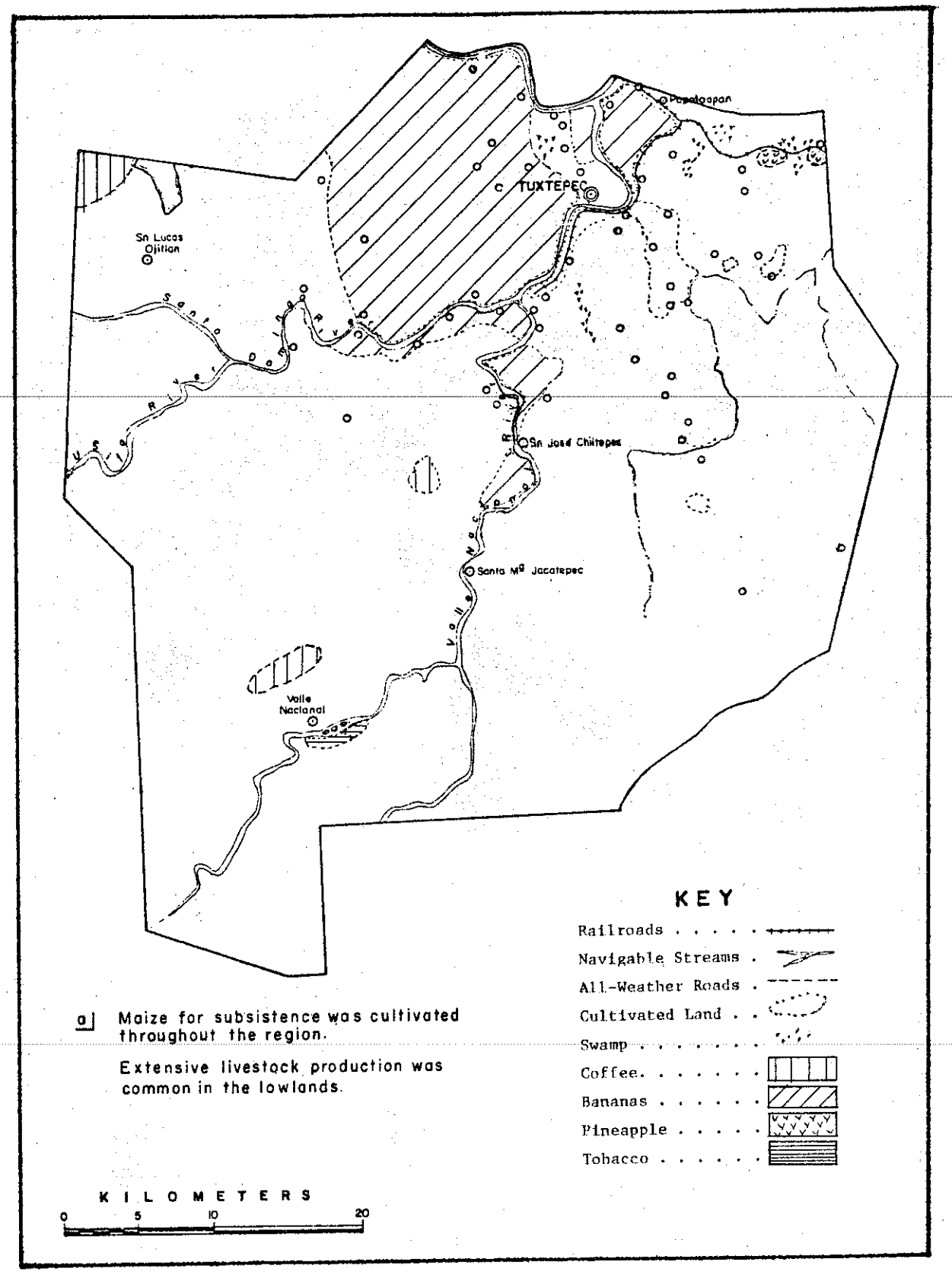
Probably the most radical single change wrought between 1945 and 1975 was that from relative isolation from the rest of the country and state to complete integration. Maps 6-3 and 6-4 compare the systems. Urban Tuxtepec is now the hub of the Basin's transportation net, and the most important link for the Central Plateau to southern Mexico.

Population

The region's population more than tripled, as shown in Graph 6-1. Not only did urban Tuxtepec itself grow to be a major city, but there are urban centers blossoming in the communities of Ojitlan, Valle Nacional, Benemerito Juarez, Papaloapan and Chiltepec[2/] (9). While in 1950 the urban population--i.e., Tuxtepec city--accounted for only an eighth of total regional population, it now acounts for approximately a third.

2/The first two have over 2500 inhabitants; the latter three between 1800 and 2000.

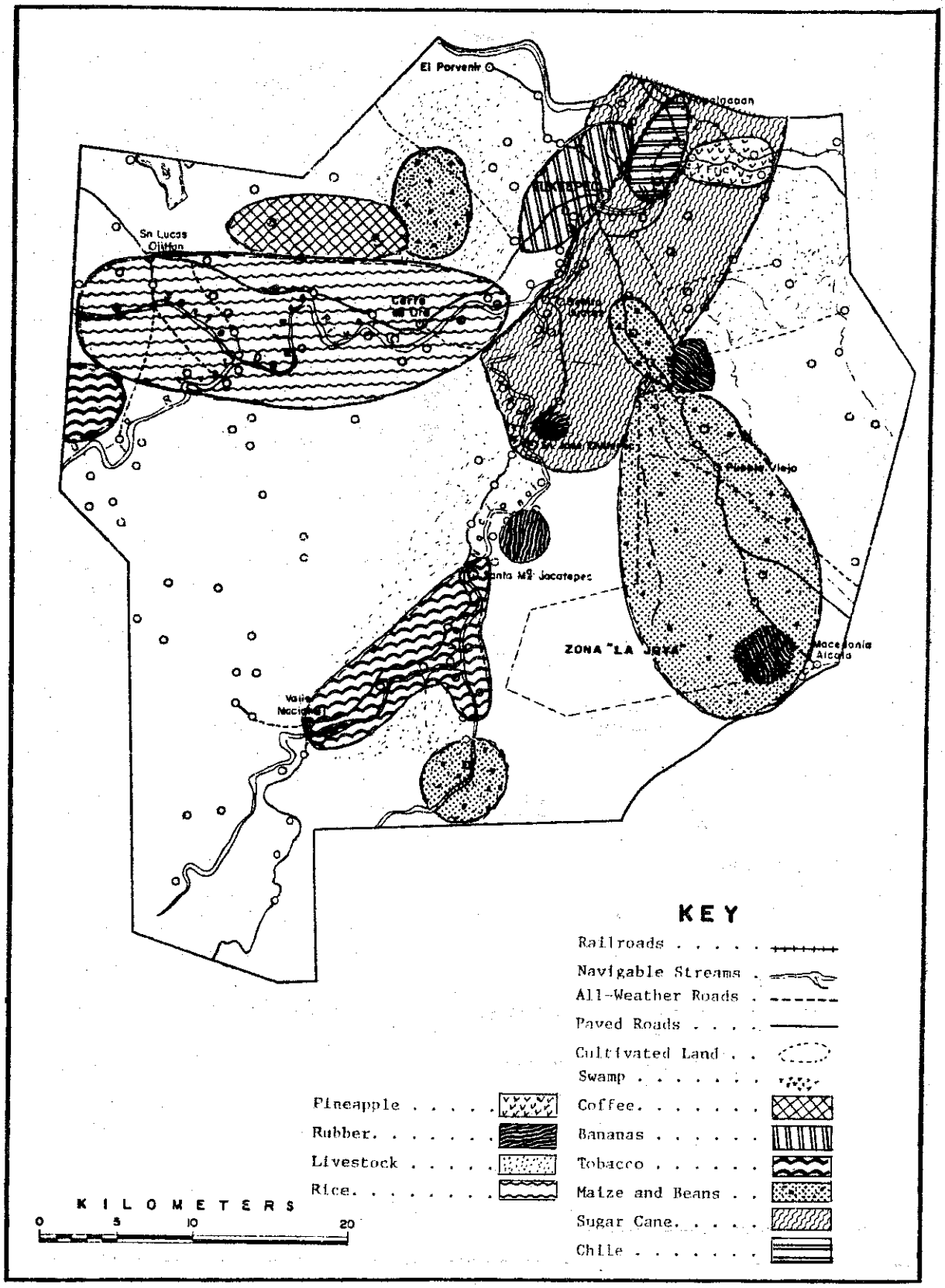
MAP 6-3. "TUXTEPEC" ZONE: COMMUNICATIONS AND AGRICULTURE, 1950[a/]



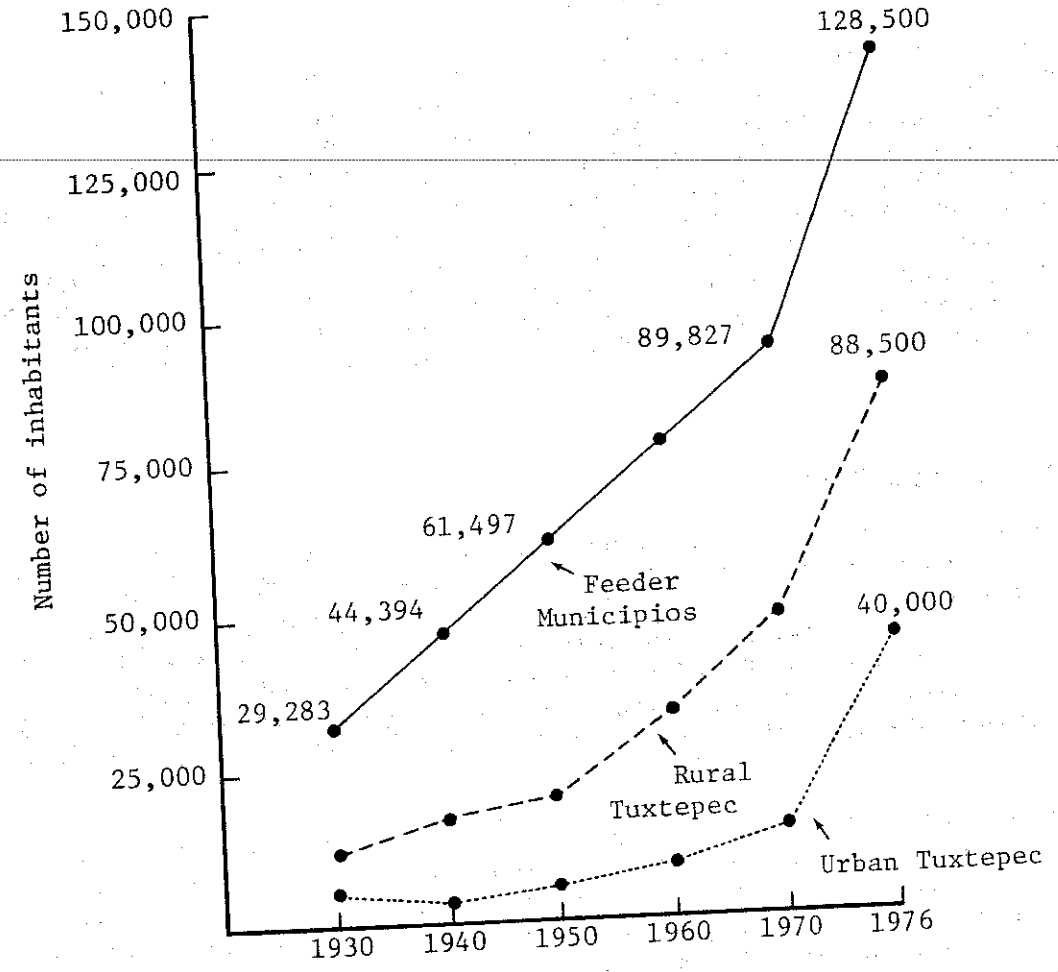
a/ Maize for subsistence was cultivated throughout the region.

Extensive livestock production was common in the lowlands.

MAP 6-4. "TUXTEPEC" ZONE: COMMUNICATIONS AND AGRICULTURE, 1976



GRAPH 6-1. POPULATION CHANGES IN TUXTEPEC, 1930-1976*



* Mexico, SIC, Quinto, Séptimo, Octavo, y Noveno Censo de Población (published in 1932, 1952, 1962, 1972); 1976 figures are estimates based on Tuxtepec Municipal government and Comisión para la Eradicación del Paludismo of the SSA 1976 information.

Agriculture

The dramatic transition of the area to commercial farming from primarily subsistence agriculture is shown in Maps 6-3 and 6-4 and Charts 6-1 and 6-2. In 1950, the only important commercial production was of bananas on the riversides, a little bit of pineapple, and low technology livestock raising and fattening, all located close to the rivers.

During the next twenty years, there was diversification into rice, coffee, chile, tobacco, cane and commercial maize and bean production. Almost all the flat lands in the zone were cleared for semi-permanent or short-fallow agriculture, except along parts of the recently opened road to Palomares. Pasture land particularly has increased, and at least twenty percent is now in cultivated species. There are over 125,000 head of cattle, up from 25,000 in 1950.3/

In many places livestock production is now replacing crops in importance, but very large land areas have been opened over time to commercial crops. The charts underestimate the real growth of agriculture through 1976 because intensity factors are not included. Fallow periods in much of the area have been cut at least in half in only ten years, which has been the main incentive to use purchased agricultural inputs. In 1950, almost no mechanical or chemical inputs were being used, now most farmers commonly utilize at least one "modern" input. Skewed land tenure patterns remain, but ejidatarios as well as the large landholders are participating in agricultural expansion.

Incomes and Employment

The economy of Tuxtepec has markedly diversified, and has supported a work force that grew from 13,400 in 1950 to about 37,000 in 1976. Graph 6-2 illustrates changes in the sectoral distribution of the EAP. In 1950, only five percent of the workers were employed in industry and 13 percent in services. By 1976, 14 percent were in industry and 22 percent in services. In urban Tuxtepec these sectors included 25 and 59 percent respectively of the labor force. Maps 6-5 and 6-6 show industry locations.

There were only two small lemon essence plants in the zone in 1950, which have since been closed. The important industries now include a sugar mill, paper mill, rice mill, rubber processing plant and fruit cannery, which together employ about 1600 workers. There are under construction in Tuxtepec half a dozen more small-scale plants.

A booming commercial center has grown up in urban Tuxtepec. In 1975, there were about 715 commercial establishments, of which 100 were

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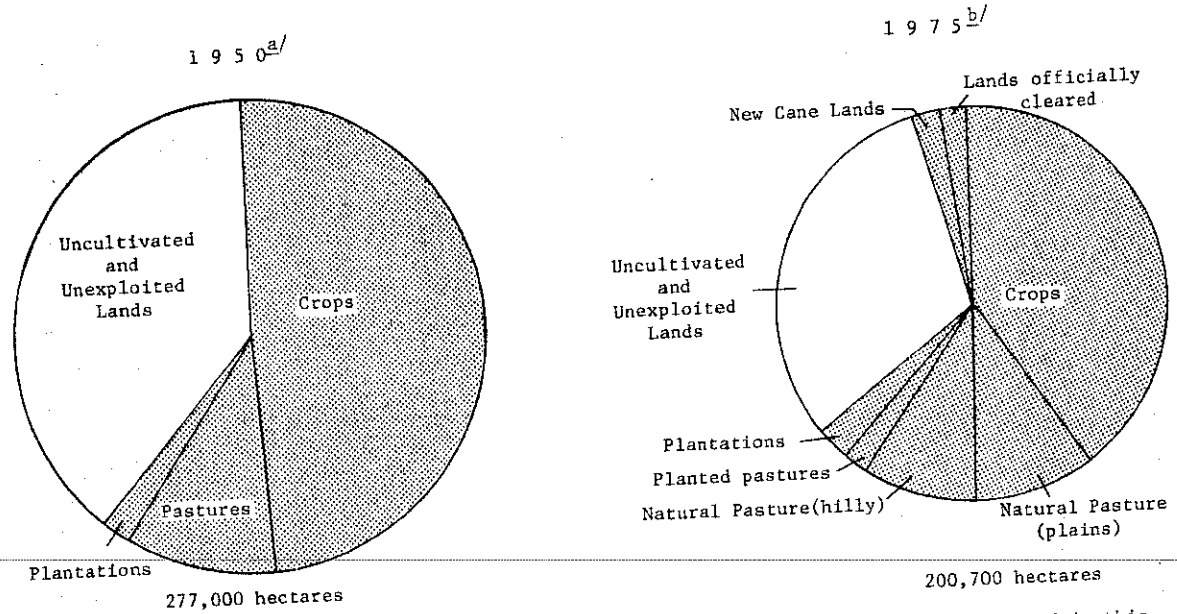
3/ If, in 1950, there were 28,430 hectares in pastureland in the total district, at most 25,000 were in this region, and the density of cattle was surely less than one animal per hectare.

CHART 6-1. CHANGES IN LAND USE IN TUXTEPEC, 1950-1970*

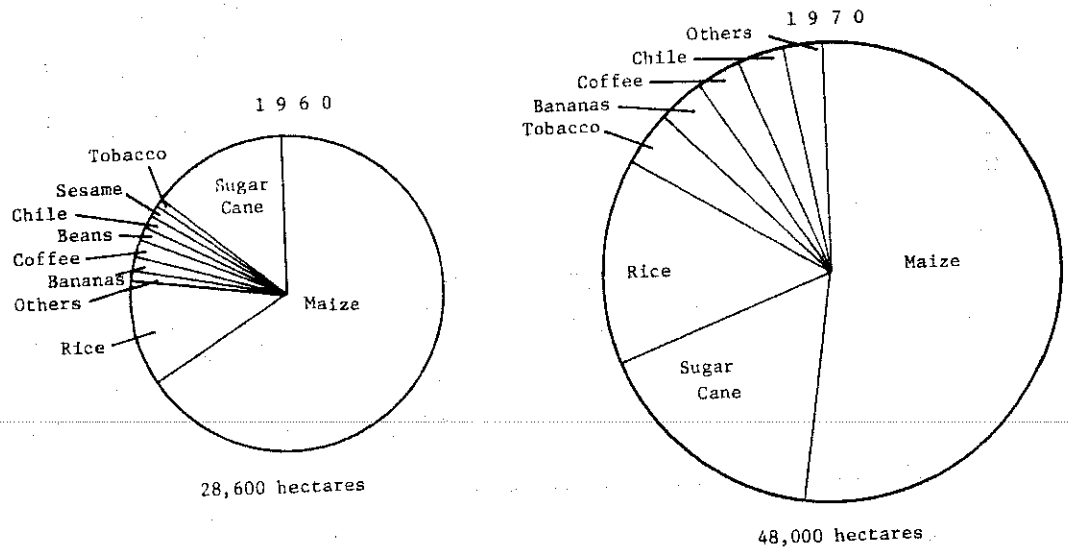


a/ 1950 data is for the entire Greater District of Tuxtepec. The municipios included in this study account for 70 percent of the Greater District Area.

b/ Figures are from 1970 data, adjusted from field research and official data for 1970-75.

* Mexico, SIC, Censo Agricola Ganadero 1950 y 1970 (published in 1955 and 1975).

CHART 6-2. CHANGES IN CROP COMPOSITION IN TUXTEPEC, 1960-1970* a,b,c/



a/ The areas presented here cover both winter and spring/summer cropping. Because much of the land area is double-cropped -- this does not represent exactly the quantity of land utilized.

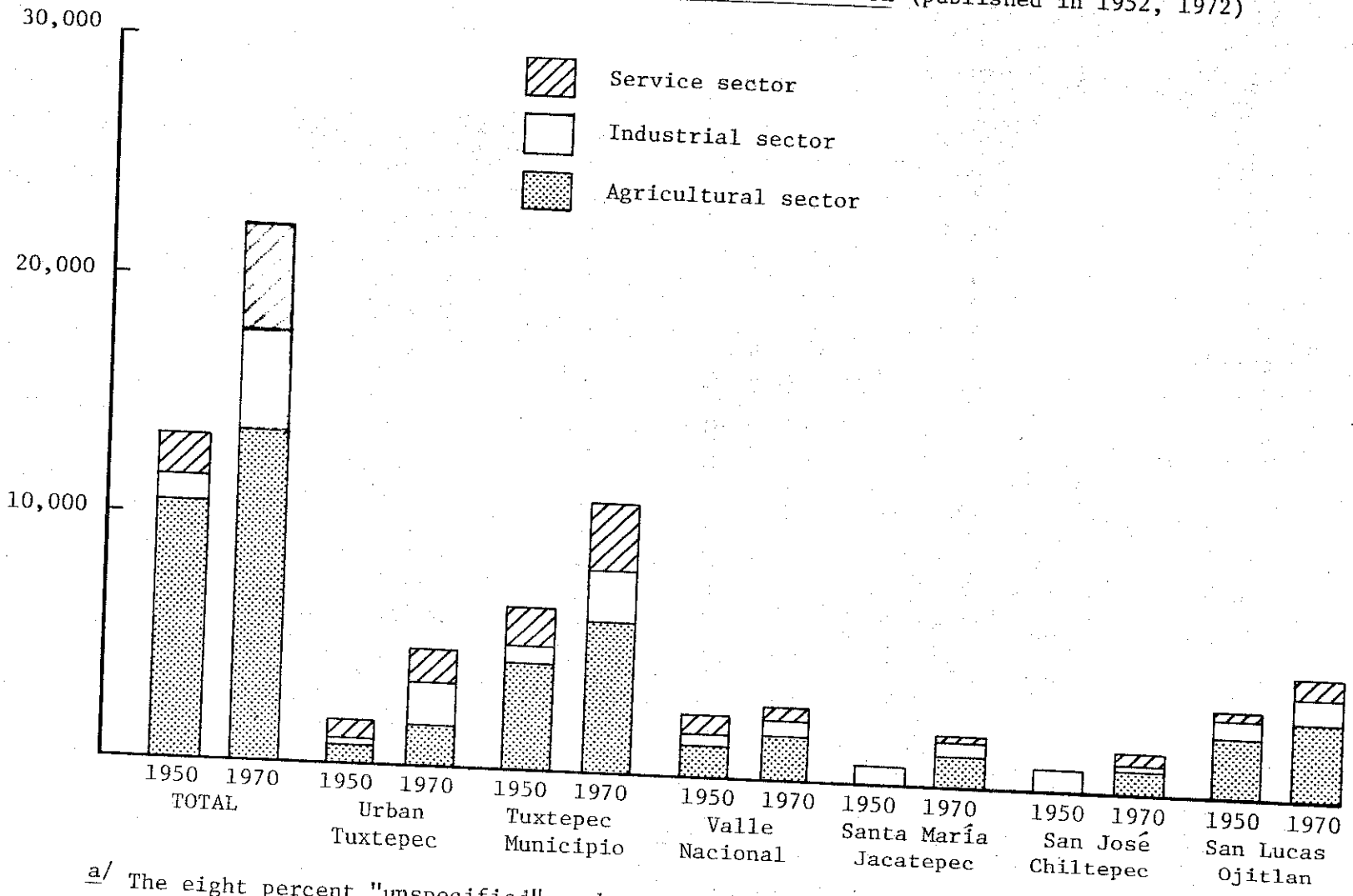
b/ See Appendix 6-A for crop composition in each municipio.

c/ Note that the cropping fallow index dropped from 3:1 in 1960 to 2:1 in 1970.

* Mexico, SRH, Comisión del Papaloapan "Cultivos 1961", "Frutales, 1961," "Cultivos 1970," "Frutales, 1970" (unpublished).

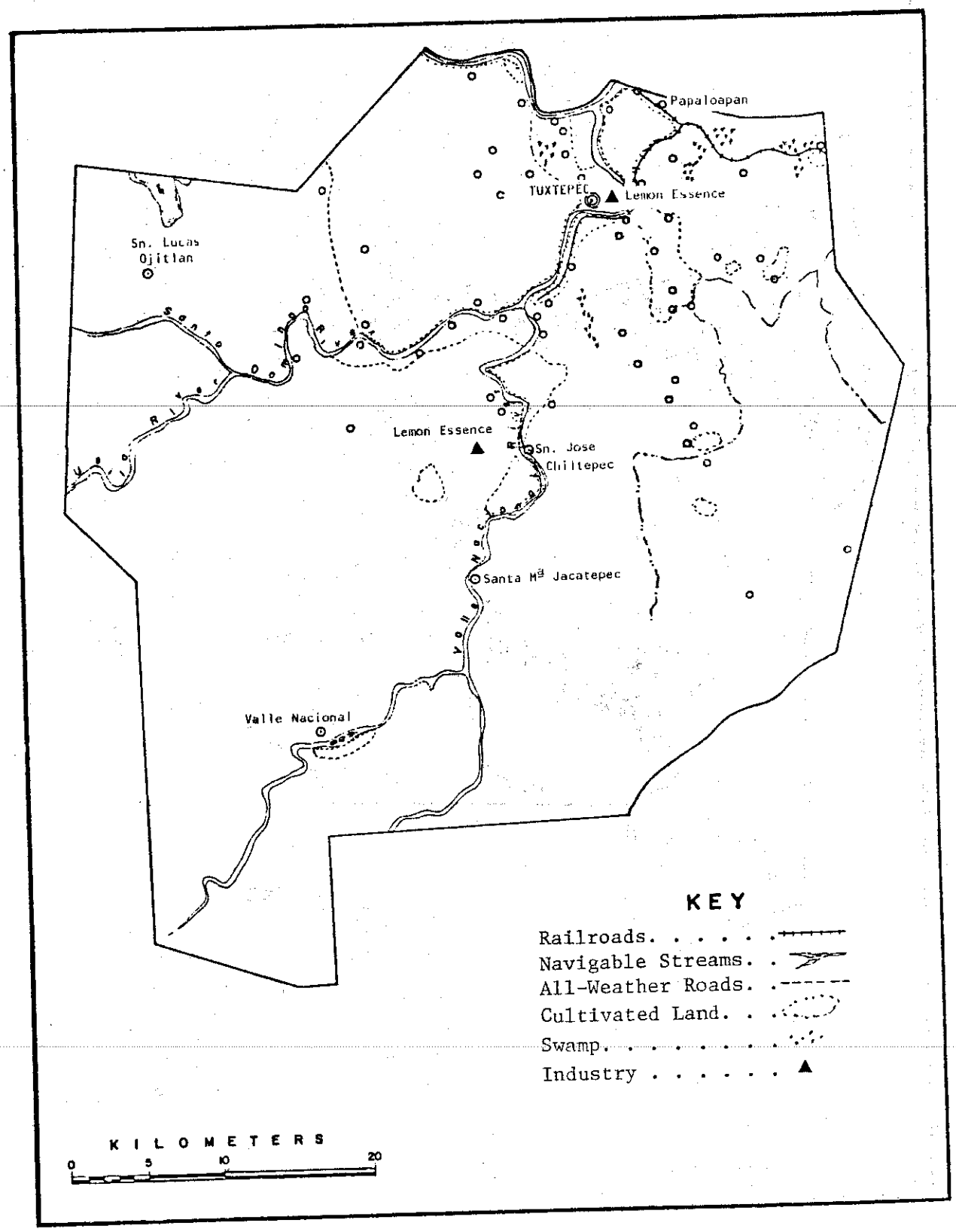
Graph 6-2: Sectoral Distribution of the Economically Active Population of Tuxtepec*

* Mexico, SIC, Séptimo y Noveno Censo General de Población (published in 1952, 1972)

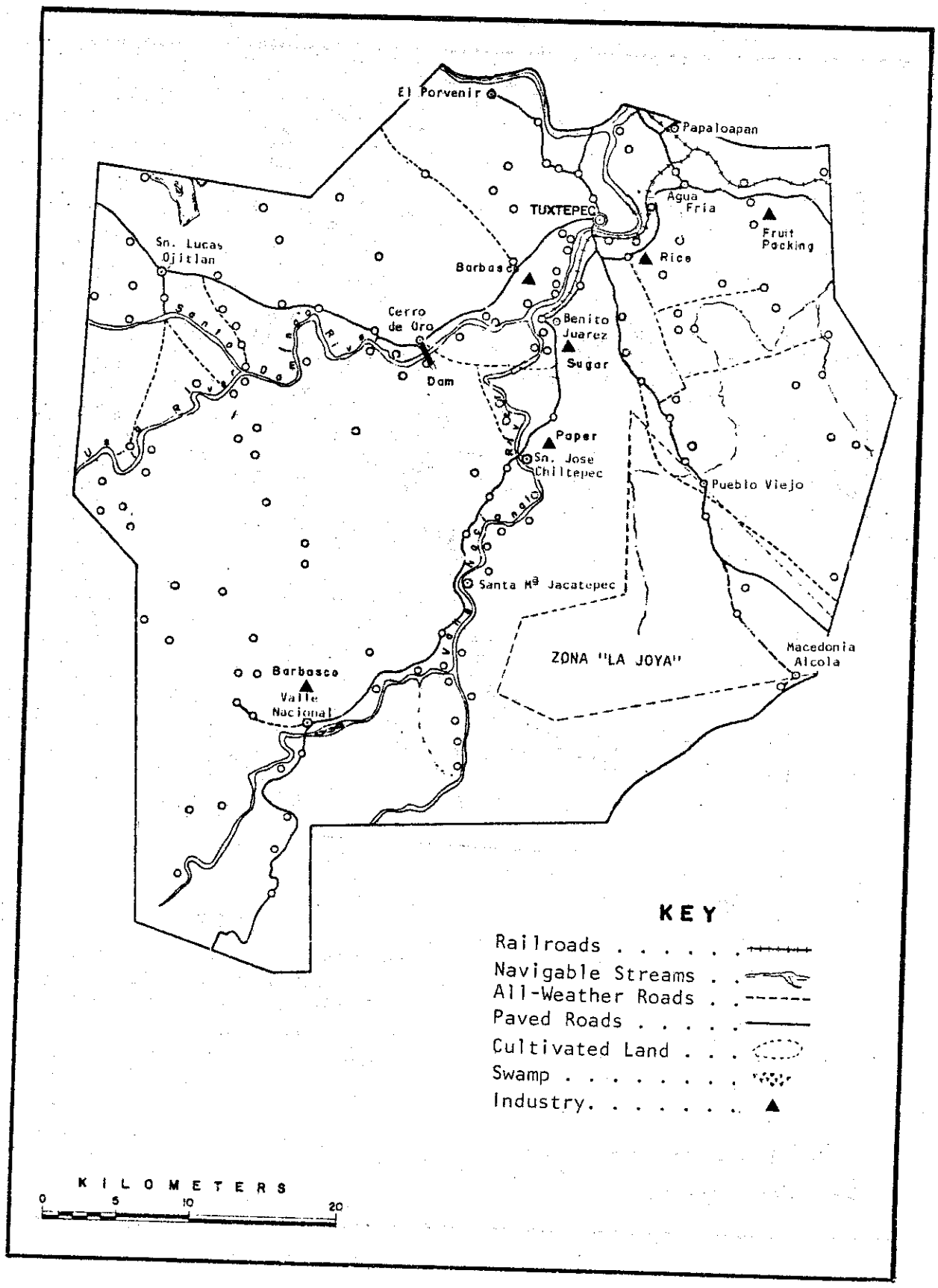


a/ The eight percent "unspecified" we have distributed proportionally among the three sectors.

MAP 6-5. "TUXTEPEC" ZONE: INDUSTRY, 1950



MAP 6-6. "TUXTEPEC" ZONE: INDUSTRY, 1976



"important" and highly capitalized (11). Ojitlan and Valle Nacional are also enjoying a period of commercial prosperity. With growth in these other sectors, and improvements of the communication system, transportation activities have escalated rapidly as well.

Living Standards

In 1950, a third of the Tuxtepecanos enjoyed good drinking water, but outside the Tuxtepec municipio, there was no potable water or sewage facilities. Living standards in general were very low. Less than a quarter of the population over six years of age was literate. Flooding was a frequent problem in the lowlands and many health problems were endemic.

Chart 6-3 gives Census and Commission statistics for the major indicators for the early 1970s. This data is already outdated; the "civilization" that took place since then is visibly evident. The city has been fully protected from flooding. Infrastructure is still far superior in urban Tuxtepec, but there have been improvements everywhere.

Cultural Change

The modernization of Tuxtepec has been more than a mere change in physical appearances and production. There have been significant changes in outlook. In part, this is due to substantial numbers of educated people who came in from outside. Numerous technicians, engineers and managers moved to Tuxtepec with the industries, and radically changed the nature of "high society" from the rich landowning gentlemen ranchers who traditionally ran Tuxtepec.

The town is now building a "House of Culture," whose auditorium is already finished. An Athletic Center was established last year and regional sports events are held to attract tourists. Most interestingly, a very large number of small sugar cane farmers now have local bank accounts.

There is strong emphasis on education for children. All schools in the Tuxtepec municipio now have titled teachers, and all agrarian communities have primary schools. There are three kindergartens, seven primary schools and seven junior high schools in the town. There are also more advanced level schools for technology, teachers' education, and forest technology, as well as a special program for children of migrant cane workers.

Urban Tuxtepec is certainly a modern city by anyone's definition. Rural Tuxtepec shows unmistakable signs of prosperity, and the potential for sharing the wealth with the hinterland municipios is there.

How was such a marked transformation brought about? Who have been the principal beneficiaries?

CHART 6-3. LIVING STANDARDS IN THE TUXTEPEC ZONE IN 1970*

(percent)

Standard:	Urban Tuxtepec	Tuxtepec Municipio	Valle Nacional	Chiltepec	Jacatepec	Ojitlán
Literacy (of the population older than 6 years)	80	71	- - - - - - - - - range 51 to 61 - - - - - -			
Schooling past sixth grade (of the population older than 14 years)	30	- - - - - - - - - - - - - - - - no data - - - - - - - - - - -				
Potable drinking water	66	50.0	25.0	33.0	7.0	20.0
Sewerage	42	25.0	9.3	20.9	1.0	.7
Nonearthen floor	66	- - - - - - - - - - - - - - - - no data - - - - - - - - - - -				
Radio	75	48.0	53.0	56.4	51.1	42.3
Television	33	1.8	.1	none	.1	.1
Electricity	23	45.3	13.9	21.1	5.1	1.2

*México, SIC, Dirección General de Estadística, Noveno Censo de Población, 1972.

Traditional Tuxtepec

The town of Tuxtepec is at least 1000 years old. The first settlements were in the foothills, by the Mazatec, Chinantec and Ojitec Indians. For centuries, the town of Tuxtepec has been the commercial center for these people. Seven to nine hundred years ago, the Zapotecs and later the Aztecs used the city as a tribute center for cotton goods, rubber and cacao. The site was vital during the days of river travel--through the Colonial Era up to the present century--as urban Tuxtepec was the farthest point upriver which could be traveled to by boat (5, pp. 17-19).

Furthermore, the town was looked to as the political center for most of the villages upstream. Like Orizaba and Playa Vicente it was a "boca de la Sierra" or "mouth of the mountain" through which all travellers and trade from the highlands had to pass.

The earliest record of a serious flood was in 1571. In the mid-1800's flooding began to occur at about six-year intervals, but the water stayed on the land only three to four days. The resulting sediment was beneficial to crop production, and there was no major interruption of trade except what was normal in the rainy season when the city was water-bound. But muddy conditions in the highlands prevented trading there as well (3, pp. 38-39).

Railroad and Revolution: 1900-1920

During the late 1800s, the Veracruz-Isthmus railroad was built and made a stop at "El Hule" (now known as Papaloapan, Oaxaca). By boat, one could travel easily to urban Tuxtepec and this reinforced its position of importance for the Sierra.

Ojitlan grew substantial amounts of commercial coffee at this time, and Valle Nacional was particularly important for its tobacco exports of high-quality filler leaf. Spanish-owned plantations in the latter were forced to import contract laborers from the more populous parts of the county to replace the indigenous Chinantecs, who, upon losing their land, fled to the hills (4, pp. 61, 143). The region became infamous throughout Mexico for being a virtual slave labor camp and depository for political prisoners of the Diaz regime.

The extreme concentration of land in the Tuxtepec lowlands further heightened local resentments. After the Revolution, the tobacco owners were driven out and many of the largest holdings were broken up. Both cattle and tobacco production was seriously disrupted.

Era of Green Gold: 1920s

In 1923, the Standard Fruit Company arrived in the Basin. Wherever suitable, the land from Cosamaloapan and Tuxtilla to Ojitlan was planted

to roatan (Gros Michel) bananas. The boom in the fruit market marked an age of prosperity--at least for the minority of private growers involved. In 1928/29, 40 percent of all taxes for Oaxaca State were collected here. This period is still referred to as the era of "Oro Verde"--"green gold" (13).

Nonetheless, population in the town never exceeded 5000. In 1930, the population of the whole region was only 28,907, according to the Census. Over half lived in Tuxtepec municipio, almost a third in Ojitlan and an eighth in Valle Nacional.

The 1920s and 1930s also saw the introduction of Zebu cattle to the Zone, and the rapid clearing of three fourths of the entire district for ranching. There were even some crosses with Brown Swiss made at this time. Over the next two decades, the area became one of the fattening centers of the Basin.4/ (1).

Stagnation: 1930s and 1940s

But in 1932/33, the Panama disease struck and devastated the banana plantations. The disease cannot be chemically controlled, and is only overcome by establishing resistant varieties. The company chose instead to depart, and Tuxtepec's economy never entirely recovered, despite the cushion of ranching, until recent years.

Around the early 1920s, the frequency and duration of flooding had begun to increase, and this--coupled with lack of a profitable crop--effectively stifled important agricultural expansion on the floodplain. Many ejidos were set up by Cardenas on land abandoned by the banana growers--avoiding the disputes common elsewhere. But the other ejidos were more often established in the hills and mountains far from transport facilities. The ejidatarios remained for the most part outside of commercial agriculture.

The huge 1944 flood was the low point in Tuxtepec's history. A good part of the city was destroyed, with a loss of about M$3 million ($13.5 million in 1974 pesos).5/ One hundred persons, at least, were killed. The flood reached south of Tuxtepec as far as the branching of the Valle Nacional and San Cristobal Rivers.

4/By 1950, there was a Livestock Association in the municipio of Tuxtepec, and five tick baths in Chiltepec.

5/This assumes that $1.00 of 1974 money is worth $4.50 in 1944 money. This is extrapolated from Commission inflation indices for 1947-1974, with 1947 = $4.30.

Almost the entire population of the city moved away that year. Many returned after the waters subsided and homes were rebuilt, but in 1950, there were still only 5800 persons living there.

The Papaloapan Commission and Two Decades of Development

When the Papaloapan Commission was created in response to flooding and general interest in tropical development, Tuxtepec was its center of operations. All of the Commission's first major capital investments served to benefit the city directly.

Flood Control

After completion of the Pres. Miguel Aleman Dam, the flood dikes along the left margin of the Papaloapan River, and other flood control projects in 1954, the city of Tuxtepec was never again flooded. Along with the right margin dike--prompted by damages of the 1958 flood--these effectively protected the Zone from major flooding. About forty percent of the land by the rivers is now being cropped. Since there is still minor flooding periodically, the main products are tonalmil grains and flood-tolerant sugar cane.

Road Communications for the City

Certainly, the Commission's most stimulatory investment in the Tuxtepec Zone during the 1950s and '60s was in roads. Map 6-4 shows the all-weather roads, both paved and resurfaced, as they appeared in 1976. Numerous less expensive roads passable only in the dry season were built as well.

The paved roads to La Tinaja and Tlacotalpan effectively connected Tuxtepec to the outside world during the Commission's first few years. By 1970, there were 3 to 35 vehicles per hour traveling the La Tinaja road.

For the city itself, the two bridges that were built over the Papaloapan and Tonto rivers marked a new era. For the first time ever urban Tuxtepec was physically accessible all year round.

Opening the Hinterland

The Commission, in its first flurry of activities, tried to open up the hinterland municipios as well. During the 1950s an all-weather road was built to Oaxaca, the state capital. Despite its extraordinary roller-coaster ride south of Valle Nacional, this road provided the first opportunity in history for the mountain villagers to move goods other

than by human power or small canoe. Much new land was opened in the feeder municipios to exploit the advantage. Commercial crops of tobacco became important in Valle Nacional; cattle numbers increased in Jacatepec and Chiltepec; and more maize was planted throughout the hinterland.

The resettlement of the Mazatec Indians to make way for the Aleman reservoir of the dam caused considerable upset in the Tuxtepec area, the affected municipios being part of the Greater District of Tuxtepec. Resettlement was very hastily carried out, with many people reluctantly moving out of their homes only as the water began to cover them.

One of the resettled zones was La Joya in southeastern Jacatepec. In the initial enthusiasm over the colonization venture, a resurfaced road was built in the mid-1950s there. But because of poor local resources and local politics, the project was abandoned and maintenance of the road east of Pueblo Viejo was dropped for lack of funding in the early 1960s. The colonies fell into abject poverty. Meanwhile, those ejidos serviced by the road from Pueblo Viejo north experienced a sharp rise in prosperity.

The response to the first resurfaced road through Ojitlan in 1960 was even more marked. As the number of truckers increased, agricultural prices rose significantly. As a result, the total area in cropland nearly doubled in the municipio within the decade. With a decline in funding of the Papaloapan Commission in the 1960s there was little new construction, but expansion of the land along the previously built roads continued to stimulate the economy. Whereas high value crops like tobacco and some rice were the only important commercial crops in Ojitlan in the 1950s, in the 1960s maize and rice production were emphasized and some sugar cane, while tobacco declined in importance. The first major increase in Ojitlan town's population occurred as a direct response to increased mobility and prosperity.

As of 1960, Tuxtepec municipal authorities estimated that about 25,000 people--40 percent of the Zone's population--were linked with Tuxtepec through paved or dirt roads (9, Anexo p. 2). Increased land clearing in rural Tuxtepec took place with most vigor in the late 1960s after the roads to Chacaltianguis and Loma Bonita were opened.

Between 1960 and 1970, cropland expanded in Tuxtepec and Ojitlan from 20,000 to 40,000 hectares. Bananas were reintroduced as resistant plantain and (Musa paradisiaca), Lacatan, Robusta and Valery varieties were found. Cattle pastures, maize, chile and sugar cane predominated.

Road-building kept pace with population growth and by 1970 nearly 30,000 persons--still forty percent of the population--had road access to the city of Tuxtepec (9, Anexo p. 2) and it was well-established as the commercial center for all of rural Tuxtepec and the hinterland.

Agricultural Change

Outside the expansion of total land area, there were few major changes in agriculture in the Tuxtepec Zone. Maize and rice remained the two most important crops grown, mostly on ejidal land. Because of lack of machinery to facilitate clearing efforts, lack of capital, and crop prices too low to justify the investment, only a few hectares on most ejidal parcels (which averaged ten to twenty hectares in size in the lowlands, less in the hills) were utilized.

Because the fallow period under shifting cultivation had declined by 1970 to around 5:3 years cropping from 6:3 in 1960, and wider traditionally, pest problems grew such that the compesinos were forced to begin using commercial pesticides. Otherwise, there were almost no major changes in agricultural technology through the 1960s.

Direct programs influencing agriculture received little emphasis from the Commission's civil engineers, and had very little effect. Two experimental stations in La Granja and La Isleta were built fairly near Tuxtepec, but few practical results were forthcoming, and almost no extension facilities existed to bring results to the farmers. There was little continuity in research as the centers moved often from one ministry's jurisdiction to another's.

In the late 1950s, some commercial rubber plantations were planted under a Commission program, particularly around the La Mina area, and in Macedonio Alcala in Jacatepec. In 1962, the program was taken over by INMECAFE (Instituto Mexicano del Cafe) under its diversification program.6/ About 2000 hectares were planted on 24 ejidos in rural Tuxtepec. The results from these investments were not felt until the 1970s, due to the long period required for rubber to begin producing.

The private ranching sector made few advances until the late 1960s. The animals were low quality, and the pastures were native grass varieties under minimal management. Then, the price of beef nationally began to rise, particularly relative to crops. Private ranchers rapidly expanded their herd size, either with personal profits from Tuxtepec businesses or with capital provided by the Banco de Comercio de Oaxaca, S.A., which had arrived in the early 1960s. Between 1960 and 1970, the herd in rural Tuxtepec and Valle Nacional tripled, causing a net decline in cropland in the latter. Ojitlan developed a huge herd almost overnight, and in Chiltepec cattle numbers doubled. Appendix 6-A gives

6/ In 1960, there was high internal demand for rubber, worth M$150 million. So in 1961, the government put a tax on foreign imports, which money was used to fund the rubber program. The national goal was to plant 45,000 hectares. By 1970, 20,000 hectares had been planted. Tuxtepec was one of the six regions (including Acayucan and El Palmer in the Basin).

municipal production statistics. The level of livestock technology remained low.

Economic Diversity

The first important industry to enter the Tuxtepec Zone--or for that matter, the entire state of Oaxaca--was the Tuxtepec Paper Factory in Sebastopol. In 1954, a Canadian firm organized the plant to produce 30,000 tons yearly of newsprint. The main factors influencing the choice of the site was the convenience of the La Tinaja highway and an old railroad line previously used for bananas, energy from the Temascal power plant, and abundant water. The future potential of sugar cane bagasse and tropical woods as sources of cellulose was an added attraction.

In 1956, a Forest Concession was established by Presidential Decree (outside the Tuxtepec Zone) and in 1959, the factory began to operate. The road to Oaxaca was built during this period specifically to serve the paper mill and connect it with the logging areas of the Ixtlan concession.

In 1959, textbook paper production was added, about 8000 tons yearly. At that time, the plant employed around 300 workers. In 1964, the mill expanded, and the following year the Mexican government bought up all the stock. Between 1966 and 1971, the plant was semimodernized, and production increased to 55,000 tons a year, requiring an extra hundred employees (to total 400). Although the impact on urban Tuxtepec's commercial life was very positive, the industry itself had chronic cost and supply problems and most often operated in the red (7, p. 142-147).

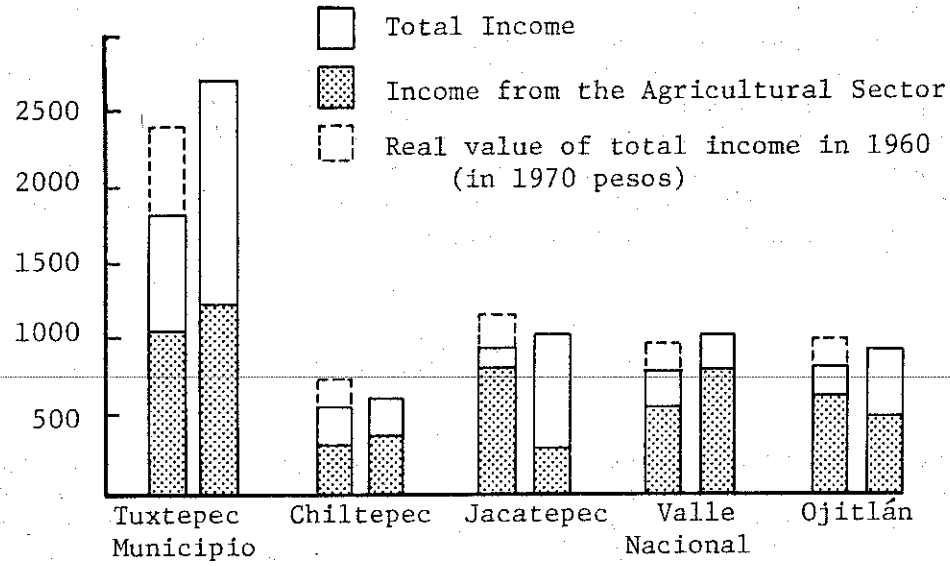
Until the late 1960s, this was the only major industry in the Zone. There were a few minor enterprises. Timber operations from the La Joya area supported a sawmill in Pueblo Viejo (1956-59) and in Tuxtepec (1963-69). In 1955, the Banco Nacional de Credito Ejidal expropriated an old warehouse in Silverio, used in the 1930s for bananas, and installed it with rice milling equipment to process the increased commercial production.

A Summary of Progress Through 1970

Over these two decades, the population of the Zone increased 50 percent, meaning that the average annual rate of growth was nearly 3.0 percent a year --greater than Mexico's national figure over the same period of time. Thus, the record through the late 1960s was already respectable in the sense of absorbing new population. This seems to be due overwhelmingly to the frontier nature of the place. There was strong immigration from outside to work the new lands, once they were communicated with the rest of the country. Increased quantity rather than improved technology of production resulted.

Average personal incomes for the Zone in 1960 and 1970 are shown in Graph 6-3. In that period, only Tuxtepec and Valle Nacional municipios

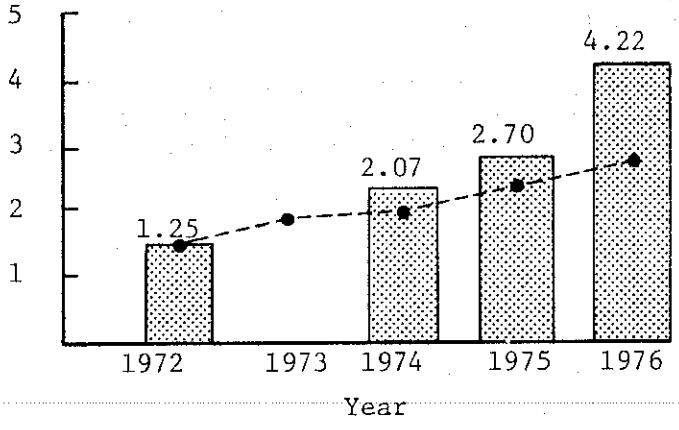
Graph 6-3: Average Personal Income in Tuxtepec 1960, 1970*[a/]



[a/] Official price indices of the Papaloapan Commission were used; in which: $1.00 of 1970 is equal to $1.26 in 1960 prices.

* Mexico, Banco de Mexico, S.A. "Producto Bruto e Ingreso Personal en la Cuenca del Papaloapan" (mimeo, 1971).

Graph 6-4: Growth of the Municipal Budget of Tuxtepec*[a/]



---- Real value of the budget, based on 1972 prices.[a/]

[a/] 1972-75, inflation rates based on official Papaloapan Commission figures were used, 1975-76, the average annual rate of inflation was estimated to be 20 percent.

* Municipal Treasury of San Juan Bautista Tuxtepec, Oaxaca, Mexico.

experienced increases in real incomes. In both cases, the increase was mainly from non-agricultural sources. In Tuxtepec, the non-agricultural sectors provided over half of the total personal income. Living standards in the hinterland remained very low; per capita income appears to have declined.

Although urban Tuxtepec tripled in size to 17,700, no other major towns had emerged in the zone. Tuxtepec itself was little more than an agricultural supply and trading center, though well-integrated with the nation and more prosperous than most because of the surge in ranching. By 1970, the percentage of the EAP in the primary sector was still 72 percent, far higher than Mexico's 39 percent. In the hinterland municipios, the figure was 89 percent. The muddy streets and small-town atmosphere of the city were the same as always, and Tuxtepec could claim successful, but not extraordinary growth.

The "Boom" of the 1970s

The truly radical transformation of Tuxtepec into a thriving, commercial, modern city took place since 1969. The changes in population are the most impressive: over and above the normal population growth of Tuxtepec municipio (assumed to increase at 3.5 percent per year), some 23,000 people apparently migrated to the city, and 19,000 to rural Tuxtepec (4, p.2).7/

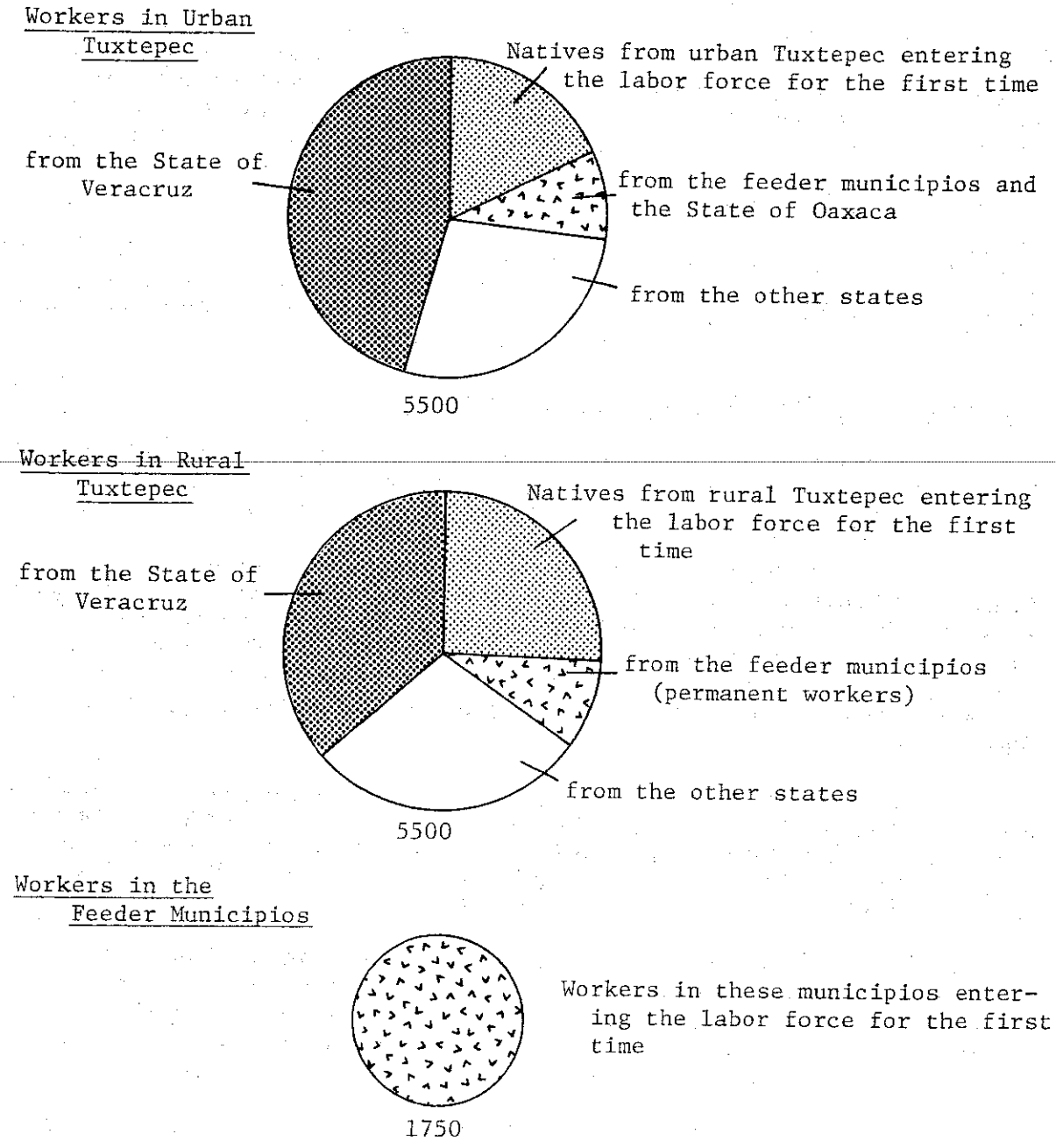
It is estimated that about 8000 of the city's 48,000 inhabitants are "floating," i.e. migrant canecutters and their families, students, construction crews, traveling salespeople (2). But the rest are permanently settled there--a population increase of 235 percent in six years. The changes in life style and property that have accompanied this influx have been felt through the entire region.

Including these immigrants and the normal addition of local workers to the labor force (assuming again a 25 percent EAP), 5500 new urban jobs were created and 5600 rural jobs in Tuxtepec municipio alone. The probable breakdown is shown in Chart 6-4.

Improvements were slow but substantial, in the feeder municipios south of Tuxtepec. Chiltepec has experienced the most change, probably due to both its nearness to Tuxtepec, and the location there of the paper mill. The town's population nearly doubled in size between 1970 and 1976. Valle Nacional town grew by 20 percent. Ojitlan, though it got no bigger, grew more prosperous.

7/ The number of native entrants to the labor force is based on an extrapolation of 3.2 percent per year increase in the labor force and a 25 percent EAP. The number coming from within the District was estimated from population increase and jobs available in the rest of Tuxtepec.

CHART 6-4. SOURCES OF NEW WORKERS IN TUXTEPEC, 1970-1976*[a/]



[a/] We estimate that there was a rate of increase of the labor force of 3.2 percent annually.

* These data are estimates based on the author's research.

Sources of Urban Change

Urban Tuxtepec has been the focus of most of the changes, and the most obvious difference there is the explosion of commercial activity. Indeed, it is the tertiary sector that has absorbed most of the new entrants to the labor force. (See Graph 6-3.) Unlike places such as Mexico City, this growth of the service sector does not seem to reflect largely superfluous activity. Rather, real incomes in the zone have risen so much that there is a thriving demand for services.

But the key to a place's ability to profitably employ a large service sector is rising incomes in the directly productive sectors, this reflected by the increase in total taxes collected in Tuxtepec municipio for public services, shown in Graph 6-4.

Beginnings: The Adolfo Lopez Mateos Sugar Mill

The sources of the new-found prosperity are complex, but the initial impact on city incomes was made by the local Adolfo Lopez Mateos Sugar Mill, which began to operate for the 1968/69 cane harvest.

The mill was built in 1964 by FONAFE (Fondo Nacional de Fomento Ejidal) on contract to the French Societe Fines Lille-Cail, with a capacity of 720,000 tons over a 180-day harvest. In 1965, the federal government, in a reorganization move, had the Nacional Financiera, S.A. acquire the plant from FONAFE along with four others which had been privately owned, and formed the Operadora Nacional de Ingenios, S.A. (ONISA) (8).

In its first full harvest, in 1969/70, over 300,000 tons of cane were processed. Seven hundred thirty-five workers were hired at the mill itself (8). Most of the first workers came from outside Tuxtepec, and this influx of outsiders had a big effect on the "style" of city life, the demand for products and the social structure.

By the 1975/76 harvest, the plant was processing 530,000 tons of cane--a 70 percent increase from 1969/70. Factory yields are very efficient. The increased production required hiring 100 additional workers. Now, 287 are permanent employees, and 548 work from mid-December to June for the harvest season, in three shifts.

Because the factory is nationally owned, its workers are relatively privileged and wages have risen to more than offset inflation. Combined wages rose from $10.5 m. in 1969/70 to $31.4 m. in 1974/75. This supported the first major surge of Tuxtepec commerce (8).

In addition, the mill itself built many new penetration roads.

Government Investments

In 1969, the most destructive flood in Tuxtepec's history struck. Although the city was not affected, both of the dikes experienced major

breaks in several places to the north, and the municipio suffered considerable damage to infrastructure and crops.8/

This disaster brought national attention to the region after a decade of disinterest. The Commission was again generously funded and put under the leadership of a powerful native Oaxacan leader, Ing. Jorge L. Tamayo.

The biggest project for the Commission was the proposed Cerro de Oro Dam in Ojitlan municipio. Extremely rapid silting of the Papaloapan River was making the Aleman Dam less and less effective for flood control. Although there are likely to be no major agricultural gains from the new dam, it probably is necessary to prevent further major flooding.

The project, however, is highly controversial. In the first place, some 20,000 Chinantec Indians are going to be flooded out of their homes in Ojitlan by the reservoir. Secondly, many Tuxtepecanos who owned river land had been frightened by the 1969 flood and blamed the disaster on the Temascal dam. They were afraid of what might happen if another dam were built on similar terrain by the same engineers.

The Commission and Tamayo, who assumed great personal responsibility for the project, were obliged to in some way quiet these reactions. For the Chinantecs, the very costly venture of Uxpanapa was devised and--as resettlement schemes go--careful public relations were carried out to avoid the tragedies of the Mazatec experience. Simultaneously, the Commission put in effect a program of roads, electricity, drinking water, schools and town improvements for the rest of the Ojitlan municipio.9/ Tuxtepec, they launched a similar program of infrastructure, both to promote development and appease the Tuxtepecanos.

Construction of the dam began in 1973/74. Millions of pesos were spent in just two years, and much of this was funnelled through salaries, wages or services into Tuxtepec pockets. When dam construction was halted in 1976, some of the nonlocal construction workers became permanent residents of the city. Dam construction was reinitiated in 1977.

The Commission itself had an important effect on population. At the peak year of 1975, a third of the several thousand Commission employees lived in Tuxtepec city.

8/ 881 farmers on 2130 hectares were affected, with a loss of about $11.9 m. in agriculture alone--about eight percent of total Basin losses in land and money. Three fourths of the loss was bananas; another third maize; the rest rice, cane and fruit trees. Cattle losses were minimal (2, p. 12).

9/ Because much of the infrastructure was built on land ostensibly to be flooded, the ejidatarios were even more cynical that they would ever be flooded at all, and the resettlement work was that much harder.

Other federal money was channeled into Tuxtepec through the influence of Ing. Victor Bravo Ahuja, a native Tuxtepecano and former governor of Oaxaca who became President Echeverria's Minister of Public Education. One-hundred-ten schools were built in the municipio of Tuxtepec. Several new institutions of higher education--vocational and technological schools--are among Tuxtepec's leading assets now. For the first time, young people of the central Basin seeking education can get it there.

Feeder Municipios Infrastructure. In Ojitlan, almost every public work of any sort was done after 1970. There had been only one small road other than the main one before 1972. Afterwards, many penetration roads were built, and there is a plan for paving the town streets.

The Commission was the primary mover in this, through its recompensation plan for the flood victims. However, the direct cash payments made to the campesinos for indemnification were also spent in great part in Ojitlan, to the subsequent benefit of the commercial class there. The paving of the road to Ojitlan stimulated further trade from beyond.

Communication was also important for Valle Nacional. After the road to Oaxaca was paved, traffic increased through here, and proximity to Tuxtepec could be more easily exploited. Between that, and other government projects, particularly electricity and urban works, the town looks completely different from what it was seven or eight years ago. The houses are "nicer," potable water, some drainage facilities and telephone service are available. In 1970, the first junior high school was built there. Since 1974, the municipal budget of Valle Nacional has risen markedly (17). Chiltepec received drinking water in 1971, telephone service and a telesecundaria in 1972. An active local priest began a medical dispensary and a vocational school for children ten to fifteen years old in about 1974 (18). The new educational facilities in Tuxtepec have been made available to hinterland youth, but this is probably the extent of the city's direct effect on welfare in the hinterland.

Industrial Expansion

The two leaders have long been committed to attracting industry to Oaxaca. Tamayo, besides being Executive Director for the Commission, is also director of the Tuxtepec Paper Mill; Bravo Ahuja's term as Governor is most remembered for its emphasis on modern industry. With growing interest at the national level for economic decentralization, Tuxtepec, with its excellent road system, was a logical choice. It is the closest locale south of Veracruz City which is still within a reasonable distance of Mexico City, the major national market.

Tuxtepec Paper Mill. Besides the Sugar Mill, the leading industry remains the Paper Mill. Between 1971 and 1976, production there rose from 55,000 to 70,000 tons yearly. With only six more employees, there was a 40 percent rise in productivity. This productivity improvement was directed in large part to improved salaries for the 400 plus workers. The mill pays out some $.5 m. weekly in salaries (13). Since 1969, all the staff has been Mexican, and particularly the recent changes attracted many technicians and specialists to the area.

Fruit Packing Plant. In Palo Gacho (renamed Benemerito Juarez), ten kilometers from Tuxtepec, a private Mexican company built a packing plant Empacadora de Frutas del Papaloapan, S.A. in 1969. Its first season was 1970. With 100 tons per day capacity, it produced 2000 tons of pineapple slices, canned fruit and nectar for export in 1970. During the 1971/73 agricultural cycle there were only 256 workers. By 1976, production had reached up to 7000 tons of pineapple, 3000 of mango, 500 of chile jalapeno and 50 of papaya. Twenty management personnel are now employed in the off season (August 15 - December 15); during the harvest, 250 workers.

Several hundred local campesinos on ejidos produce fruit for them. When the Commission-run COFRINSA plants in Loma Bonita and Islas run out of capacity at harvest time, the Empacadora works with them. Relative to other workers in the Basin, both factory workers and farmers are well-paid, and, as in the previous examples, urban Tuxtepec has benefitted from the increased spending power.

Rubber Processing Plant. The newest processor is an INMECAFR rubber plant opened in 1973. It was set up specifically to give the ejidal rubber growers (whose trees had just begun to produce) a stable market. Before this alternative began, private buyers came who generally took advantage of the campesinos.

After an initial year producing 950 tons of latex, the plant has regularly produced 2000 tons in block form for use in tires. Their factory yields are fairly good considering that the plant's technology is nearly obsolete. The processed rubber is sold at widely fluctuating prices--ranging from $5 to $20/kilo (one reason for the low prices often paid to producers in private markets). The rubber is not high quality.

Some 600 campesinos supply the raw material. Thirty-five workers were employed at the factory in 1973, but by 1976--after bringing in a new machine--53, in three shifts per day were required.

Rice Mill. In 1970, the Silverio rice mill put in new machinery and began a new credit program. Even so, the operation has been successful economically. Production costs are high, and private competitors have bid up the prices paid to campesinos. Maximum capacity is 100 tons daily in three shifts. The mill operates only October to December, employing 41 workers and eight in management.

Others. The new concentration of skilled workers has attracted more industry to Tuxtepec, both private and public. Several small-scale factories for barbasco processing, chemical and others are now being built nearby.

The Influence of Roads

The hub-like effect of Tuxtepec's position in the road system has been highly reinforced by new construction during the 1970's boom. The paving of the roads to Isla, Oaxaca, Ojitlan and Agua Fria shortened travel time markedly, both facilitating the movement of seasonal labor,

and strengthening the commercial bonds between the city and the agricultural hinterland. With completion of the bridge over the Papaloapan River across from the Sugar Mill, Tuxtepec was connected year-round in every direction with the outside world.

The building of numerous dry season penetration roads has meant easy access to Tuxtepec for many rural inhabitants. There are now six bus lines running through Tuxtepec, plus an urban bus service and two local cooperative trucking unions. The first union has 20 vehicles with under three-ton capacity; the second has 50 vehicles with over five-ton capacity.

Most important is the road just finished in 1975 from Tuxtepec to Palomares, Oaxaca. By 1976, traffic density was 40 vehicles per hour (12). Located along the edge of the Sierras de Juarez and Mixe, it collects products and traffic from all along this previously unopened area and funnels them through Tuxtepec. Furthermore, the road connects with the highway from the oil port of Coatzocoalcos, Veracruz to Salina Cruz, Oaxaca, and is now the major link of Oaxaca, Chiapas and Guatemala with Mexico City.

The expectation is that when the road from Tuxtepec to Sayula, Veracruz is finished, much of this Southeast traffic will divert there. It is estimated that traffic density will immediately reach 80 vehicles per hour (12), which will make it one of the leading highways in Mexico. Already, the road reaching as far as Isla is making an impact on Tuxtepec traffic. The projected roads to Usila and Huautla promise to connect a large part of the Sierra with the city.

As a result of these new communications, increased agricultural production in general, and the increase in commercial and passenger transport, use of the road to La Tinaja quadrupled since 1970--130 vehicles per hour (12). Nearly all of this was channeled directly through urban Tuxtepec, whose commercial sector profited highly.

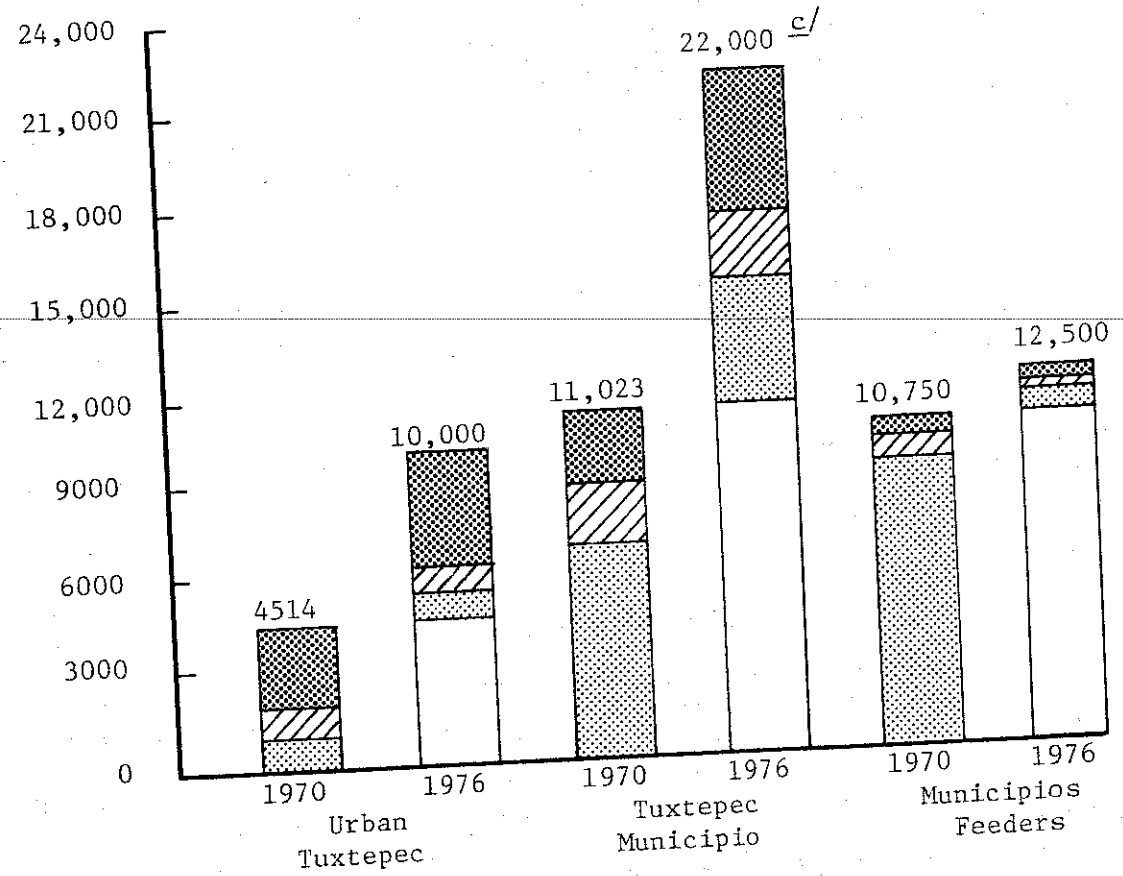
Urban Employment

The share of agriculture and ranching in the EAP dropped from 76 percent in 1970 to 64 per cent in 1976, as shown in Graph 6-5. In Tuxtepec municipio, the share of the primary sector dropped from 57 to 48 percent. The number of nonagricultural jobs rose 229 percent in those six years.

Approximately 2100 industrial jobs developed. Industrial employment in the five larger enterprises rose from 450 in 1968 to 1605 in 1976. Most of the rest of the increase was from cottage industry goods and the enormous amount of construction that has been undertaken. Hundreds of migrant workers reside here, hired for work on the dam, roads or schools. Hundreds more Tuxtepec residents and seasonal migrants from the hinterland are occupied building new stores, hotels and offices. The sum effect of the roads, construction boom, industrial expansion and agricultural prosperity has been to nourish a business center in Tuxtepec city

Graph 6-5: Sectoral Distribution of New Workers in Tuxtepec 1970-1976*a/b/

* These estimates are based on general comments on employment and income sources by local bankers, the Chamber of Commerce, the Municipal government, and officials of the Papaloapan Commission, and the author's farm survey.



a/ We estimate 25 percent of the population to be in the EAP.

b/ For simplification we assume that workers registered in 1970 stayed in the same jobs in 1976.

c/ These data do not include migrant canecutters or floating salespeople.

that grew up almost overnight. There were 4,950 jobs created in the service sector. Of 5500 new jobs in the city, it is likely that around 4200 were in commerce and services. The number of commercial enterprises grew from 400 in 1970 to 715 in 1976 (11). The total value of transactions is estimated by one bank manager to have increased five-fold. Of the new stores, 150 are major enterprises. Under such conditions, it is very reasonable that employment in this sector would have increased almost two and 1/2 times. Several hundred jobs were created in hinterland commerce.

Many of the larger new enterprises were Veracruz or other national branches. In numbers, however, new commercial entrepreneurs were almost exclusively from other parts of the Tuxtepec District, or local people who expanded or opened a business. About a fourth are owned by big ranchers, who finance one from the profits of the other (14). The Banco de Comercio had in 1976, 447 users of commercial credit--roughly double the number in 1973.

Noncommercial activities in the service sector are also important. From some 300 workers in 1970 in government, the Commission, transportation, teaching, banking, etc., the sectoral work force in Tuxtepec grew to around 1000 in 1976.

Chart 6-4 shows the origin of the new workers. The state of Veracruz is the leading source of migrants to Tuxtepec; surprisingly few moved from Oaxaca.

Sources of Rural Change

The rest of the municipio of Tuxtepec remains rural in character and still dependent upon agricultural production. Their rising incomes, however, have played a very important role in maintaining Tuxtepec's commercial growth. Rural development has definitely been most responsible for the positive distributional characteristics of regional prosperity. Without the specific programs and investments that affected rural Tuxtepec, it is doubtful that those in the agricultural sector would have prospered from the commercial orientation of Tuxtepec development.

The Importance of Sugar Cane

By far, the most important agricultural change that has occurred is the production of sugar cane with the opening of the Lopez Mateos Mill. In 1976, 9500 hectares were planted in cane, 7000 on land that was previously unused in Tuxtepec and Chiltepec municipios. The Mill's Machinery Complex, with 150 of its own tractors, had done all the clearing since 1969. Most of the land is owned by ejidatarios, who before had grown only subsistence maize and beans and a little commercial rice.

Cane production involves some 3300 agricultural workers. Migrant labor is very important. In 1976, 1200 canecutters came from elsewhere for the harvest, plus about 130 truckers. Seventy-five percent of these are from Guerrero, the rest from Oaxaca.

Because of the 1970 Presidential decree devised to radically improve national sugar cane production through increased farmer incentives (explained further in the chapter on Tierra Blanca), the price paid to farmers for their cane was more than double (14). Money paid to farm workers between 1969/70 and 1974/75 rose from M$22.4 m. to $58.1 m. Meanwhile, as the chart below shows, the costs of production have gone up far less sharply (8).

Cycle	1971	1976
First year planting	$5642/ha ($88.60/ton)	$6500-700/ha
Ratoon crops	$2354/ha (33.63/ton)	$4500/ha

Profits for the farmers have thus risen considerably.

Cane production technology is still very poor, and there is much room for continued expansion of production on the same land area. One engineer estimated that in 1976, 60 percent of the land in production would have been sufficient to obtain the same yields, under better technology. Also, much of the land is not particularly well-suited for cane.10/

Through 1975, the relationship of the Mill with the farmers was--as everywhere in Mexico--very paternalistic. The credit system used works by subtracting the costs of all mechanical work done by the mill, the harvest costs, and a living stipend from the final price of the cane. The work actually required by the landholder is minimal, and he has almost no role in decision-making.

The new cane laws of 1976 were designed so that the farmer would have more independence and incentives for better cultivation. The decree should foster more direct farmer participation in mechanization, especially, by providing him credit to buy machinery. The new laws have as yet had little effect. But since the area has no historical experience with cane production, and the traditional difficulties with the mills, relations are still amiable, and the new ideas are being received with some confidence.

Private Cattle Expansion

In 1975, the Tuxtepec herd was officially valued at M$250 m., for 60,000 animals (9, p.3). But estimates of the true herd size range to over 150,000 head. There are about 300 private cattlemen in the municipio, many of whom have combined holdings of far more than 1000

10/ The best production by tonnage is on the alluvial soils, which make up about a quarter of the cane land. Highest sugar yield comes from cane grown on deep (50-60cm.) clays, found on about a third of the land.

hectares.11/ One of the Basin's most skewed land tenancy systems is in Tuxtepec, stemming from pre-Revolutionary patterns. The advance of ranching in Chiltepec and Valle Nacional has also been limited to the 200 or so large property owners. Ejidatarios have been little affected; livestock production on ejidos is encouraged to exploit unused land of poor quality, rather than to replace limited, valuable cropland--as had happened among large ranchers in the region (19).

Another legacy of earlier times is the traditional resistance in Tuxtepec of "gentleman ranchers" to technological progress. In the past few years, however, the attitude toward progressive ranching has become more positive. The two most important factors encouraging this were price changes and banking credit.

The increasing cattle prices at the end of the 1960s and early 1970s encouraged ranchers to build up herd size all over the Zone, but there were few technical improvements. Neither of the two leading ranchers in the case studies used particularly advanced technology. The native grasses (Pelillo and Cola de venado) are very good in the rainy season, and as long as there were ample lowlands to move the animals to in the dry season, there was no strong movement to improve pastures.

Livestock prices reached their highest real value in 1971/72, when much land was switched to pasture. Although prices doubled from 1970 to 1976 for meat and breeding stock, costs rose more markedly; the market contracted when the U.S. closed its borders in 1974 to beef imports, and competition for land from crops with rising prices offset this advantage. The price declined from $14.50 in 1973 to $10.50 in 1974. As a result, there was a strong incentive for intensification to maintain income levels and pay off earlier investments in animals. Since 1974, livestock production lost much of its dynamism. Fattening operations remained predominant, but the number of rearing operations markedly increased in recent years.

Although the 150-member Tuxtepec Livestock Association hosted neither cattle fairs nor artificial insemination programs, the group supported changes in breeding, health and pastures. The Union of Livestock Associations of the Tuxtepec District sponsored an Animal Pathology Laboratory with the SAG and associated pest control programs, which have been responsible for excellent results in health control.

Most of the animals are specialized for rearing and milk production, rather than fattening. Zebu and Zebu-Brown Swiss, genetically improved with high-quality bulls, are the most common breeds. Much land was planted to African stargrass (Cynodon dactylon) and Pangola grass (Digitaria decumbens) since 1970, although the pastures are rarely fertilized. Returns on this investment are reputedly excellent. Technology is still changing very slowly.

11/ One Commission technician suggested that perhaps five percent of the cattlemen in the Zone had extensions of land of at least 1000 hectares, and often much more.

Most of the changes were promoted by the private banking institutions in Tuxtepec. This was foreseen by a Commission survey in 1973 that concluded that the greatest constraint on new technology and expansion was financing.

The Banco Nacional de Mexico (BANAMEX) came to Tuxtepec seven years ago and is primarily dedicated to private production. Some 130 cattlemen receive both "avio" (which is two years for fattening) and "refaccionario" (long-term) credit for acquiring breeding stock, installations and tractors. The Banco de Comercio de Oaxaca, S.A. (BANCOMER) in 1976 had 653 recipients of agricultural/livestock credit-- more than double the number in 1973, almost all private property owners. The usual rate of interest is 12 percent annually. The Financiera de Oaxaca, nine years in Tuxtepec, works entirely with private property holders. There are 36 recipients of agricultural credit for maize and beans and 180 cattlemen (16). After the devaluation, with tighter credit, it was in fact the agricultural-livestock sector which received banking funds at the expense of commerce.

Public Policies for Poorer Farmers

The impact of President Echeverria's policies of rural development were felt most in Tuxtepec through credit programs. For private banks, this meant increased federal requirements for agricultural credit, and expansion of the rediscounting program of the Bank of Mexico. In addition, money flowed from the coffers of the INMECAFE rubber and coffee programs, the Livestock Commission (Comision Ganadero), the National Land Clearing Commission (Comision Nacional de Desmontes), and the Tobacco Institute. Over 3000 ejidatarios were recipients of such credit, a substantial portion of the ejidal sector.

Probably most important, a far larger proportion of "refaccionario" credit for long-term capital improvement has been offered.

Improved crop prices have been instrumental in supporting viable credit-cum-technology programs, and in improving the standards of living in the rural zones. The coyote problem still exists for smaller producers, and the price differential can be significant, especially in chile, bananas and beans. The favored farmers who deal with the city market in grains, fruits and milk get much higher prices for their products. Despite such disparities, government support prices at a level where farming can be profitable has been of undeniable benefit in strengthening the countryside. Only in Ojitlan was agriculture on a decline, with reduced production for rice, maize and beans there, the promising agricultural progress of the 1960s was nearly halted because of land expropriation for the dam.

Production Credit for Improving Incomes and Technology

The lack of access of Tuxtepec ejidatarios and smallholders to modern technology was chronic, until recent years, due overwhelmingly to lack of financing. Without exception, the reported use of fertilizer and improved varieties in the Tuxtepec case studies began after 1970, with their use of public credit. Still, in 1976, only four out of seven ejidos reported using any fertilizer, improved varieties or tractors.

This is true despite universal reports of declining yields.12/ Although the ejidatarios were quite aware of the detrimental effects on soils of reducing fallow periods overmuch, they felt obliged to because of rising population pressures. But because of this, many campesinos were willing to work with the new credit programs, despite traditional fear of banks.

The most visible public credit program aimed at technification of the small farmer was that of the Banco de Credito Rural (BANRURAL) in Tuxtepec. Although a moderate amount of credit was funnelled through the various banks before unification, in 1975 all Veracruz loans were dropped from the Tuxtepec office and in Oaxaca, they initially dropped everyone that owed money, causing a great deal of confusion. Several special projects are directed through the Bank, such as the Livestock Commission, the Land Clearing Commission and the Silverio rice mill credit, but these will be discussed later.

The program has now stabilized, and credit going to Jalapa de Diaz (the branch which covers Ojitlan) and the Valle Nacional branches increased. In the 1976/77 cycle, the Bank worked with 1133 ejidatarios in 47 credit societies in rice and maize production, and with six societies in livestock production. Sixty percent of those assisted were introduced to--or continued with--mechanized production.13/ Technical assistance and regulation accompany all the loans. The main effect of the Bank program has been in area cultivated; the double cropping pattern remains the same (19).

The National Banco de Mexico, S.A. also provides agricultural credit assistance, but through the private banking system. There is an office of the Fondo de Garantia set up in 1974, which supervises the FIRA project described in Chapter 1. Ten percent of the credit administered by BANAMEX is for ejidatarios, through the Fondo. This program reaches some 150 individuals on seven ejidos. 90 percent of the land is used for cattle, the rest is for grain crops. Most are located in the newly opened areas around the Palomares highway. Earnings are of one to two percent on the loans.

12/Maize yields reported ranged from .8 to 1.5 tons per hectare, and the Valle Nacional, Chiltepec and Ojitlan ejidos all reported declines over time. Rice yields ranged from .9 to 2 tons per hectare, also on the decline. Cane yields on one Tuxtepec ejido declined from 90-100 tons five years ago to 75-85 tons now (which they blame on high machinery losses and declining soil fertility). Chile yields declined on one farm from 12 to 14 tons per hectare in the late 1960's to 10 to 12 tons in 1976, on unfertilized land.

13/One private farmer and 515 ejidatarios received credit for mechanized maize production; for espeque maize, 459 ejidatarios; for mechanized rice, 157 ejidatarios; for cattle breeding, one society; for fattening, five societies. Also, three private ranchers received credit for beef fattening and three received credit for poultry production.

BANAMEX does not work with more agricultural ejidos because of a lack of technicians for the assistance program.

The Banco de Comercio lends to only one ejido, through a Livestock Commission program, but 70 percent of cattle loans are to smaller private property owners through FIRA (15). The primary crops affected are maize, chile and rice. The Financiera de Oaxaca since 1974 has worked with "solidarity groups" of smallholders. There are now five groups with a total of 134 members. They receive up to five years credit, particularly for cattle (16).

Ejidal Livestock Credit

Because of its comparative profitability, there is great interest locally in promoting livestock production on ejidos. (Especially 1972-1974, lots of credit for rearing was provided by the U.S.) Two special federal commissions have been working with this mandate.

The Livestock Commission was begun nationally in October of 1973, and arrived in Tuxtepec in August 1975. Its capital is provided by the Treasury Ministry, and is managed by BANRURAL. At the beginning, this Commission also worked with private owners, but stopped because of tenancy difficulties between the two groups.

To qualify, a credit society must have at least ten members and 150 hectares of land available. The cattle are given as government property, along with cattle insurance, medicines, mineral salts and the salary of one herdsman per 150 head. Technicians give courses to the ejidatarios at a subprofessional level. Veterinarians from SAG provide medical care. During the first year of operations, 3545 cattle were brought to distribute. Half came originally from breeding stations in San Luis Potosi, Tabasco or Chiapas, and half from the farms of a private rancher. Over 20 ejidos--all in Tuxtepec municipio--are involved, some of which were originally in ranching, others agriculture. The most fertile land is supposed to be saved for crops. Most of the ejidos chosen are well-communicated, so that services are easier and cheaper to provide.

Apart from this, the Livestock Commission is petitioning for a Semen Bank, and is setting up a course on insemination techniques.

The National Program on Land Clearing was also begun in 1971 by President Echeverria. It subsidizes the incorporation of new lands to agriculture and livestock, principally on ejidos. Most of the clearing is done by machinery, the cost of which the government covers through the BANRURAL. The Program was most active in Loma Bonita, but Tuxtepec and Chiltepec municipios were included. Two of the most prosperous ejidos, Pueblo Viejo and Papaloapan, were participants and openly acknowledge the enormous influence of the Program.

Planners stress pasture initiation because of the ease of immediate sowing, which is necessary to prevent regrowth, and the relative

cheapness compared to crop establishment. They also put up fences, cattle bath and access roads.14/

These public programs are having a very beneficial effect on private ranching. During the 1960s there was almost no local market for heifers. Now many ranchers sell youngstock to the bank and to ejidal ranchers as well as each other, and are earning more than they were in fattening operations.

Commodity Credit

INMECAFE has two programs in Tuxtepec providing commodity credit for rubber and coffee. These reach over a thousand ejidatarios.

The original programs for rubber were begun by the Papaloapan Commission. They finally came into fruition during the 1970s. This is a particularly profitable enterprise for the 600 farmers involved, since the market is very good. The government buys most of the latex, either for the Tuxtepec processing plant or for other government factories. Fifteen percent of the farmers' receipts go for paying back the initial loans for planting and maintenance. The program has had a favorable effect on participating ejidatario's incomes and technology.

The coffee program just began in 1973 in Tuxtepec, and affects farmers in Tuxtepec and Valle Nacional municipios. The program was a direct response to trends of declining coffee production in those areas. The technicians organize resident producers, to provide technical assistance, introduce high-yielding varieties and help with marketing. In 1974, INMECAFE bought two "beneficios" in Barranca Seca and Perro Quemado to process the group's production, although much is already home-processed. Production has already begun to increase significantly. There are about 800 ejidal society members (with 1150 hectares of coffee)--about 60 percent of the regions' producers. The agency is making studies in Ojitlan (which has 800 hectares in coffee) and possibly will begin next year to operate there.

TABAMEK is trying to improve the production of tobacco in Tuxtepec, emphasizing the Valle Nacional area. Since 1972, there has been an increase in production, but no turn-around in the basically depressed economics of tobacco on marginal land.

Agricultural Labor Demand

Of the total number of increased jobs in the Tuxtepec zone, 5700 were in agriculture, an amazing increase of 34 percent. This was overwhelmingly in urban linked Tuxtepec municipios. This fact suggests

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14/ We don't have the exact data from Oaxaca, but in Veracruz, the total cost was $700 per hectare for establishing pasture, and $3000 per hectare for establishing cropland.

contrary to current pessimism--there is much room to expand employment in this sector elsewhere in Mexico as well, particularly since well over half of new employment was through intensification of production, beyond mere land expansion.

300 to 400 new jobs in the feeder municipios came from land expansion and intensification; another few hundred workers have permanently migrated to Tuxtepec municipio.[15] But because wage rates and work opportunity remain limited, many of the rest do seasonal work in Tuxtepec to supplement local rural incomes.

Employment on Newly Opened Lands. Between 1969 and 1976, 12,000 hectares of cropland were opened through cane expansion (7000 hectares) and production credit for maize, rice, chile, coffee and tobacco (5000). About 16,000 hectares were opened to parture through private herd increases (12,000[16]) and ejidal livestock programs (4000). Even under extensive technology[17] around 2000 man-equivalents (meq) of employment would have been created. Because of the intensive credit programs undertaken, new employment grew instead to over 3000 man-equivalents. A single labor meq is often composed of part-time work by several laborers summing to 12 full months. Meanwhile, part of the increased labor was provided by workers already in the labor force. We can estimate that roughly 2000 additional individuals were supported.[18]

Effect of Mechanization. Mechanization has as yet had little negative effect on the demand for manual labor. The more prosperous, high employment survey ejidos rent or own tractors. Where topography allows, they are advantageous to coordinate the planting of rice and maize, since either rubber, chile or sugar cane plantings or harvests conflict with the labor requirements for the tonalmil and temporal grain crops. There is considerable double cropping in some places, for which a tractor can be justified for rapid and high quality seedbed preparation on extensions of land over 4 or 5 hectares. So far, there is little use of mechanized

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15/ If one assumes a natural population increase of 3.2 percent per year, the population of the four feeder municipios should have grown from 43,000 to 52,000 in 1976. New jobs were needed for about 2250 workers. Some 350 found jobs in towns.

16/ Assuming 25,000 new animals for private ranchers, at two animals per hectare.

17/ Coefficients for the intensity of technology are adapted from the data collected in the Tuxtepec case studies. Typical extensive employment is 8 has/meq for crops and 40 has/meq for ranching; for intensive employment, 5 has/meq for crops and 20 has/meq for cattle.

18/ E.g., the 1200 migrant canecutters work full-time for six months of the year; the corresponding number of meq's is thus 600.

harvesting for any crop, but it is likely that such mechanization would have serious consequences for those seasonal migrants from the hinterland or outside states who receive a large portion of their income from harvest work. Already the increasing wages of canecutters has led to increased mechanization for lifting the cane. Also there may be conflicts where labor demand is already carefully organized through crop diversity in different microclimates, and complex reciprocal labor relations.

Seasonal Labor Distribution. Agricultural demand for manual labor in this zone is fairly continuous, as is illustrated in Chart 6-5, which shows seasonal labor requirements by product. The lowlands and the foothills have distinctly different cropping patterns, due to different rainfall and soil types. The coastal plains produce mostly during the rainy season, because of lack of moisture in the winter months. Some double-cropping is possible in the foothills, but in most of the foothills and mountains of the hinterland municipios and southern Tuxtepec, drainage conditions are such that rainy season maize production is very difficult. Moisture is sufficient in the winter months to support a major crop then, and in some places flood-tolerant second crops may be grown in the rainy season (6).

Increased tonalmil maize and chile production in Jacatepec demand labor during the period of least demand on the plains. With improved communications, new crops and newly opened lands, the patterns of labor demand have reinforced the relations between the two ecological zones.

Sugar cane demands help to balance ejidal labor distribution over time. The influx of outside workers for harvest work is still only a minor part of total labor. Rubber tapping requires almost continuous, year-round labor.

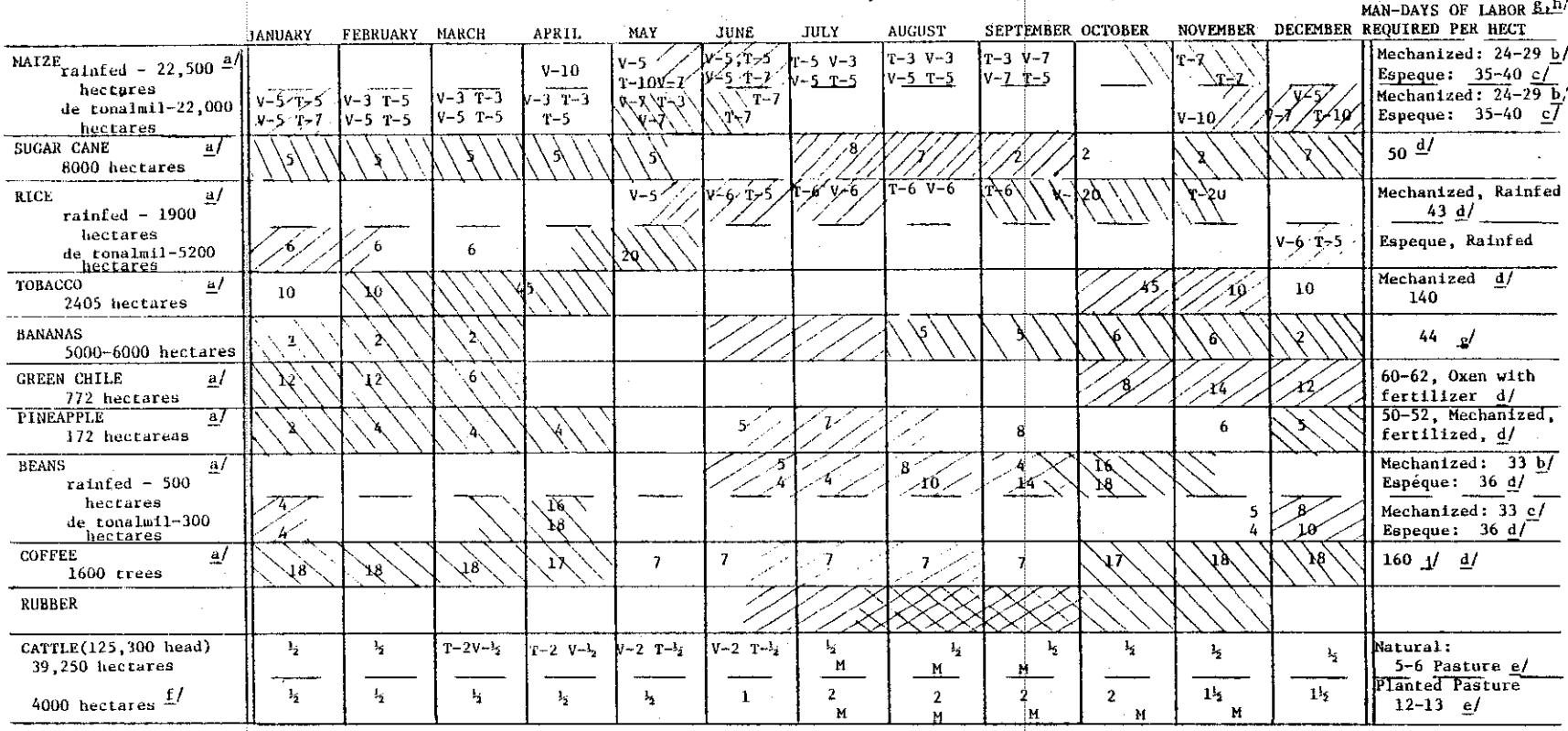
The resurgence of banana production also helps even out labor demand in Tuxtepec municipio, since the slow months for bananas correspond to the peak months for other crops and livestock. The peak months for coffee labor in Valle Nacional correspond to the dry season on the coastal plain, and the peak work period for part-time labor on the coast fits in neatly with seasonal migration supply.

The growing importance of livestock production in Valle Nacional, Chiltepec and Tuxtepec has probably had a net positive impact on labor demand. On ejidos, the introduction of cattle provided an income supplement to the group, rather than displacing labor or attention to basic crops. Where new private land was opened to pasture, there was an increase in employment for the landless. But where cattle were substituted for crops, net employment probably went down. No private ranchers surveyed in this zone had a high employment/land ratio.

Land Tenure Effects on Employment. Land tenure affects all these variables. Large ranchers, have poor to medicore labor absorption, despite high capital investments. Most work is done during short periods of the year, at which time, relatively large numbers of part-time laborers are hired. The ranchers had significant off-farm income--mostly from other ranches which were integrated into a single coordinated productive unit.

CHART 6-5. SEASONAL DISTRIBUTION OF AGRICULTURAL LABOR IN TUXTEPEC

T = Crops in the municipio of Tuxtepec
VN = Crops in the south, for example Valle Nacional



Sowing

Harvest

M = Greater Milk Production

Burning of Pastures

Sources:

a/ Mexico, SIC, Censo Agrícola y Ganadero, 1970 (published in 1975).

b/ Regional summaries of the "programa de Desarrollo Rural," (Papaloapan Commission (Ciudad Alemán, 1973).

c/ Hector Duarte P., "Costos de Cultivos 1974/75 - Bajo Papaloapan" (unpublished, for the Papaloapan Commission, Ciudad Alemán, 1975).

d/ Hector Duarte P., "Costos de Cutivos, 1967" (unpublished, for the Papaloapan Commission, Ciudad Alemán,1970).

e/ Interview with R.E. MacDowell, Professor of Animal Science, Cornell University, Ithaca, New York, 1977.

f/ Papaloapan Commission, Department of Economics, "Inventario Ganadero," 1971.

Notes:

g/ These data do not include clearing operations, which require, with manual labor, 45 man-days per hectare. The number of days worked each month is an approximation based on the total requirement, and the schedule of activities.

h/ The range is due to different fertilization practices.

i/ Estimates from economists of the Papaloapan Commission.

j/ This data includes replanting requirements, and yield changes over time.

Most ejidos "good" labor absorption which we consider to be fewer than 20 hectares per man-equivalent employed. High-employment, high-income ejidos were distinguished by large size and abundant natural resources and had often benefitted from government programs. There was little parttime labor used in these ejidos, except for the cane and rice harvests. The major labor effect of the new programs was fuller utilization of the ejido's own available manpower, with subsequent higher incomes per worker.

Some ejidos--small or with marginal lands--were forced to look outside the ejido for supplemental income. The minifundista had a high labor/land ratio, but the plots are so small and returns from banana and maize production so small, that incomes are very low.

Employment Patterns by Class. Landowners have the advantage of more secure and steady employment than the other groups. They have a better cash flow in general, and usually higher incomes. Certainly, they have been the prime beneficiaries of agricultural price improvements and better market conditions.

In general, those with claim to land, regardless of how small or poor, tend to remain on the land and do not migrate.

Ranchers very frequently have outside income sources - either multiple farms, or businesses in Tuxtepec or smaller towns. Tuxtepec ejidatarios holding land rights rarely need to seek supplemental outside income, but those in the more mountainous parts with poorer land resources are forced to find seasonal employment. In the ejidos interviewed in the hinterland, at least a third of total income came from outside the ejido. Obviously, the larger parcel size in the lowlands (20 to 25 hectares), compared to the hinterland (8 to 10 hectares at most) is a major advantage. Of course, during the peak cropping seasons, many ejidatarios hire part-time labor for their own parcels.

The minifundistas, who do not have the benefit of strong reciprocal labor and support ties, such as the ejidatarios have, nor the capital base of their larger neighbors, have shared little in the Tuxtepec boom. The only exceptions to this are the few private sugar cane farmers who, like the ejidatarios, have benefitted from price increases.

One of the obvious beneficial effects of Tuxtepec agricultural progress has been to create conditions where increasing numbers of ejidatarios without land rights can be supported on the ejidos. In other parts of Mexico and the Basin, this is one of the groups most likely to emigrate to the cities and elsewhere. Of the four survey ejidos in which nearly all income was generated on the ejido, three had almost as many adult men without rights as with them, and the other had over half as many, yet migration was not a serious problem.

On the two ejidos with limited land resource, there were still at least half as many without rights, but here considerable outside employment was needed to supplement incomes. The major benefits to the hinterland have come through availability of seasonal wage labor in Tuxtepec. Most of this group retains their home in the hinterland and

large numbers have not permanently migrated to Tuxtepec despite better conditions there.

One element that slowed down the entrance of the younger generation into the full-time EAP of the ejido--and thus postponed the land squeeze--is the availability of advanced schooling. Of the 3000 young people now studying locally past sixth grade (not including the telesecundaria program, which reaches many more) at least a third are from local farms. This reduced new entrants into the agricultural labor force by several percent, and although they must still be supported, they are less of a political or social problem for the ejidos.

It is the student rather than any other sector, which is permanently emigrating, particularly from the hinterland. Since Tuxtepec has begun to grow, many of the zones' students now stay, with fewer going to Oaxaca and Mexico, but the drain on the hinterland has been significant.

The position of landless labor is better in Tuxtepec than in most of the surrounding areas. This stems from the increased opportunities for year-round agricultural work, higher demand in general for agricultural labor, and the opportunity to seek employment in town if rural jobs are not available.

While there is sufficient work in physical terms in much of the hinterland, the difference in pay rates attracts them to seasonal labor around Tuxtepec. In late 1976, the wage in Chiltepec town for manual labor was M$30 daily; in Tuxtepec's countryside, it was $40-45 per day for an eight- to ten-hour day. In Ojitlan, the wage rate grew from $15 per day in 1972, plus food, to $30 in 1976, rising to $45-50 at peak periods due to competition from rates in the Uxpanapa resettlement zone. On hinterland ejidos, landless laborers are often paid even less, and although payment in kind is common and may be worth more, most workers want an income for monetary purchases.

Those landless workers living in ejidos far from the rapid communication routes remained in the hills until very recently. Migration patterns there involved movement from the mountain to the municipal cabacera, rather than outside the municipio. Cabaceras grew while total municipal population remained fairly stable.

The evidence of declining per capita incomes from 1960 to 1970 in much of the area, and for many minifundistas and ejidal maize and banana producers post-1970 illustrates the uneven distribution of benefits from classic development investments. The reversal of the trend was made possible through money flows to the poorer sectors either directly (through credit, product prices) or indirectly through employment-generating investments.

The migrant laborers from Oaxaca and Guerrero who work half the year in the sugar cane fields are a somewhat privileged group among migrants because of government minimum wage (M$57/day for 1975) and benefits. However, costs such as social security and transport are important and minimum wage is often not paid. Rice, chile and pineapple harvest workers are local. There are significant wage differences between rich

and poor landholdings. One Tuxtepec ejido paid only M$12 a day plus meals for a work day of 8-9 hours; a private farmer complained that he paid M$50 daily for 6-7 hours work.

The sum effect of changing agricultural labor demand is that there has been very little migration out of the Tuxtepec zone in the last ten years. Movement to Mexico City continues, but is not increasing. Net farm incomes are rising and, with a lag, agricultural wages. Part-time work in Tuxtepec city is a powerful buffer against tight years in agriculture, and counters the necessity of looking to the huge cities of the north to find jobs at such times.

Summary: The Value of Integrated Rural Development

Tuxtepec, then, is an example of a place where "integrated rural development" has been carried out. The city and countryside has been integrated economically as a single unit, with growth in each sector positively affecting the other. The balance was acquired in numerous ways, and the Tuxtepec experience offers many practical lessons for building up dynamic urban centers in the countryside.

Basic Requirements

Basic to success is a communication system which effectively connects villages and small rural centers with a central town, which is then connected by modern highways to the country's major cities. Successful marketing, low input prices, worker mobility and reasonable costs for infrastructure construction are dependent upon good communications.

Support prices that allow farmers a reasonable profit margin are absolutely critical to any sort of rural development. While the role of industry is likely to grow, its potential is limited by the huge capital investment required. It is therefore agriculture which must be depended upon to initiate commercial growth in rural areas.

This is impossible without rising farmer incomes; witness the stagnation of the rural sector of Tuxtepec before 1970. Only the expectation of respectable earnings will induce poor farmers to risk purchased inputs for intensification, such as they have recently done with rice, cane and the particularly difficult transition to livestock production. The experience of the 1970's indicates that maintenance of high prices, while it does not guarantee development, is a precondition to successful credit of technical assistance programs.

Employment Stimulation

Much of the technological change that has taken place in Tuxtepec in the last six years has been of a type that intensifies production and employs more labor, because technological improvements have been coordinated with the local labor patterns. Tractor power for land preparation in an area recently opened to double cropping makes sense; tractor power where there is no serious labor constraint and where the tractor directly

substitutes for available labor does not make sense. The evidence in Tuxtepec suggests that simple technological changes can be as effective in absorbing workers as opening new land.

The experience with sugar cane illustrates the potential to increase land in production without the need for expensive colonization schemes, or opening new lands whose ecology is not well understood. This is by inducing ejidatarios to use all their land resources. The highly efficient sugar mill appears to be operating in the black, while providing both high industrial wages and high raw materials prices to hundreds of workers.

The promotion of such a product with a ready market in a local processor is a sturdy base on which to build a city's economy. More value-added accumulates in one place, and the commercial sector gets the extra boost from expenditures of industrial workers. Industrial concentration is an undeniable advantage, providing the benefits are distributed locally, and widely, through wages, raw materials payments, or profits in a collective enterprise.

Stable working relations between farmers in different ecological zones should be encouraged. Where possible, however, it is even better to establish direct programs with year-round local benefits. While the labor force of the Tuxtepec hinterland has benefitted somewhat by increased agricultural production and job opportunities in the municipio of Tuxtepec, there is no comparison between their living standards and those of farmers who directly received credit, government assistance and new infrastructure.

Official credit can be a powerful force for changing technology and improved incomes and employment. This was illustrated here by the newly prosperous ejidos working the Clearing Program and rubber credit. A good credit program, however, needs good administration and must be as flexible as possible. There are still considerable problems on some Tuxtepec ejidos with misunderstood debts and delayed inputs arrivals. More crops could be covered--perhaps yuca, bananas, some garden crops. Timetables should be more in the farmers' hands to facilitate the multiple cropping that is the traditional farming pattern of many Tuxtepec zone producers, and improve yields in that system.

Credit for large private farmers or ranchers can be used to encourage greater intensification and employment. So long as the political scene is such that land concentrations will not be broken up, this is a way to make them more responsive to social needs.

Urban Investments

Construction projects for local infrastructure can concentrate money, skills and buying power in a small urban center, while improving the standard of living and reducing urban/rural dichotomies.

A portion of the projects can be financed by the people themselves. Once rural incomes have risen through price, credit or communications policies, many ejidos in Tuxtepec helped to finance their own projects of

buildings, schools, sewerage and potable water. The townspeople of Tuxtepec assisted in their share of the costs of street paving. In these situations, the government position might best be one of coordination, such as the Commission held in many cases.

The immigration of "outsiders" is a fundamental goal of development, to broaden the spatial distribution of economic activity. Those groups with little money will be attracted by jobs. In Tuxtepec's case, they came from fairly nearby, but it is likely that even people from the north would be induced to come to the zone, at least for jobs outside of agriculture. To attract skilled and educated personnel, good education facilities, amenities of life such as paved streets, a cultural center and movie houses must be available.

A Network of Regional Centers

Certainly, the experience of Tuxtepec shows that tropical urbanization is viable, and indeed, a strategy to be fostered. Furthermore, this can be done in such a way as to integrate the countryside. In the Basin itself, there are other small towns that have potential for similar growth. Tierra Blanca is already doing well as a commercial center. Places with 5000 to 15,000 inhabitants--such as Isla, Playa Vicente, San Andres Tuxtla and Acayucan--which are already located along major highways, are prime targets for development. Places such as Ojitlan and Valle Nacional could play the same role for the highlands.

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13 Interview with Jorge L. Tamayo, Vocal Ejecutivo of the Comisión del Papaloapan, June 16, 1976.

14 Interview with Manager, Tuxtepec branch of Banco de Comercio, S.A., November 29, 1976; July 20, 1977.

15 Interview with Manager, Banco Nacional de Mexico, S.A., July 20, 1977.

16 Interview with Manager, Financiera de Oaxaca, S.A., July 20, 1977.

17 Interview with Municipal Treasurer, Valle Nacional, Oaxaca, July 22, 1977.

18 Interview with Municipal Treasurer, Chiltepec, Oaxaca, July 22, 1977.

19 Interview with Manager, BANRURAL, Valle Nacional, Oaxaca, July 22, 1977.

APPENDIX 6-A. AGRICULTURAL PRODUCTION IN TUXTEPEC ZONE, 1960-70*

(by municipio, in hectares of arable land)

PRODUCT	TUXTEPEC		OJITLÁN		CHILTEPEC		JACATEPEC		VALLE NACIONAL		TOTAL	
	1960	1970	1960	1970	1960	1970	1960	1970	1960	1970	1960	1970
Maize [a]	8098	12,777	2000	8100	1786	518	1120	1432	5723	2292	18,727	25,119
Rice	3370	3,537	900	3205	190	177	180	114	8	5	4,640	7,038
Sugar Cane	30	7,537	-	2	-	700	-	-	-	4	3,906	8,030
Coffee	17	47	300	583		-	10	53	-	918	327	1,601
Tobacco	1500	-	2200	753	70	10	200	156	520	983	4,490	1,906
Bananas	473	1,558	-	55	87	23	14	11	12	25	586	1,672
Green Chile	288	758	-	292	5	121	3	55	5	16	300	1,555
Pineapple	160	350 [b]	-	-	-	-	-	-	-	-	160	500
		500										
Beans (alone)	35	-	-	676	10	8	6	36	50	44	100	810
Beans (intercropped)	-	-	220		8		1		60		290	
Sesame	-	-	251	-	-	-	-	-	-	-	251	
Cattle	47,307	76,274 [c]	1016	23,805 [d]	2774	4001	8647	6971	4004	14,236	63,748	125,287

* Mexico, S. R. H. Comisión del Papaloapan, "Cultivos 1961", "Cultivos 1970" Frutales 1961" and Frutales 1970," based on municipal data from the Censo Agrícola y Ganadero de 1960 y 1970. Cattle numbers from "Inventario Ganadero", Comisión del Papaloapan 1971.

a/ Half of the total maize production in 1970 was rainfed; half was tonalmil.

b/ Data from the Empacadora de Frutas del Papaloapan, 1976.

c/ Probably quite underestimated; according to the Papaloapan Commission, there are probably 125,000 head.

d/ Probably overestimated; it is likely there are 15,000.

CHAPTER 7. ISLA AND LOCAL INITIATIVE

The municipio of Isla, Veracruz lies also in the Papaloapan lowlands, but nearer to the Tuxtlas Mountains. Isla was not until recently a major focus for Papaloapan Commission activities. Quite on its own, the place developed into the most progressive agricultural region in the Basin.

The village of Isla is small, and most of it looks like a classic frontier town. The railroad passes through the older part of town, where the buildings and warehouses are somewhat run-down and cluttered. But the center of town is as new and as modern as Tuxtepec. Several square blocks are paved and have traffic lights. There is a brand new municipal park complete with newly built municipal offices and some fine ice cream parlors.

Driving down the highway from Mata Limones to town, one passes several large factories, but most of the surrounding area is in very well-kept pastureland or large pineapple fields. Map 7-1 shows the major physical features of Isla. Except for the alluvial soils by the San Juan and Tesechoacan Rivers, the sandy soils which have drainage problems are not particularly good for agriculture. The rainy season lasts from June to October. Total rainfall varies only from 1300 to 1800 millimeters yearly. Soils are well-drained.

Many farmsteads here have solid handsome homes and other structures, as well as modern equipment, more so than in Tuxtepec. Smaller ranchers in areas that are still being opened are less prosperous, but comfortable. The ejidos in the municipio play a minor role in the economy, and some are quite poor, but the members of the private sector share pretty broadly in the municipio's prosperity.

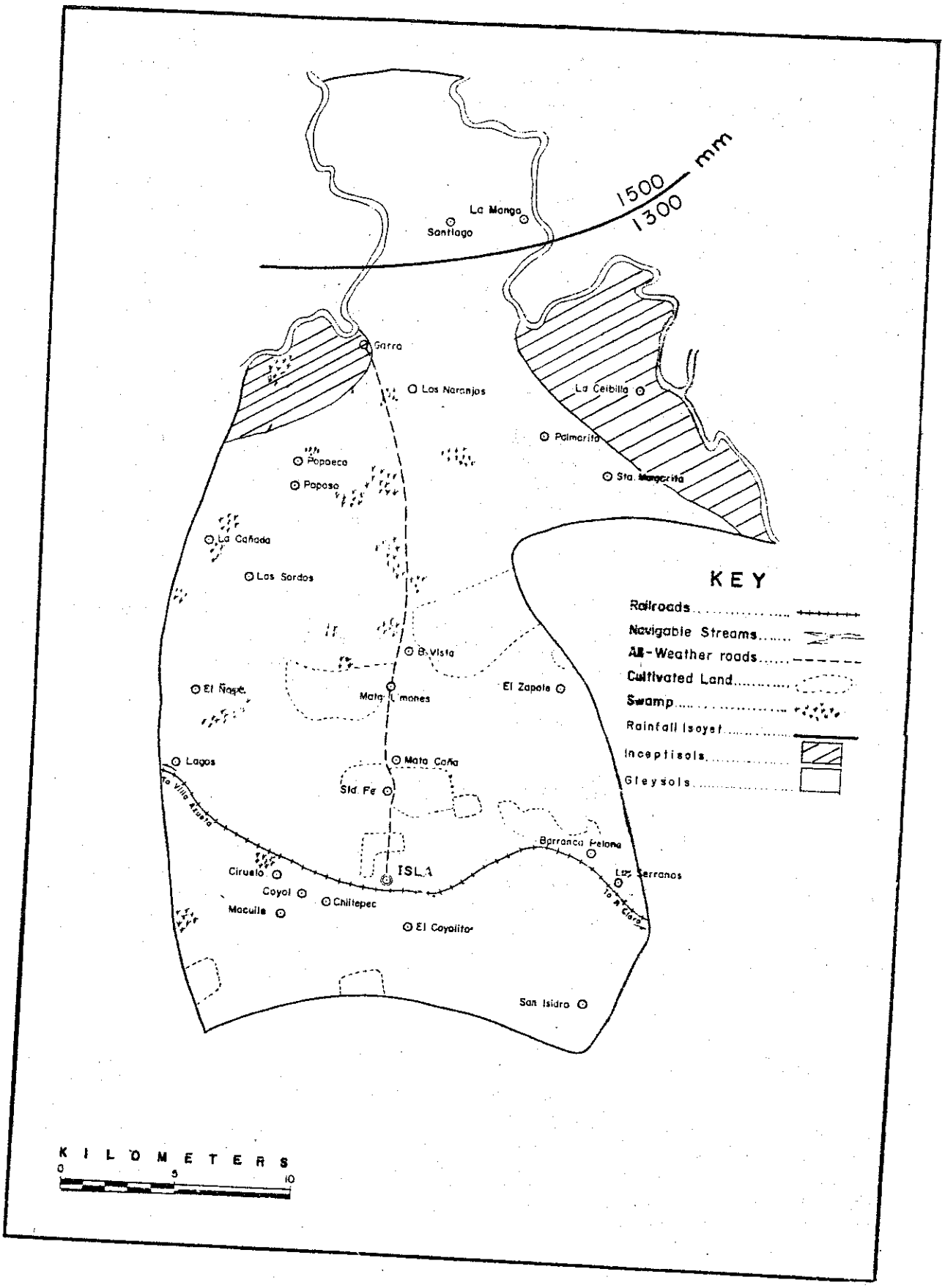
The Nature of the Changes

The most significant difference in Isla's type of development was the leading role of local initiative. Since the town's beginnings early in this century, there has been some growth and progress and very successful responses to external influences. Growth in population and employment opportunities peaked in the mid-1960s when the Isla area won its political sovereignty as a municipio. Since then, Isla has managed to modernize production and accumulate wealth to a remarkable degree.

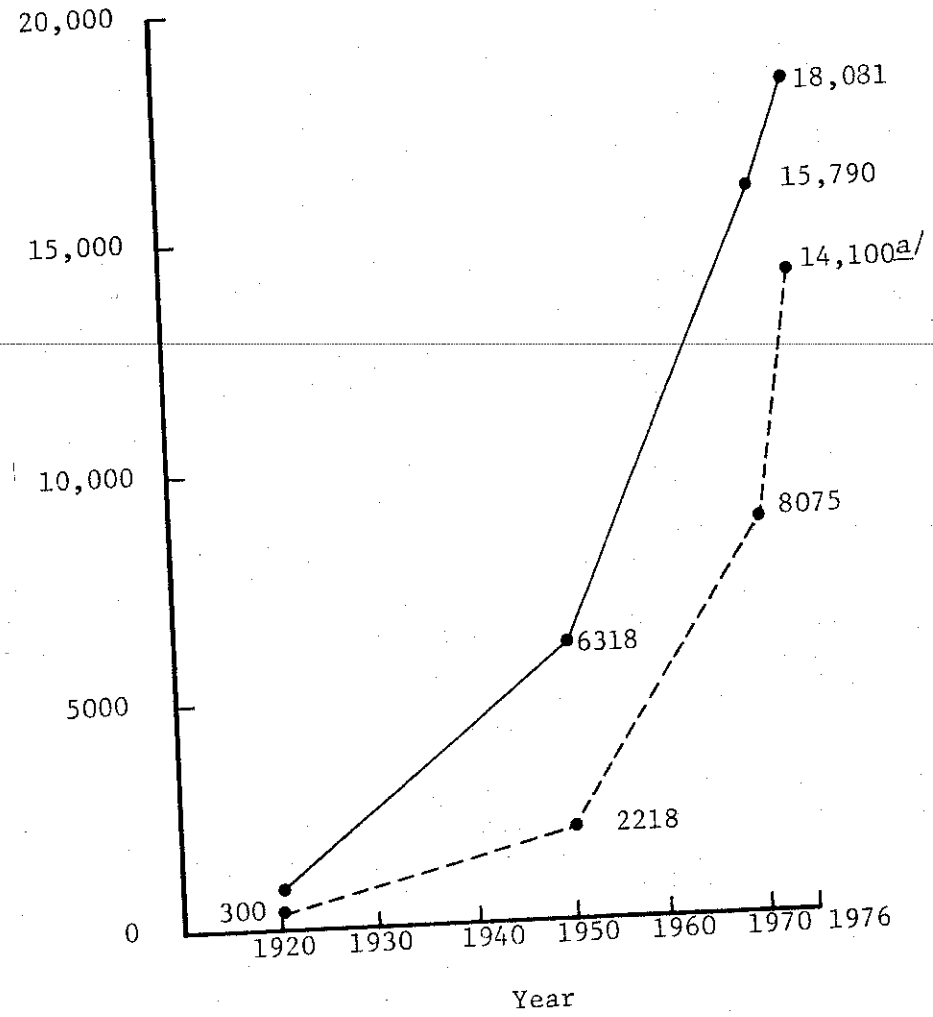
Population

Graph 7-1 illustrates population growth in Isla since its conception. Growth was fairly rapid during the first three decades, but around the late 1940s , population began to spurt forward at a rate of over five percent per year in the region as a whole, and almost 7 1/2 percent in the town. The immigrants were mostly from other parts of Veracruz, especially the municipio of Tlacotalpan.

MAP 7-1. "ISLA" ZONE: PHYSICAL CHARACTERISTICS



GRAPH 7-1. DEMOGRAPHIC GROWTH IN ISLA*



a/ The "Relación de localidades existentes" of the Comisión para la Eradicación del Paludismo of the SSA gave 9325 as the population of Villa Isla in 1976. The "Estudio Integral de la Comunidad de Villa Isla, Veracruz" (Tesis, Universidad Veracruzana, Facultad de Medicina, 1970) of Salvador García Torres, gave 14,000 as the population and the estimates given by local authorities varied between 12,000 and 15,000, so we have followed García Torres.

* Mexico, SIC, Séptimo y Noveno Censo de Población, 1950 and 1970 (published in 1952 and 1972); Gustavo Ramos Cabrera "Monografía de Villa Isla" (Isla, Veracruz: Febrero, 1971).

The 1950s saw the most rapid growth; the pace slowed only slightly in the 1960s. During the 1970s, population seemed to have stabilized in the whole municipio at about 3 to 3 1/2 percent yearly, since all the land had been cleared and occupied. Meanwhile, the birth rate here in 1976 appeared to be only half the national rate in 1970.

Communications

Since Isla grew up around the railroad, it has long been communicated with the rest of Mexico. The road to Garro built in 1946 first opened up the interior of the zone, giving access to both river routes on the Tesechoacan and the railroad at Isla. Map 7-2 shows the state of communications in 1950. But access was still very limited. Small producers were at a real disadvantage, and the local inhabitants still considered themselves very isolated.

The road system that has been built up since is part of the main national network. A paved road to the northeast has integrated Isla with the Tuxtlas region. Isla is connected by modern two-lane highway to Tuxtepec and beyond in the west, and to Sayula and the Isthmus to the Southeast. As a result, the town has become somewhat of a regional crossroads, as shown in Map 7-3.

Agriculture

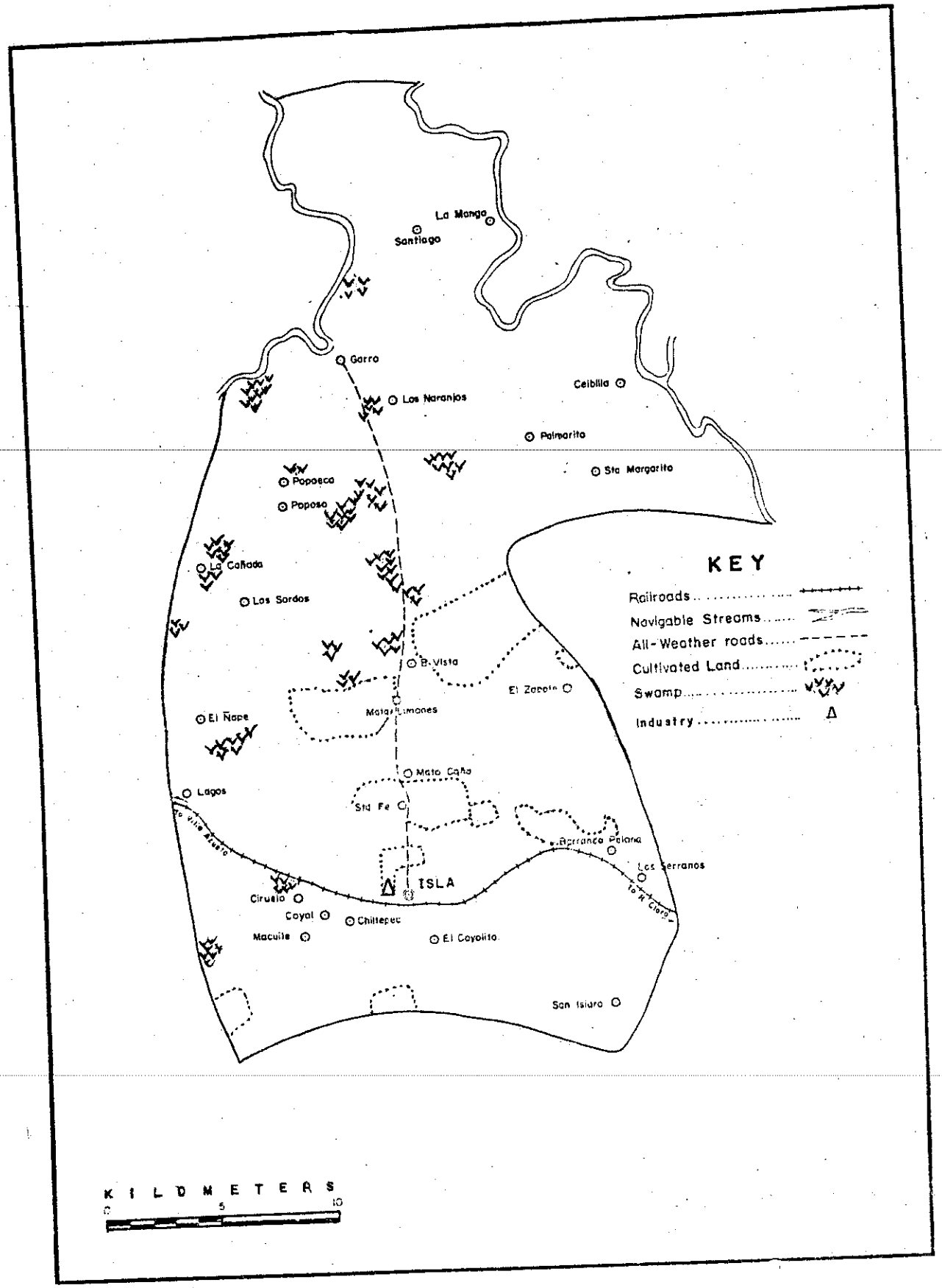
Isla has traditionally been, and continues to be, a producer of livestock products and pineapple. The major differences between Isla's agriculture in 1950 and in 1970 were the marked intensification and modernization of production, relative to other areas in the Basin and in the tropics in general, and the fact that the entire municipio had been cleared and put into production. Compare Maps 7-4 and 7-5. About 40 percent of the land is on 25 ejidos.

Chart 7-1 compared land use patterns in Tesechoacan (of which Isla was previously part) in 1950 and Isla in 1970. The amount of unexploited land had been cut by more than half, to be put primarily into pasture. Although as of the 1970 Census, less than half the land was in cultivated species, it is estimated that in 1976, close to 80 percent was (9). The changes in crop composition are shown in Chart 7-2.

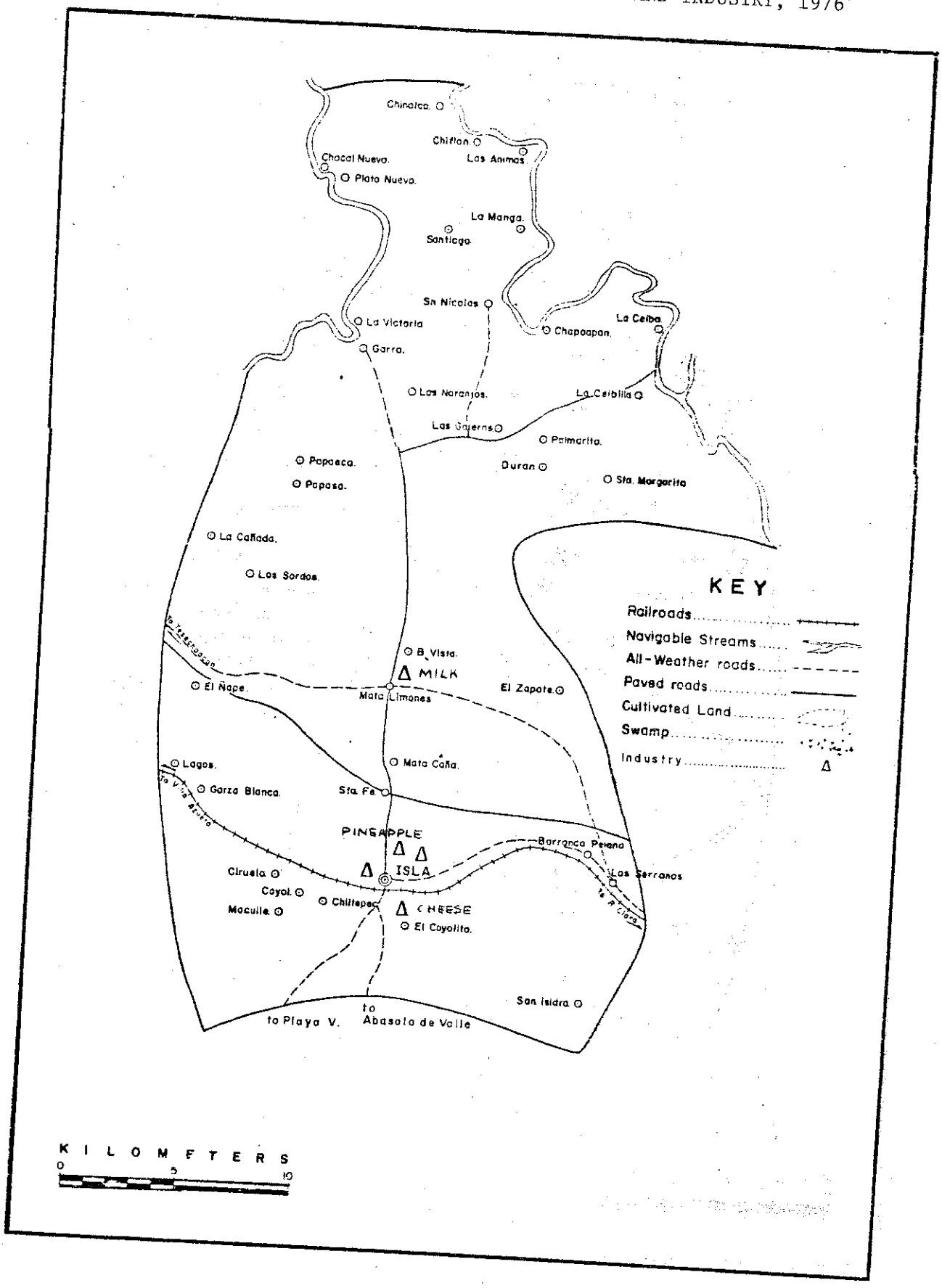
Just between 1970 and 1976, the cattle herd grew by 75 percent-- to about 60,000 head.1/ Total cropland has probably changed little, if at all. Pineapple has again become overwhelmingly important, and comprises over half the total crop acreage. Because of growing value of production and the fact that there is little land left uncleared, land values have risen tremendously (7):

1/This is a conservative figure--a 1971 estimate from the Livestock Association put the number at about 50,000--as there are probably many more now.

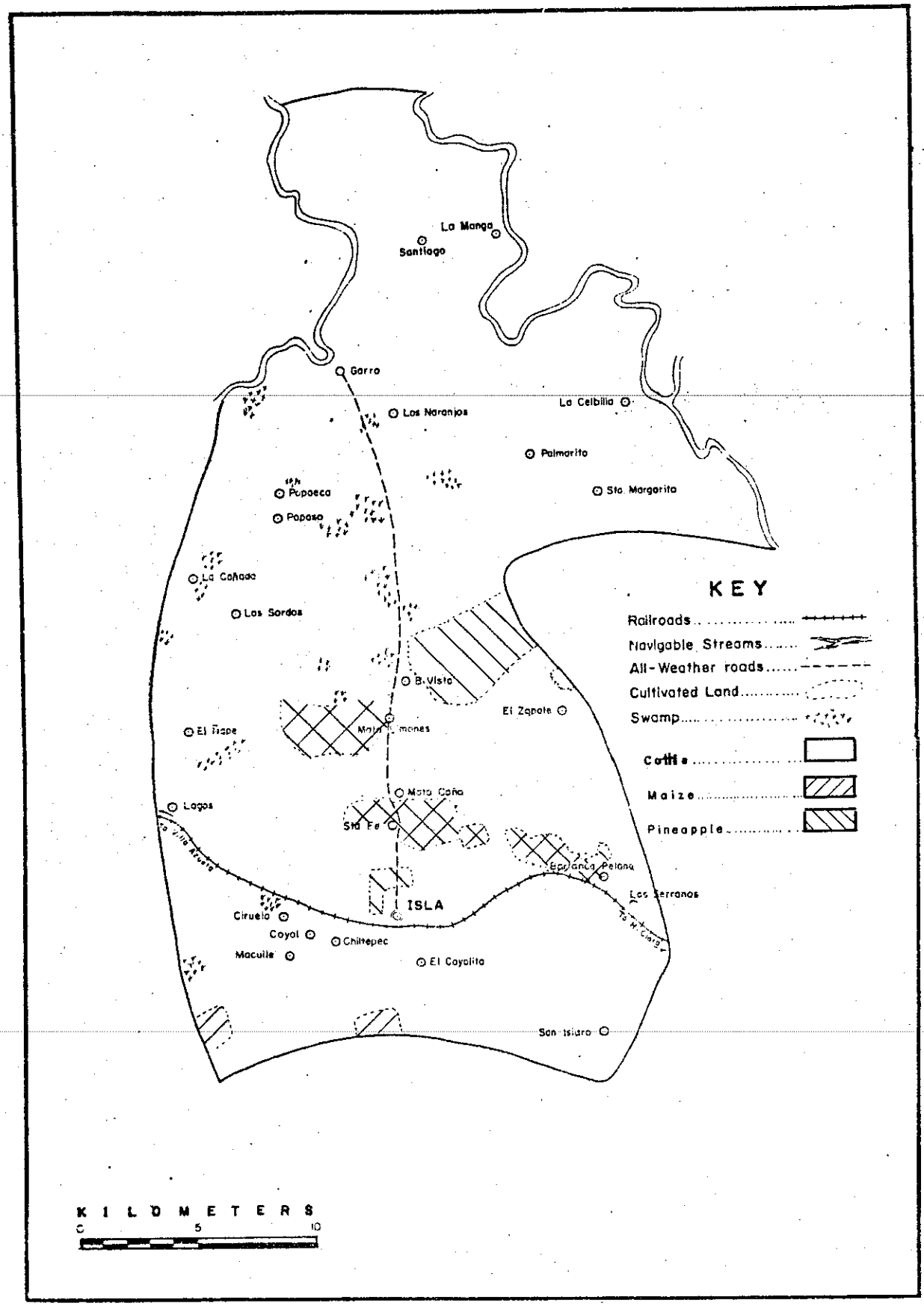
MAP 7.2. "ISLA" ZONE: COMMUNICATIONS AND INDUSTRY, 1950



MAP 7-3. "ISLA" ZONE: COMMUNICATIONS AND INDUSTRY, 1976



MAP 7-4. "ISLA" ZONE: AGRICULTURE, 1950



MAP 7-5. "ISLA" ZONE: AGRICULTURE, 1976

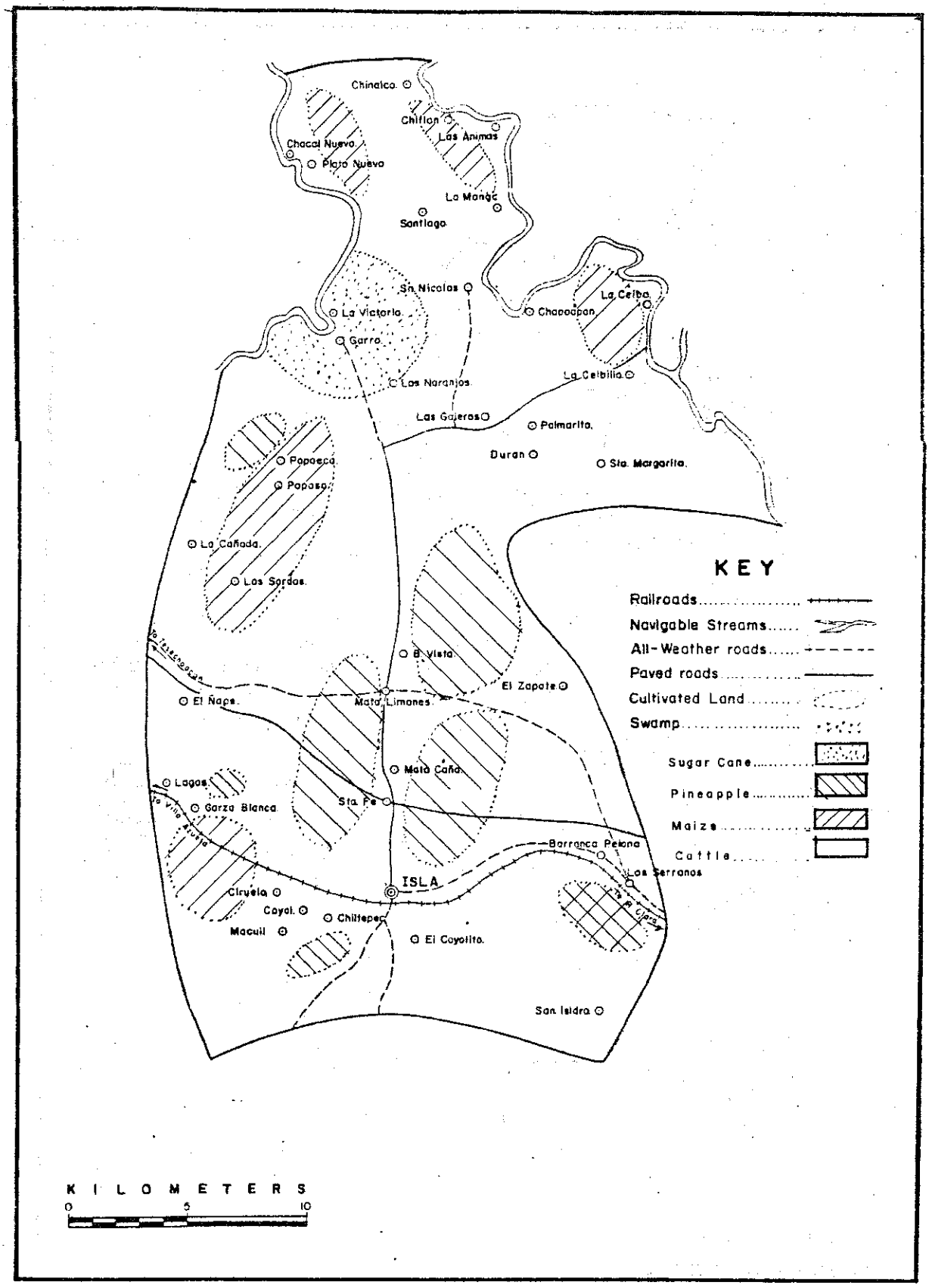
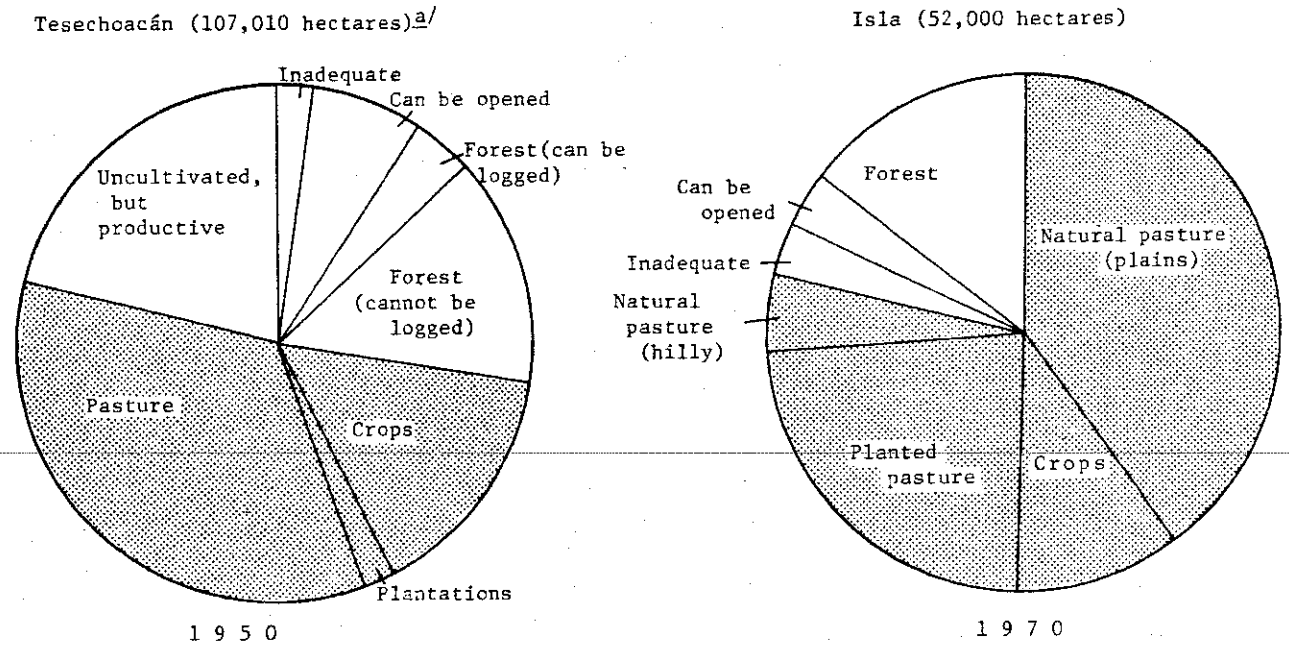


CHART 7-1. LAND USE IN ISLA*

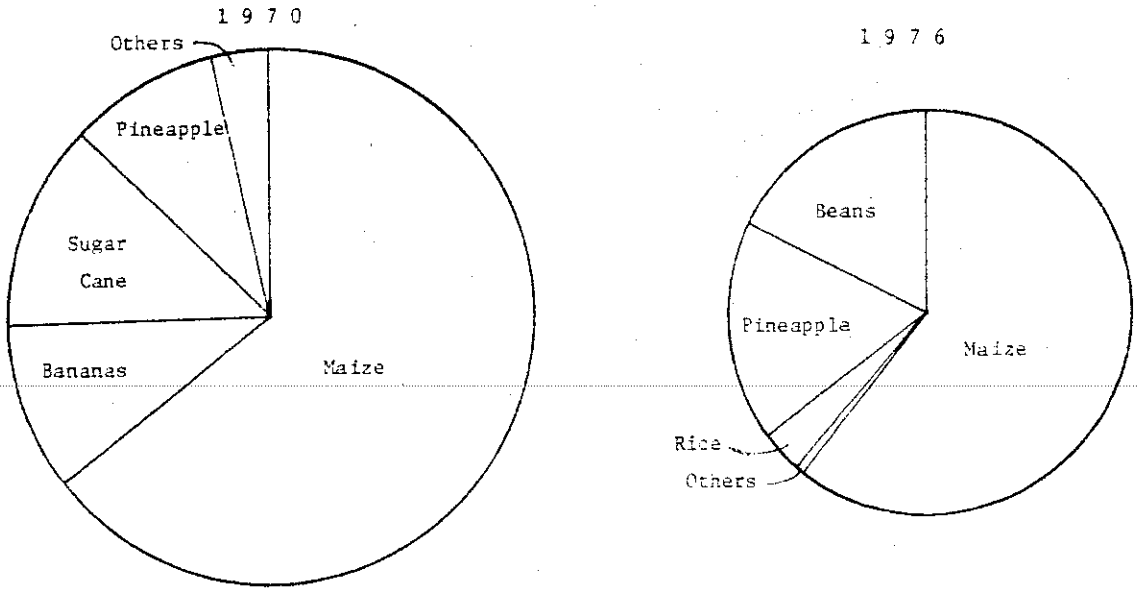
(hectares)



a/During this epoch, Isla was part of the municipio of Tesechoacán, Veracruz.

* Mexico, SIC, Censo Agrícola y Ganadero, 1950, (published in 1955). Mexico, SIC, Censo Agrícola y Ganadero, 1970, (published in 1975).

CHART 7-2. CHANGES IN CROP COMPOSITION IN ISLA, 1970-76*



Hectares Cropped:	12,400	8530

* Mexico, SRH, Comisión del Papaloapan, Preliminary data from the Censo Agrícola y Ganadero de 1970; "Cultivos, 1970;" Mexico, Dirección General de Agricultura en coordinación con la Agencia General de la SAG, "Ciclo Agrícola 1974/75 de Veracruz," (Xalapa, Veracruz: Marzo, 1976).

Year	Value Per Hectare	Type of Land
1958	$30	
1960-65	$1000-3000	
1970	$2000-5000	
1976	$2500-3000	River lowlands
	$3000-3500	Brush land
	$4000-7000	Cleared land (US$320-560)
	$10,000	Land by highway (US$800)

There are officially registered about 500 ranching plots and 200 agricultural plots (8).

Agricultural technology in Isla is one of the highest in the Basin. Nearly everyone uses fertilizer, pesticides and improved crop varieties. Tractors are very common. The John Deere Company put up a sales center in Isla in 1973. Between their sales and others' there are probably about 300 tractors in the zone (20).2/

Artificial insemination is popular, and many ranchers fertilize their pastures and provide dry season supplements. All use fertilizer, pesticides, some improved varieties and tick control. All but one had their own tractors; six out of eight use cultivated pastures; five out of eight artificial insemination.

Economic Diversification

Isla remains primarily an agricultural economy. As of the 1970 Census--illustrated in Graph 7-2--nearly two thirds of the EAP were in the primary sector. In 1975, livestock production was estimated at $452 million; agricultural production, $81.9 million; industrial production, $42 million (6).

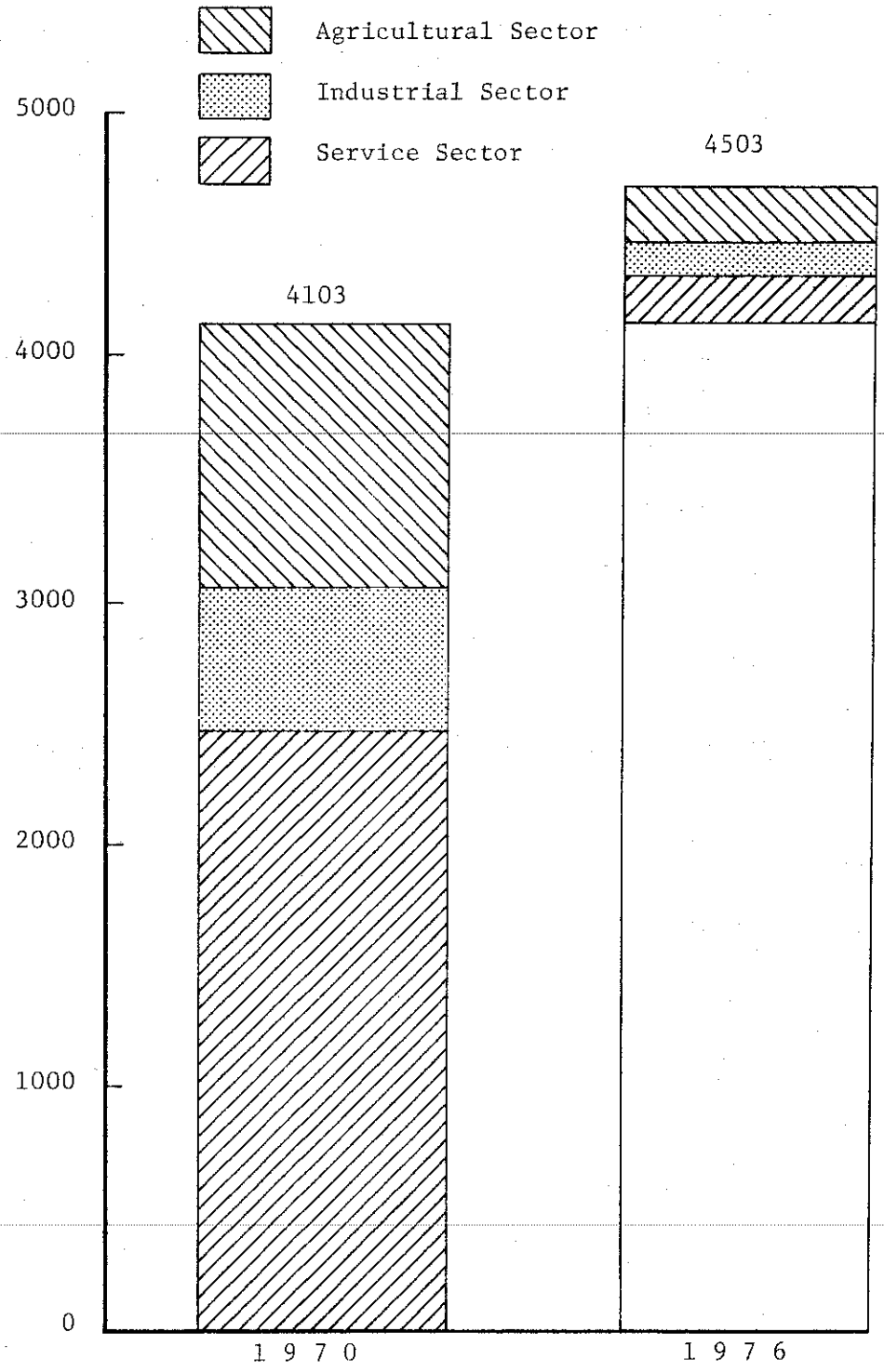
Only around half of gross product and personal income in 1970 came from the primary sector (5). The major industries are three fruit processors which employ a total of 100 full-time workers and about 2000 part-time workers during the packing season. These industries, although they employ a smaller number of workers, exercise enormous influence on Isla's economy.

There are also three small cheese plants which produce over 12 tons of cheese monthly, and two small rice mills. Each hires fewer than half a dozen workers.

Commercial activity has increased since 1970, and has probably absorbed most of the new entrants of the labor force.

2/John Deere sold 220 tractors in Isla and surrounding municipios, about half inside Isla. They estimate that half the tractors in the zone are John Deere.

GRAPH 7-2. SECTORAL DISTRIBUTION OF THE ECONOMICALLY ACTIVE POPULATION OF ISLA, 1970 AND 1976*



* Mexico, SIC, Noveno Censo de Población, 1970 (published in 1972); data for 1976 estimated by the author.

Living Standards

Isla has been a relatively high-income zone in comparison with the rest of the Basin, because of high-value pineapple production. In 1970, gross product was eleventh highest of the Papaloapan municipios outside the Industrial Region--about the same as Tierra Blanca, but lower than Tuxtepec and the neighboring pineapple capital Loma Bonita (5).

Living standards in the town are high. There was potable water, sewage, electricity, a hospital, and a junior high school. The rural area was not so well-endowed. There was minimal infrastructure and lack of schools brought its literacy rate down to 58 percent. See Chart 7-3 for present living standards in Isla town.

The 1970's was a boom time for Isla, however, and both average incomes and living standards went up. One banker suggested that there were now two or three people with $4 to 5 million in capital (US$320,000-400,000); 12 to 15 with about $1 million (US$80,000) and 40 to 100 with $200,000 - $400,000 (US$16,000 - 32,000).

The wealthier farmers had their own wells and one had his own sewage system, but there were still few rural works. Few ranches had electricity service; few ejidos had potable water. All had their children in school, and two were professionally trained veterinarians. Most of the ranchers had televisions and radios; there were several televisions on the ejido. Even in the least prosperous unit in the sample, houses were neat and sturdy and there were a few private cars.

Sources of Isla's Development: The Early Years, 1900-1945

The roots of Isla's development date almost from the time of founding. In essence, the sources of growth have remained the same; it is mostly the intensity of activity that has changed. One more or less interrelated group of private individuals has been responsible for stimulating most of the changes.

Isla's Founding

Until the present century, the Isla area was very sparsely populated by ranchers. When the Veracruz-Isthmus railroad was built in 1900, it passed by "Limon de Guerrero," a ranch belonging to Alonso Isla Camacho. What is now the town of Isla was then mostly covered by lakes. In 1904, Mr. Isla managed to arrange for a train station there to be called "Isla" (4).

During the Revolution, the zone was devastated. In 1917, many of the ranches were burned down. Their owners fled, leaving cattle to roam wild. In 1918, Alonso F. Isla Niemeyer inherited his father's land and made a deal with the Compania Agricola Abastecedora de Cereales to regenerate the place. "Limon de Guerrero" was to be its center (4).

CHART 7-3. LIVING STANDARDS IN VILLA ISLA*

		Percent of the population
Nutrition:	Drink milk daily	72
	Eat meat daily	45
	Eat meat 3 to 4 times each week	25
	Eat meat 1 to 2 times each week	30
Housing:	Brick or cement, with flat roof, latrine or inside bathroom, cement floor	22
	Brick or cement, with roof of asbestos sheeting, latrine or inside bathroom, and cement floor	26
	Wood, with roof of zinc or oilpaper - half have cememt floors	33
	One-room, with roof of oil-paper, earth floor, outside bath	19
	With furniture including: bed, dining set, closet, living room set	45
Appliances:	Television	75
	Radio	82
	Gas stove	56
	Refrigerator	38
	Record player	30

* Salvador García Torre, "Estudio integral de la comunidad de Villa Isla, Veracruz" (Thesis, Universidad Veracruzana, Facultad de Medicina, 1970).

This was a group of technology-oriented people who wanted to modernize and mechanize grain production. The company brought 13 tractors and the personnel to work them, but ultimately failed financially in 1920. The village, however, had been born and now had a population of 300. These people turned to raising the cattle left over from the war, and some staple crops (4).

Introduction of Pineapple

By 1920, the first pineapple plantation had been set up in Loma Bonita, Oaxaca. In 1924, an American came to Isla, rented some land from Mr. Isla Niemeyer, and started to plant pineapple in a small way. Not until two more foreigners, one English and one American, came to Isla in 1928-30 to plant the fruit did local interest stir. Pineapple was a very appropriate crop for the sandy, low fertility soils of Isla, with few risks from disease or other environmental problems. (4).

The market in Mexico City and in the United States grew steadily for pineapple, and Isla grew along with the expansion of its pineapple fields. In 1932, 40 freight cars of fruit were harvested. With the money made from the plantations, farmers bought more cattle. Still, the larger ranches in 1932 had only 30 to 40 head apiece (4).

In 1925, the first industry in Isla was set up--a sawmill founded by the same Mr. Isla Niemeyer. Wood was sold to the Port of Veracruz for dock construction. Second class wood was sold at reduced prices to Islenos for house construction. The mill employed about 30 people (4).

Immigration

During the 1930s and 1940s, many immigrants were attracted by Isla's boom. Landless workers came to work in the pineapple fields, made good money and bought their own land. Wealthier Veracruzanos from the river cities came to invest in the zone. Over this period, population growth ranged between five and eight percent yearly.

In 1936, the Associacion Agricola de Cosecheros de Pina was founded with 135 members. World War II brought a bigger boom in pineapple production to Isla, as the United States was cut off from Hawaii, and bought up supplies to feed its troops. The first pineapple packing plant was opened in 1942. The association grew to 204 members; cattle numbers increased and the town grew wealthier (4).

Settlement, 1945-1965

The boom was short-lived, however. When the war ended, the pineapple market collapsed and the privately-run packing plant failed in 1947. Shortly afterwards, hoof-and-mouth disease decimated the cattle herds.

This double disaster might have halted Isla's growth altogether had it not been for migration after 1947 from the flood-ruined zones by the rivers, and the new stimulus that arrived with the immigrants. 1950 to

1965 marked the completed settlement of Isla zone, and the foundations for the 1970s leap into prosperity.

New People

After the 1947 flood nearly wiped out the town of Tlacotalpan, many of the emigrants there headed toward Isla, where relatives and friends had already settled or had business interests. These people were warmly welcomed and given substantial assistance in getting started in the Isla community.

These people in turn not only brought their cumulative wealth and ranching and commercial know-how, but were energetic about making their new home as civilized as the old. By 1950, the population of Isla--then part of Tesechoacan--was 6318, with almost a third living in the village.

Isla rallied quickly economically. A splinter group of the old Pineapple Association--the Buena Vista group--played a leading role with the Tlacotalpan immigrants in improving the town's living standards. In the 1950s, each member paid $10,000-15,000 toward improvements--lights, drinking water, roads and schools--while the other townspeople gave what they could. In 1962, the electrification of the entire town was completed and a health center and hospital were set up (21).

This group was progressive in other ways as well. Being an important employer, due to very large pineapple holdings, the group made several far-reaching reforms in labor management, increasing salaries, and providing medical care and protection to employees (21). This tradition was continued--not always smoothly--but has resulted in a more equitable distribution of wealth and better relations between landed and landless than is found in most parts of the Basin.

Communications

This initiative for progress extended to communications. In 1945, the railroad line was Isla's only link to the outside world. To take full advantage of the World War II pineapple market, the Pineapple Association constructed a road 28 kilometers long to Garro in the north in 1946. The operation involved not only building the dirt road--at a cost of $650,000--but dragging the river and fixing the embankments as well. This connected them with the Tesechoacan River and gave access to the sea (4).

In 1954, the Islenos, the Commission and the Santiago Tuxtla authorities participated jointly in building 42 kilometers of all-weather road joining the Garro road to connect the two towns. With heavy traffic and bad weather conditions, its maintenance was very expensive, and Isla petitioned the Commission to pave the road. The Commission authorities refused, so in 1958, the Buena Vista group financed the resurfacing of the 62 kilometers on their own (4).

In 1962/63 Isla was connected to Playa Vicente in the south by a dirt road which was passable only in the dry season. The road east to

Rodriguez Clara was the same. A resurfaced road followed the railroad lines from Mata Limones to Juanita. To the west, the Mata Limones road connected with Tesechoacan and then to Ciudad Aleman, a trip which until 1965 required three to three and a half hours travelling. All these roads were financed jointly by the Commission and the Isla authorities. Because of the help offered to Isla by the Commission and its Vocal Ejecutivo, a statue was raised there, the only one in the Basin, to Raul Sandoval.

Progress in Ranching

As a reaction to the devastation of the hoof-and-mouth disease, 36 ranchers joined together in Isla's first Livestock Association in 1946. Their goals were to improve techniques, lower freight costs, cancel sales taxes, and help improve owner/worker relations. By 1964, there were about 350 members (4). The ranchers made a comeback, both through Association efforts and the experience and financing from former ranchers of Tlacotalpan, and others from Cordoba who were attracted by the apparent economic potential in Isla.

Starting in 1960, the group helped host a yearly Agricultural Cattle Industrial Exposition the first week of June, which coincided with the religious Sacred Heart of Jesus celebration and the annual Pineapple Fair (4). The object of the Expo has been to display improvements achieved in the area and to introduce new industrial products. For these fairs, cattle have been brought from as far as Texas, Canada and Kentucky for demonstration and sale as breeding bulls and dairy cows.

In the same year, the first Nestle's collecting plant came to Isla, at which time they began to collect 15,000 to 20,000 liters of milk daily. The livestock industry of Isla was beginning to turn into a scientific enterprise.

Progress in Pineapple Production

The first packing plant in Isla, Conservas Fausto, S.A. was interested mainly in chiles, and had worked with pineapple only in limited quantities (500 tons/year). When it closed down in 1947, the Pineapple Association tried to buy it. Due to a series of problems and apparently some shady dealing, they were unable to, and Mr. Isla Niemeyer took it over, and converted the plant to Empacadora Isla, S.A. which began producing in 1949 (4).

Problems continued, since the plant's capacity was too small to have a serious effect on the local pineapple market. The farmers meanwhile had appealed to the Veracruz governor for aid after the post-War bust. In 1952, the National Bank of Foreign Commerce acquired the plant to modernize and expand it. Yearly production of 5000 tons was achieved--200 tons daily over 42 work days, in three daily shifts. During January and February, the plant worked with chiles jalapenos; in May and June with pineapple (4).

In 1954, the National Bank of Ejidal Credit acquired the plant along with almost all of the Loma Bonita plants.3/ Credit programs were put into effect and experimentation began with the use of hormones to spread out the harvest from two to six months. By 1958, average annual production hit 12,000 tons, and by 1968, more than 18,000 tons (4).

By the mid-1960s, Isla had grown quite prosperous. Most of its land was cleared and being cultivated and population was beginning to stabilize. The zone was prepared for another surge of activity.

Isla as a Free Municipio

Isla's dynamism was not shared by the rest of Tesechoacan nor its county seat, Villa Azueta. In the mid-1960s, Islenos were paying roughly $520,000 to Azueta in taxes and receiving very little benefit in return. A strong movement grew for a "free municipio" to separate from Teschoacan.

Municipal Activity

Isla was declared separate by the State Assembly in December 1967. Since then, the budget of the municipio has risen to $4 million, probably a quadrupling in real terms (8).4/ Appendix 7-A shows calculations for estimating the real increase in average incomes from 1970 to 1975--about three and a half times.

Population growth slowed down and total population in 1976 was about 18,000, with between 12,000 and 14,000 living in Villa Isla. The living standards seemed comfortable, and did not visibly reflect such a drastic change. It appeared that most of the new wealth was reinvested in houses and in less visible consumer goods such as cattle, tractors, and children's professional education.

Islenos point proudly to a number of impressive social improvements since they became "free," particularly in town. The potable water system was extended; some streets were paved and drained and provided with mercury lights. Several new schools were built including a junior high (1967), a Telesecundaria (1968) and a high school. A park and municipal center were built as well (6).

3/ The one that is left there also changed hands many times; Villaria (1940), Compania Empacadora Loma Bonita, S.A. (1955), Heinz International (1964), and Productos Loma Bonita, S.A. (1974).

4/ An informant who worked in a government office in Isla for more than 20 years noted an increase in monthly taxes for the Federal Government from $60,000-70,000 in 1965 to $250,000 in 1970. This reflects partially increasing tax rates and inflation, but he thought they reflected at least a 50 percent increase in real incomes (21).

The emphasis on improvement by landholders in Isla is evident not only in their support for public projects, but by the fact that those with money enough send their children to be educated, in the professions: agronomy, veterinary medicine and accounting being the most frequently mentioned. A good number of these have returned to help on the farm, which is significantly affecting the technological level on these farms, and by demonstration effect, on their neighbors'.

New Roads

The more recent communications projects have been funded and planned by the federal and state government, rather than solely local initiative. The road to Santiago was paved in 1970 by the Commission, after being devastated by the 1969 flood. A bridge over the San Juan river replaced the ferry.

Since 1967-68, the road from Isla west had been paved. In 1973, the Sayula highway construction by the Commission reached Santa Fe, and the time required for the trip from Isla to Aleman was shortened to one and a half hours, despite detours at the river crossings. Now that the bridges have finally been finished, the route takes only an hour.

A project to resurface the road to Playa Vicente began in 1970. Another resurfaced road to Colony Abasolo del Valle in Playa Vicente Municipio was begun in 1975 as part of a PLANPA project, scheduled to be finished in 1977. The Playa Vicente road will provide southern access for Isla to the Tuxtepec-Palomares highway and hence to the southeastern part of the Basin and Salina Cruz.

The road to Sayula is scheduled to be fully completed in 1977, at which time Isla will be directly on the major Mexican highway out of Coatzocoalcos. Already, Isla's commerce is showing signs of awakening as the first traffic on these major crossroads trickles through. Certainly, the benefit for the fresh pineapple growers and beef fatteners has been tremendous as marketing costs have been more than cut in half.

When this system of roads is completed, Isla will undoubtedly be the crossroads of the eastern Papaloapan. With easy access to both major highways to southern Mexico, the region is sure to show dramatic growth in the next decade, and this expectation is encouraging increased investment in the zone.

Pineapple

Along with Loma Bonita and other pineapple communities of the Basin, Isla now produces about 85 percent of all the nation's canned pineapple and nearly half of its fresh fruit. Despite the presence of processors since the 1940s, the national fresh fruit market has always been Isla's forte until the past couple years. Today probably 30 to 40 percent of the fruit produced is sold to the packers (12).

Through mutual assistance, some technical aid by the factories, and the Exposition, pineapple technology has improved greatly and is as high as any in Mexico. All growers in the case study farms used fertilizers,

pesticides, tractors, and calcium carbonate to artificially lengthen the growing season.

Prices in Isla are generally higher than elsewhere, in part because the soils are more apt for pineapple and the fruit is sweeter. Also, until the early 1970s, Isla had better road communications than Loma or elsewhere.

The crop is quite profitable, even for those who produce for the low-paying packers. Per hectare costs and returns are computed below. In 1972, gross income was estimated to be $8770 annually; now it is $12,000-15,000 (18).

Gross return	45,000	(50 tons at $900/ton)
Costs	31,000	(25,000 + 4000 transport + 2000 extras)
Net return	14,000 (US$1120)[5/]	

For a 50-hectare plot, there is a $500,000 to 600,000 profit yearly--about US$40,000 to 48,000.

The Role of the Industries. The major role of the packing plants has always been as a market stabilizer, a source of employment, and a source of value-added locally. Particularly since the opening of adequate truck communications which facilitated access to the fresh fruit market, their role has been as "buyer of last resort" because prices are higher for fresh fruit.

Although the plants account for only ten percent of local income, there have been many advantages in having the processors in Isla. Most of the profits are extracted locally.[6/]

In 1970, it was estimated that the ejidal plant alone contributed $37,500 in municipal taxes, $2 million in salaries of factory workers and those involved in loading railroad cars, and $460,000 to the railroad in freight charges. It produced $9 million worth of goods, nearly 90 percent of which was exported. Nevertheless, in 1972, the plant was working at only 30 percent capacity. It was operating at a loss, primarily because high fresh pineapple prices, supply problems and inefficiency were making them noncompetitive in the international market (1).

5/ If there is a fallow, this is reduced in real value to $11,250 per hectare, since only three-fourths of the land is in production.

6/ In the fresh fruit export trade, the "coyote" takes his share from both the producer and the consumer, but most of the value of the higher prices abroad are captured by the foreign import and retailing concerns.

The Empacadora del Oriente S.A. was founded in 1966 to pickle pineapple pieces. It has 33 permanent workers and about 300 during the packing season. Two hundred and fifty tons of pickled fruit are exported directly to the United States and another 8000 tons are sent to the adjoining Procesadora S.A. which was set up in 1969, and transferred to the present Empacadora owner in 1973. Glacee is their major product, of which they export 2000 tons a year. The Procesadora has 15 permanent staff members and 90 seasonal workers (14).7/

These two plants process mostly the green fruit of the "acahual" or second harvest fruit, while the ejidal processor uses the mature fruit. There is minimal competition between the two plants for raw materials. The new plants therefore had a definite stimulatory effect on Isla's economy. In 1976, they merged to become one company--Procesadora, S.A.

Approximate total industry production in 1968-1976, by inputs of fresh fruit, increased as follows (4):

	1968	1969	1970	1971	1972	1976
Loma Bonita	29,000	20,000	21,643	31,675	30,000	30,000
Isla					8,745	34,794
Oriente	?	?	3,800	9,000	?	?

COFRINSA Credit. Because of the numerous difficulties of the Ejidal plant, in 1974 it passed into control of the Complejo Fruticola Industrial, S.A. (COFRINSA) which is run by the Papaloapan Commission.8/

COFRINSA has particularly emphasized improvements in ejidal pineapple production. There are only 25 ejidos in Isla, which own about 30 percent of the land, but they have been less benefitted historically through pineapple production, although they have often worked in the processing factories.

In general, most of Isla's investments were dependent upon personal financing or the help of wealthy friends and relatives. Thus, those without access to such capital did not participate as much in the progress.

COFRINSA was set up to provide a credit and marketing program in Loma Bonita and Isla, and particularly in neighboring Rodriguez Clara.9/

7/ Besides pineapple, they also make limited amounts of candied papaya, which is often substituted for citrus fruit in fruitcake. They are experimenting with ochra (used as a base in soups) and cucumbers.

8/ The Loma Bonita plants previously under Banco Ejidal also passed to COFRINSA, although the only one presently operating is the Empacadora Ejidal, S.A.

9/ Isla produces only 10 to 15 percent of the supply for the Isla COFRINSA plant.

The creditors for pineapple before 1972 were the Ejidal Bank (25 percent), the Heinz Company plant in Loma Bonita (12 percent), the Commission (12 percent), and the rest self-financing or through private banks, particularly BANAMEX. When the Heinz Company suddenly withdrew all its credit in 1972, prior to its 1973 departure, the Commission increased its loans to cover a fifth of producers and the Banco Ejidal, a third (1). A Fideicomiso de la Pina was set up, operated by the Banco de Credito Agropecuario. Then COFRINSA, a Fideicomiso whose president was the head of Recursos Hidraulicos, took it over.

The present credit program assists 22 work groups on about 200 farms. Credit is given for a two-year period of time at $26,000 per hectare in 1976. Through minor assistance programs, and just greater experience, field yields have risen 20 to 25 percent in the last few years. The number of farmers, particularly ejidatarios, working with pineapple has risen greatly. 1140 hectares were planted in 1970, about 2000 in 1972 and 3000 in 1976 (11).10/

The plant pays relatively high wages and keeps the price for pineapple stable all year long to protect farmers, rather than fluctuating price with supply. There were initially some problems with credit in that the pineapple was sent to the fresh fruit market and the debt was repaid in cash. There is now a ruling that a certain part of the area for which any farmer receives credit must go to the packers; the rest he is free to sell where he pleases.

Ranching

Both the quantity and technological level of ranching operations has increased rapidly since the late 1960s. The Livestock Association has continued to be very active and progressive; prices have improved; the Nestle's milk plant has expanded operations and several new credit programs are in effect. By 1971 the Association had 547 members, and in 1976, over 700. This is thought to include about two-thirds of all Isla ranchers, and all the large ones (9).

Each year, they have tried to make some collective contribution to Isla. In 1972 they built the new Association building. In 1973, they bought the land for the yearly Exposition; in 1974, they bought fancy display equipment for it (10). The Association is also responsible for land tenure problem assistance. In reality, however, this is mostly a nuisance, not a substantial problem. Little land is ever expropriated. The Association does take care of organizing protective litigation when there are threats of invasions.

10/ Twenty percent of Isla's production goes to the national market; 80 percent is exported. In previous years, the main buyers were the United States, Spain, Argentina, Chile and Holland. There have been big increases recently in sales to Holland, Scandinavia and Austria, and there are now ties with the European Common Market.

Improved Breeding. Artificial insemination has been popular in Isla since about 1968. In 1973/74, the Association sponsored the opening of the Frozen Semen Bank financed by the ranchers themselves. There is now a very high rate of bull and cow renovation. One-fifth to one-fourth of the ranchers are now using this service, and the Bank makes $12,000 to 14,000 monthly from sales of semen (22).

The dual purpose Zebu-Brown Swiss is the most common breed, but there is much experimentation here. Some Sta. Gertrudis, Charolais, Brahman and Indobrasil are found in crosses.

On the ranch where best breeding technology was seen, the average daily milk production of cows had increased from two to ten liters in three years--which gives some idea of the future potential production in Isla.

Better Pastures. The Association, through its educational role in the Fair has promoted the use of improved pastures also. Because Isla's native grasses are very poor, the return on this investment is high. Pangola grass has been around for at least ten years, but most of the new species were introduced just since 1970.

In 1973, more than 40 percent of the ranchers had part of their pasture in improved species (3); in 1976, this probably approached 80 percent. The most popular species are African stargrass, Aleman, Jaragua, Ines, Gigante (Elephant grass) and Merkeron. In 1973, about half reportedly burned their fields; most in 1976 did not. Three in the case study survey fertilized part or all of their improved pastures.

Other Advances. Isla received better technical testing of pasture and pasture management than most other areas because of the presence of the Instituto Nacional de Investigaciones Pecuarios, which was established in the early 1970's by SAG on the road to Playa Vicente.

In 1973, a third of those ranchers who had water deficiencies in the dry season were using supplements, a practice which sharply reduced cattle mortality rates. The major supplements are molasses from the sugar mills--which is becoming common as a year-round feed--and crushed corn and sorghum silage (3).

The Association is now in the process of organizing, with the municipal authorities, a $25 million slaughterhouse to be shared with four other livestock associations from Playa Vicente, Tesechoacan, Rodriguez Clara, and Loma Bonita (9). Isla was chosen as the site primarily for its superior communications.

Good Prices. Undoubtedly a major incentive for this bustle of local activity was the price factor mentioned in earlier chapters. The prices quoted for the Isla area are as follows (9):

	1960	1970/71	1976
Fattened 2-3 year old calf (per kilo)	$7-8	$9	$11-12
Year-old calf (per animal)		600-800	1700-2000
Milk cow (per animal)		800-1200	3500

improved communications alone helped encourage expansion by making the price for fattened cattle competitive with that on the coast.

Nestle's Influence. The Nestle collecting plant in 1975 was collecting 20,000 to 30,000 liters of milk daily. Because production is Isla was increasing so much, the company decided to close the Loma Bonita plant and increase the capacity in Isla to 42,000 liters daily (19).

There are now 28 different milk routes, encompassing about 800 ranchers from Isla, Santiago Tuxtla, Tesechoacan and Loma Bonita. About 20,000-30,000 liters come from Isla.11/ During the months of the dry season, when local production is low, Playa Vicente sends up two routes (19).

In 1973, almost two thirds of the ranchers were selling milk to Nestle (3). Since the expansion of the plant and the opening of new routes their portion must have increased. Of the eight ranchers interviewed in Isla, two were dedicated to milk production and all the rest sold considerable amounts of milk.

Nestle's prices have been forced to keep up with rising local fresh milk prices. Some fresh milk is sold as far as Tlacotalpan. Price per liter was:

	1965	1972	1976	1977
Nestle's	$1.20	1.80	2.55	3.00
Cheese Factory			2.60	
Fresh Milk			3.00-3.50	

The company had a program to help ranchers improve milk production by encouraging the use of pure Holstein cows and a feeding supplement. With just these two changes, they claimed increases of 30 percent in production per cow elsewhere (19). But in the humid tropics, this program failed and the Zebu-Swiss cross is still the most common milk producer.

They also had a strong credit program which began around 1970. In 1975, however, all credit was suspended due to lack of "cooperation" from the ranchers. A gradual shifting of interest toward fattening operations induced the ranchers to recuperate loans with money and not with milk once their cattle had grown (19).

Banking Credit. Banking credit played a major role in facilitating cattle expansion in the 1970s although private financing remains very important among the richer cattlemen. Forty percent of the money from the Banco de Credito Rural--which came to Isla in 1976--goes to ranching, especially to pasture establishment.12/ In Isla, most goes to small

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11/ Another 6000 liters daily is sold for commercial milk in Isla for cheese production.

12/ A problem has arisen all over the Basin because credits are mostly given for establishment, and not change of pastures.

private property owners. Credit is given for both breeding and fattening, so they can amortize the credit as they go along. In the 1975/76 cycle, the bank received more than 95 percent recuperation (16).

The BANAMEX has been in Isla since 1972 and began to work in ranching shortly thereafter. The Isla branch of the Bank of Mexico's FIRA program opened in 1974, and in 1976 95 percent of all the credit under their rediscounting program went to ranching. They concentrated on breed improvement and increasing herd size, with a smaller amount of money going for installations such as baths, insemination equipment and such (17).

Other Agricultural Credit Programs

Ninety-five percent of the private banking credit in Isla for agriculture comes through the FIRA program. Since 1969/70, some 700 farmers have been served in the Isla region, mostly in Rodriguez Clara and Tesechoacan. In 1976, there were about 300 to 350 private farms actively involved and about 35 ejidal societies (15).

Public banking credit through the BANRURAL and its predecessors has been available in Isla since 1971. Before that, the Banco Agricola and Banco Ejidal in San Andres Tuxtla provided service. Credit is provided primarily for maize, rice, beans and some soy and sesame. Of all the lending in Tesechoacan and Isla, over half is for ejidos, a very small part for private farmers. Before the unification of the bank, recuperation was not very good, and as a result, the credit offered decreased (16).

Since the unification, there has been stricter control, and 95 percent of the credit in the 1970-76 cycle was recuperated. Since returns to fertilizers on the lime-deficient plans are very high, the Bank and PLANPA programs to increase their use have been successful. The PLANPA agronomists are attempting to encourage beans and chile production; the latter have a very good market in Mexico City (18).

The sector least affected by Isla's growth and prosperity is that of rainfed agriculture--maize and beans produced by ejidatarios and small private farms. Guaranteed prices have been enjoyed by some ejidos, but the smallholders face fairly severe marketing problems.

Changing Labor Demand in Isla

Isla's major contribution to labor absorption in the Basin was during the years of settlement through the 1930s, 1940s, and 1950s. About 3500 new jobs were provided between 1930 and 1970. Of these, only 100 represent permanent industrial jobs, but part-time employment through the

packing plants helped support another 1400 for the six months of the packing season, which make it an extremely important employer.13/

Graph 7-2 shows the changes in sectoral distribution of the EAP in Isla from 1970 to 1976. Almost all the new entrants to the labor force came from other parts of Veracruz. Because Isla has become the service center for not only the local farmers and industrial workers, but also for Tesechoacan, Rodriguez Clara and Santiago Tuxtla, its commercial and service sector has been able to employ proportionately more workers.

Certainly, however, most of the jobs were in agriculture. This increased employment was mostly affected by the availability of new lands, more evening out of the seasonal labor distribution, and the nature of management on Isla ranches.

New Lands

During the settlement decades, the operative factor was new lands being opened up. About 1500 hectares of cropland were opened since 1950; probably another 2000 to 2500 from 1930 to 1950. Estimating ten hectares per man-equivalent, this meant that about 400 jobs were created. About 20,000 hectares of cattle land opened up--creating nearly 500 jobs, at 40 hectares per man-equivalent.

Seasonality

Work requirements were traditionally very seasonal in Isla--the pineapple harvest was short, the time for burning pasture was short, and there was other agriculture only during the rainy season. As a result, there was much seasonal unemployment. Even the pineapple packing jobs coincided with the harvest peaks.

Because of patterns of intensification in both pineapple and livestock production, labor distribution evened out, as shown in Chart 7-4. Longer harvests and higher yields means that there is high labor demand through most of the year. There is considerably more labor required on ranches, both for care of pastures and because milk production shot up. Intensification on ranches has come close to doubling labor demand in that sector in general--labor that is mostly full-time. While sugar cane, never really important, and maize production have declined, they have been replaced by labor-intensive chile and pineapple production.

During the rainy season, there is sometimes a labor shortage, but most of the demand is satisfied by local workers. There is minimal immigration from the Oaxacan Sierra to help the pineapple harvest.

13/ Some of these individuals only work three months. COFRINSA estimates that between 1500 and 2000 individuals worked in the plants for six months (12).

CHART 7-4. SEASONAL DISTRIBUTION OF AGRICULTURAL LABOR IN ISLA

CROPS	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	MAN-DAYS OF LABOR h i / REQUIRED FOR HECT.
MAIZE rainfed - 804 hectares	5	5	3	3	5	5	3	3	3				Mechanized:24-29 Espeque:35-40 c, j/
tonalmil - 506 hectares a/	10	7	8	8	10 7	7	5	6	5				Mechanized:24-20 Espeque:35-40 j, c/
PINEAPPLE k/ 1200 hectares a/	2	4	4	4	5	7			8	6	6	5	Mechanized and d/ fertilized:50-52
CHILE a/ 23 hectares	6	5						8	14	14	8	6	Oxen, fertilized: 60-62 d/
SUGAR CANE 1500 hectares a/	7	7	5	5	5			5	5	7	2	2	50 d/
BEANS 11 hectares a/	9 8				5	5	4 4	10 4 5	4 4 4 4	10 4	18 16 4 4	9 8	Mechanized:33 c/ Espeque: 36 d/ Mechanized: 33 c/ Espeque: 36 d/
CATTLE (34,500 head) 24,000 hectares 12,500 hectares a/	½	½	1 ½	1 ½	½ ½	½ 2	1 M 2 M	1 M 2 M	1 M 2 M	M 1 M	½ M	½ M	Natural: e/ 5-6 Pasture 12-13 e/ Planted pastures

Sowing

Harvest

Burning of Pastures

M Greater Milk production

Sources:

a/ Mexico, SIC, Censo Agrícola y Ganadero, 1970.
b/ Regional summaries from "Programa de Desarrollo Rural", Papaloapan Commission (Ciudad Alemán: 1973).
c/ Hector Duarte P., "Costos de Cultivos 1974/75 - Bajo Papaloapan" (unpublished, for the Papaloapan Commission, Ciudad Alemán, 1975).
d/ Hector Duarte P., "Costos de Cultivos, 1967" (unpublished, for the Papaloapan Commission, Ciudad Alemán, 1970).
e/ Interview with R.E. MacDowell, Professor of Animal Science, Cornell University, Ithaca, New York, 1977.
f/ Papaloapan Commission, Department of Economics, "Inventario Ganadero", 1971.

Notes:

g/ The Census does not include data on Isla ejidos; thus the area sown in maize, beans and chile is underestimated.
h/ These data do not include clearing operations, which require, with manual labor, 45 man-days per hectare.
i/ The number of man-days assigned each month to each crop is an approximation, based on the total required, and the schedule of activities.
j/ The range is due to different fertilization practices.
k/ Pineapple has a gestation period of 16 to 20 months; a fallow period is required at least every fourth year.

Type of Holding. Full-time labor is now far more important a factor for farmers than is part-time labor. Most of the part-time labor is supplied by ejidatarios.

It is interesting that the relation between size of operation or enterprise combination and labor requirements is weak. (There is a strong relation between size of holding and prosperity.) Two high-income, high-employment farms experienced dramatic increases in production and incomes in the early 1970s, and now have more workers. One was dedicated to dairy production, the other had pineapple and a raising operation. A high proportion of their full-time labor force was employed in either construction of new buildings, fencing, etc., or maintenance of a relatively large capital investment. It is notable that technology and mechanization here have brought substantial increases in labor requirements. Mechanization on the ejido during the early 1970s made it possible to cultivate all the available land and to continue to absorb the growing labor force. They are petitioning a land extension and believe that if they get it, there will be a scarcity of labor and they will be forced to mechanize further.

The PLANPA technicians consider mechanization very necessary for ejidos and provision of personally owned equipment useful, because rental services are usually overpriced and poor quality. Where custom work is poor, yields in carefully tended nonmechanized plots (with cost of production $1700 per hectare) are higher than with the mechanized plots (costing $3420 per hectare) (18).

In pineapple production, land preparation is almost universally with tractors and plows, but other operations are manual and there seems to be no trend away from this.

Two study ranches with the least intensive employment patterns were in the reputedly more intensive enterprises of dairy production with raising operations. This seems due to differences in labor management approaches.

On the intensive dairy ranch, one of the main sources of employment is hand milking. Its manager suggested that soon it may be more economical to buy a milking machine. Should that be the next step in the development of the dairy industry, much of the positive effect on employment of intensive ranching may disappear.

Off-farm income is not as important in Isla as in Tuxtepec or Tierra Blanca. Those who have outside interests, hold other farms for the most part. Furthermore, five of the eight in the survey had at least one son or daughter working on the farm, which implies much more of a commitment to the operation than was evidenced in Tierra Blanca. The trend toward professional training of children is paying off--the two intensive farms were both recently taken over by managers trained in veterinary medicine.

Labor by Class

Isla's development is definitely a product of the private landowning class, which receives most of the benefits. Solidarity and cooperation

among them was responsible for Isla's remarkable success. Chart 7-5 gives the distribution of the agricultural workers in Isla in 1970 by class and Graph 7-3 shows land distribution. There are many simulated latifundio here, made of several combined holdings. But while land distribution is definitely skewed, the smaller farms have certainly had a share in development. Most landowners are Isla residents, not outsiders. The quarter (by 1970 Census statistics) of the landowners with less than 50 hectares of land still depend mostly on maize farming and have little market leverage. They remain poor and are a source of part-time labor on ranches and even factories. There are 25 ejidos with average plot size of 20 hectares. The locals explain this by saying that prospective ejidatarios were not attracted to the plains: for lack of communications, land prices, free roaming cattle, scarcity of water. Probably more importantly, Mr. Isla Niemeyer found relatively high-paying work loading railroad cars, etc., for those who did come seeking land. Many of these were able to eventually buy private landholdings for themselves of 50 to 75 hectares. By the time the Agrarian Department investigated the tenure situation, they found that most of the early petitioners had either been absorbed, died, or had gone to ejidos in other parts of the state (4).

The free landless labor population of Isla numbers about 2000. This group was definitely assisted by agricultural intensification, since more full-time jobs were made available, although labor demand has stagnated recently. Migrant labor is minimal, but there is some seasonal exodus for the cane harvest elsewhere. The new jobs are sopping up excess local labor, rather than attracting outsiders. Historically, liberal worker relations in the area promoted their enjoying a higher standard of living, as a class, than elsewhere in the Basin.

Summary: The Potential of Local Initiative

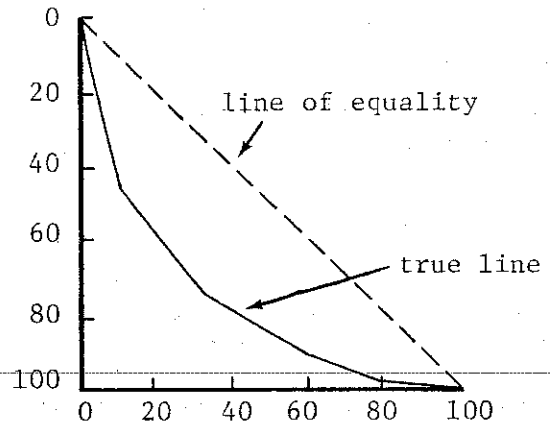
The relevance of much of the Isla experience is limited because of its dependence on private accumulations of wealth. But there are many areas in Mexico similarly controlled by "gente de razon" which could gain much from the prosperity and distributional effects of the Isla-type development.

Importance of Local Sources of Capital

It seems that a prerequisite for this growth was the availability of a large production surplus (in this case from pineapple and cattle), linked with a strong sense of community. Good things might have been done with low profit margins in such a spirited place (an example is Colonia Durango in Tierra Blanca, perhaps), but great things were done with the high profits. The people invested their money into productive and social capital. They bought more trucks than cars; more cattle than trucks, and more schools than statues. Good worker relations and a healthy and reasonably rewarded working class was considered part of "civilization."

Financing was made available through personal channels, under favorable--if not friendly--terms and because of this process, was quite flexible compared to the predominant private and public bank financing--and

GRAPH 7-3. LAND DISTRIBUTION IN ISLA*



Of ejidal properties:

42 percent with less than 100 hectares

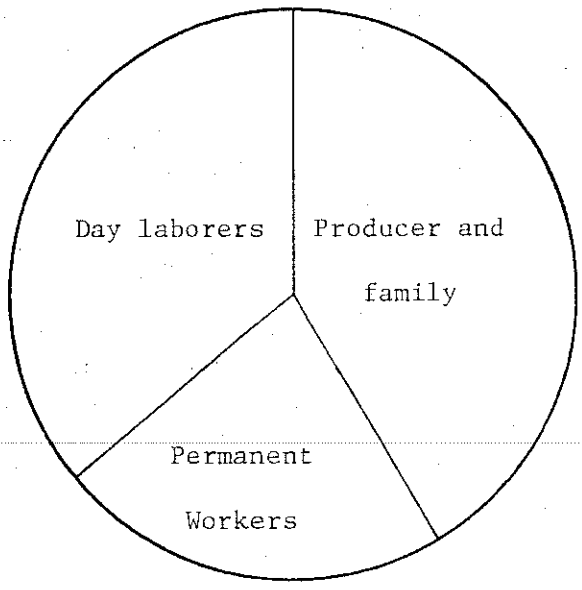
48.7 percent with 100-500 hectares

8.1 percent with 500-5000 hectares

In 1970 there were:

1062 private properties
23 ejidos

CHART 7-5. AGRICULTURAL WORKERS IN ISLA, 1970*



2272 agricultural workers in 1970 in Isla

* Mexico, SIC, Censo Agrícola y Ganadero, 1970 (published in 1975).

certainly the loan sharks--which serve most of rural Mexico. Success through self-financing requires that substantial capital be available in the system to begin with, which rules out its implementation among poorer farmers. Also, where there is local money, local people can be depended on to finance more of their own social infrastructure as well. The whole finance system has some lessons for future government attempts to channel outside capital and investment.

Technology and Education

Certainly the Isla experience shows that technology can be quite positively correlated with bettering employment opportunities. Fattening operations need not be labor-extensive. Mechanization need not steal jobs. The choice of machines depends on the quality of the work to be done, its timeliness and its price.

High education levels and goals had a very positive effect on Isla's development. Children were educated to become more productive individuals--back at home. The "brain drain" has been less severe than elsewhere because of this. Furthermore, experimentation and interest in progressive techniques was directly correlated with educational levels. Perhaps most important, good labor relations have been an important community goal among leading farmers for decades. They have been learning to work well with employees and are much more inclined than the average farmer in Tierra Blanca and Tuxtepec to intensify labor use as well as capital use when increasing production.

Success of Agricultural Credit and Vertical Integration

COFRINSA's experience in the area is encouraging. Its aggressive attempts at industrial efficiency and product diversification, combined with successful farmer assistance, have been a strong stimulus to the municipio's economy. Very positive distributional effects have emerged because of the wide range of people affected.

Finally, Isla's growth illustrates that with good highways, even areas far from major markets can be competitive in agricultural production.

Repeating the Isla Experience

The combination of investments in roads and industry can serve to develop other small towns, as in Isla. This particular model, based as it is on the availability of a very high value crop which early on acquired a large share of the market, may be somewhat limited. The fact that the problem of ejidal poverty is still unresolved by this method of growth also limits usefulness for general policy.

But the government can encourage local participation to the greatest degree possible, among other groups, including ejidos. Some of the Tuxtepec ejidos showed that such initiative occurs in that system also where there is a substantial financial base and community solidarity.

There is potential to incorporate this model in the Papaloapan Basin-in the new rubber producing zones, centers of chile production, and in the Irrigation District.

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8 Interview, Treasurer of Isla Municipio, August 2, 1976.

9 Interview, President of Livestock Association of Isla, July 22, 1976.

10 Interview, President (newly elected), Livestock Association of Isla, Dec. 8, 1976.

11 Interview, Agronomists at COFRINSA Headquarters, Loma Bonita, Oaxaca, Dec. 7, 1976.

12 Interview, Manager of Isla COFRINSA Packing Plant, July 21, 1976.

13 Interview, Director of Maintenance of COFRINSA Packing Plant, Dec. 8, 1976.

14 Interview, Owner of Empacadora del Oriente, S.A. and Procesadora, S.A. of Isla, July 22, 1976.

15 Interview, Manager, Banco de Mexico of Isla, August 2, 1976.

16 Interview, Manager, Banco de Crédito Rural of Isla, Aug. 2, 1976.

17 Interview, Assistant Manager, Banco Nacional de Mexico, S.A., Aug. 2, and Dec. 8, 1976.

18 Interview, Plan Papaloapan agronomists in Isla, Aug. 2, and June 29, 1976.

19 Interview, Manager, Nestle's Collecting Plant in Mata Limones, Aug. 1, 1976.

20 Interview, Manager, John Deere Company of Isla, Aug. 2, 1976.

21 Interview, Sr. Taurín Reyes Lagos, Private Pineapple grower of Isla, Aug. 1, 1976.

22 Interview, Veracruz State Treasury, Isla office, Aug. 3, 1976.

23 Interview, Ing. Jose Rodriguez Vallejo, Director del Fomento Agropecuario de la Comisión del Papaloapan, June 16, 1976.

APPENDIX 7-A. INCOME CHANGES IN ISLA, 1970-75

Year	Gross Product (current pesos)	Product per Capita (current pesos)	Income per Capita (current pesos)	Income per Worker (current pesos)[f]	Income per Worker (current dollars)	Gross Product (real 1975 pesos)[g]	Income per Worker (real 1975 dollars)
1970[a]	82.9 m.	5252	2070[d]	8280	662	140.9	1125
1975[b]	575.9 m.[c]	31,800	13,130[e]	50,500	4040	575.9	4040

[a] Information from the Banco de Mexico, 1970.

[b] Information from a study by the Municipal President of Isla, Veracruz, 1975.

[c] Livestock Production: $452. million
Crops production 81.9 million
Industrial production 42.0 million
Commerce not included

[d] Information from an unpublished study of the Banco de Mexico, S.A., which shows that 39 percent of the value of production goes to personal incomes.

[e] We suppose that in this year only 35 percent of production is directed to personal incomes.

[f] The economically active population is 26 percent of the total population.

[g] The real value of production in 1970, in 1975 terms, is 170 percent of the current value of production in 1970.

CHAPTER 8. ABASOLO AND GOVERNMENT INTERVENTION IN AGRICULTURE

In contrast to the first two zones of this study, the colony Abasolo del Valle is still relatively isolated. Lying south of Isla, it is the largest colony in Playa Vicente municipio--with nearly 24,000 hectares--and the outpost for the last great frontier that remains in the Papaloapan Basin.

Flying over Abasolo, one becomes aware of this aspect of the place. One has passed miles and miles of terrain with rolling hills covered by nothing but towering rain forest. Suddenly, a large open area appears with pastureland and some houses with their gardens. Scars of yellow dirt lead out from the opening, which are newly built roads.

The urban center is definitely rustic, but quite prosperous-looking for an isolated rural settlement in Mexico. Spacious houses are made of wood planks and palm thatch and there are a few more elegant homes of concrete block.

The center is dominated by a large grass plaza with a big meeting house, half-built secondary school, scattered office buildings and a statue to President Lopez Mateos, erected for his 1960 visit. The few government buildings are built in the modern style. The dirt roads of the village are very wide and are lined with almond and other trees, which give a great sense of spaciousness.

Dress in the colony is predominantly modern, although shoes are reserved for occasions. The people here are very diverse mixture of Veracruzanos and Oaxacans, and a sprinkling from many other states.

Probably half of the colonists live around the urban center, and even many with plots far away keep a second house there. The farms themselves are fairly isolated from one another. To relieve their loneliness the women make special efforts to wash laundry at the stream, or prepare maize meal together.

There are large garden plots scattered wherever there are people, full of coffee and fruit trees. The acid soils--orthic acrisols--in this zone are low in fertility and subject to erosion because of the heavy rains and topography. But there is good natural pastureland. Most of the farm land is now used for grazing, but maize, rice, beans and sesame fields also dot the flatter parts of the landscape.

There are no major rivers in the area, but the high yearly rainfall--over an eight-month period--means that moisture is not usually so much of a problem here as in other zones.

There are signs everywhere of modernity approaching in agriculture. As a colony, Abasolo is far ahead of almost all others in the Basin, particularly the directed colonization schemes. The photos on the following pages show what the area is like.

The Nature of the Changes

What is extraordinary about Abasolo is the relatively high level of technology and incomes prevalent there. As few as ten years ago the colony was as stagnant and minimally productive as its neighbors in Playa Vicente. Today, Abasolo is a prosperous ranching community with an effective and progressive local government.

Abasolo's experience is useful to look at because this sudden transition was accomplished in most part through direct government efforts aimed at primary sector producers. Abasolo has experienced a significant decrease in local underemployment and attracted hundreds of outside workers. There was a marked intensification and expansion of productive activity, and drastic improvements in rural living standards took place.

Population

Graph 8-1 shows that Abasolo's population growth was moderate until 1970. The colony began in 1952 with 250 families, and a population of about 1250. By 1960, the influx of migrants was nearly completed, and population began to stabilize.

Subsequently, Abasolo was not a particularly important magnet for other migrants. Population growth over the 1960s was very slow--about two percent per year. This suggests both that infant mortality rates remained high and that there was some outmigration for lack of jobs. But between 1970 and 1976, the population grew 50 percent to 3000. In the whole municipio, only Playa Vicente town (with 7000) and Nuevo Ixcatlan (with 3700) are larger.

Communications

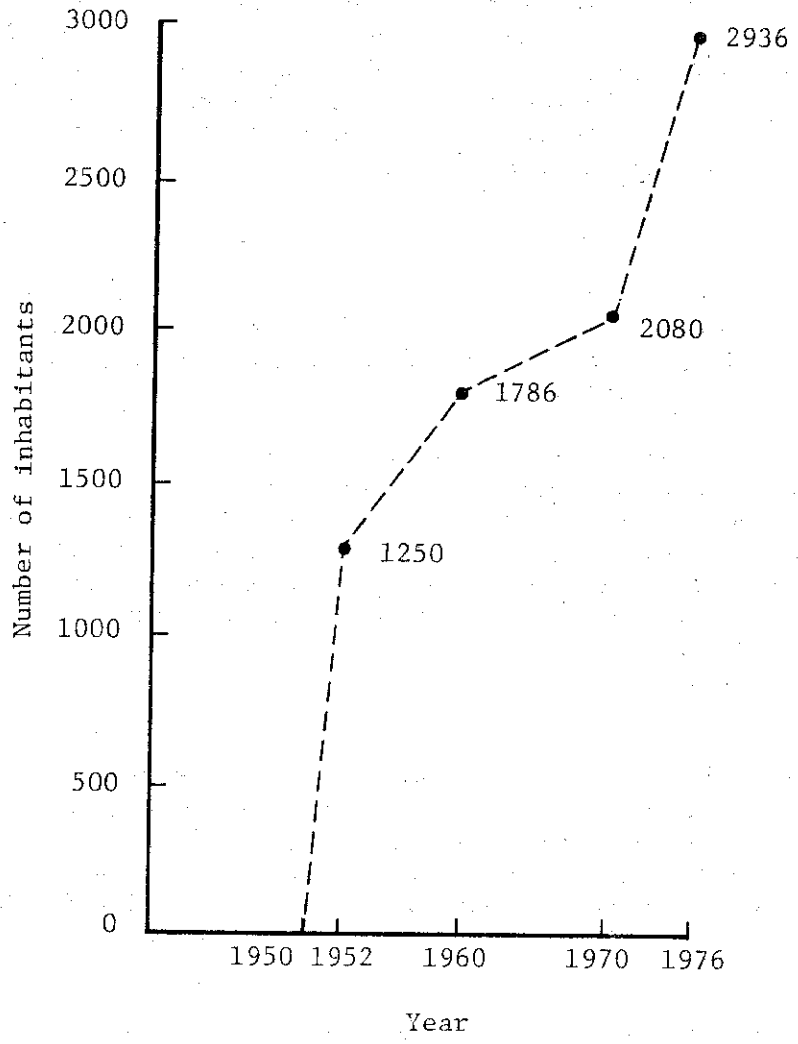
Maps 8-1 and 8-2 compare communication in the Abasolo area in 1950 and 1970. In the early years of the colony, transportation was extremely difficult. Two roads were built by the colonists themselves in the 1950s, but they were impassable in the rainy season. In the late 1960s, when the government assistance program began, the 18-mile (29 kilometer) trip to Isla required over two hours and was only made during a few months of the year.

But the PEMEX cut several rails during 1974, which improved internal transport. The Papaloapan Commission today is building a new all-weather road that even in its unfinished stage has sharply reduced traveling time and permitted rainy season truck transport to the colony.

As a result, the Abasolo colonists, who were fairly travelled before, have become regular visitors to Isla and Cordoba and some other Basin towns. Several trucks travel daily to Isla and charge $30 (US $2.40) per person for the ride. In 1977, daily bus transport from Isla was begun.

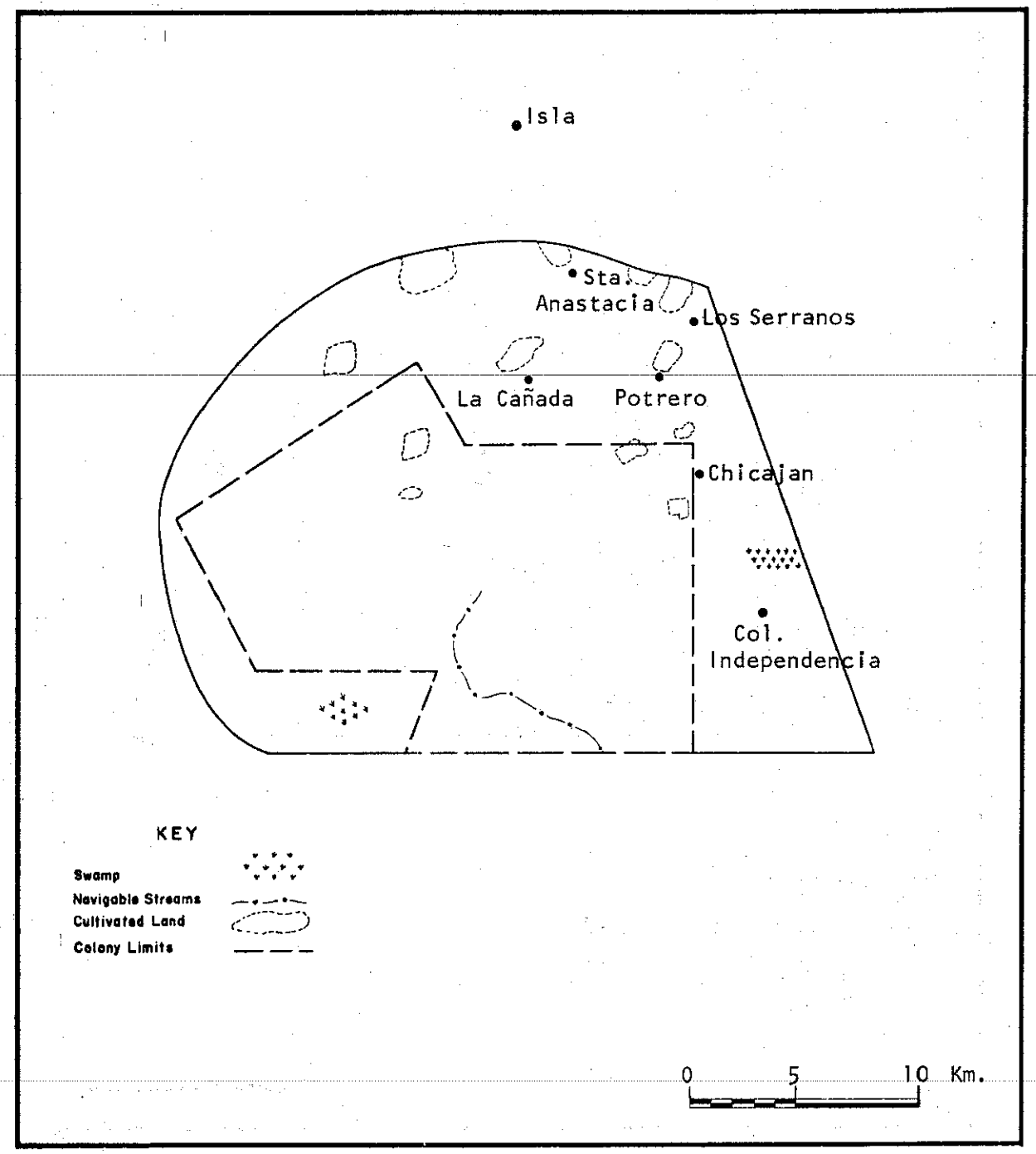
The travelers--mainly women--leave chiefly for business reasons, to buy and sell, and contribute a sizeable portion of family income by taking orders from their neighbors for goods. While everyday items are carried in one large and a handful of small local stores, clothes are often bought

GRAPH 8-1. POPULATION CHANGES IN ABASOLO DEL VALLE, 1950-76*

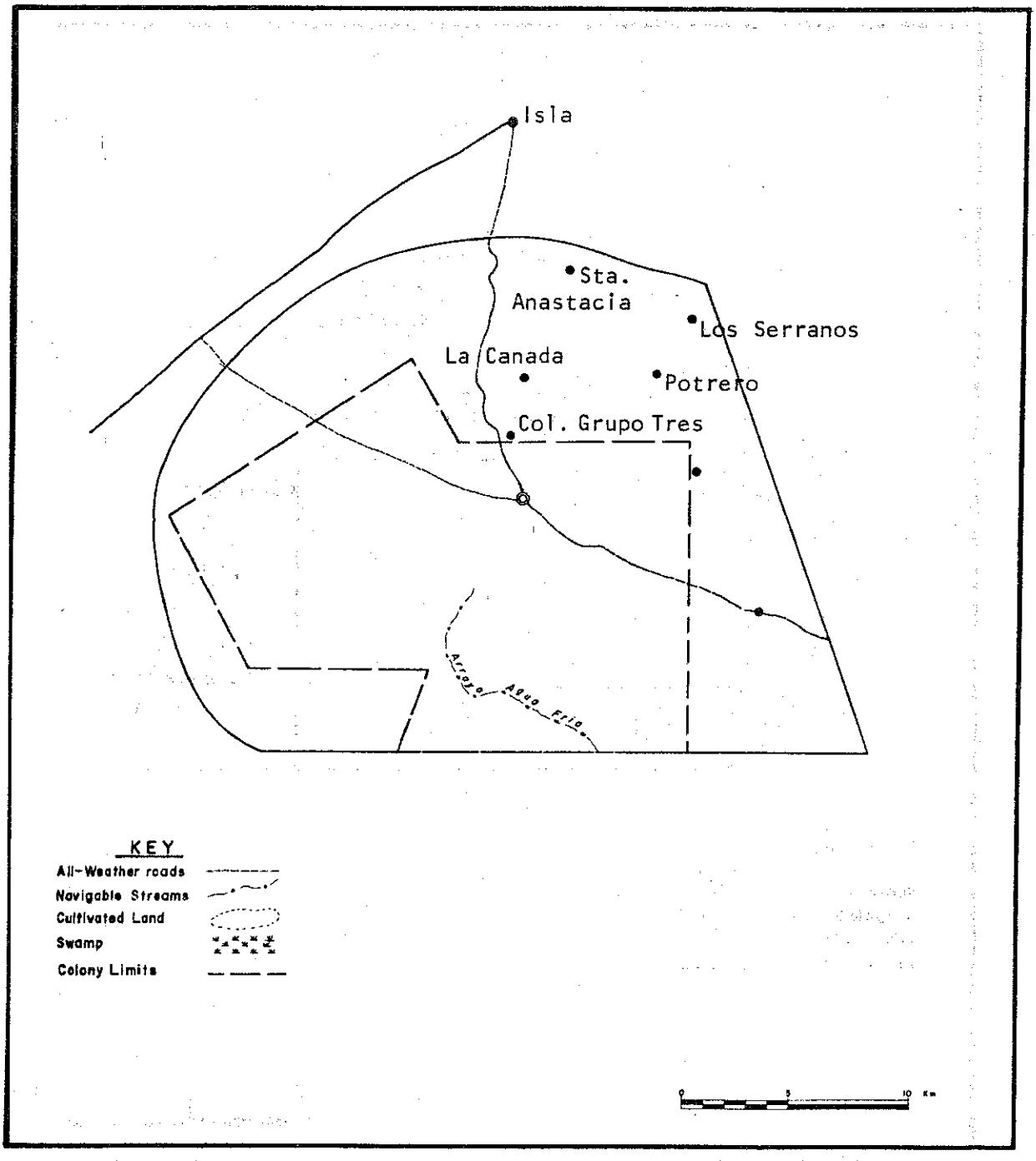


* Archives of the Colony Abasolo del Valle in Playa Vicente, Veracruz, for data of the 1950's; Mexico, SIC, Octavo y Noveno Censo de Población, 1960 y 1970 (published in 1962 and 1972), for 1960 and 1970 data; Mexico, SSA, Comisión para la Eradicación del Paludismo "Relación de localidades existentes", 1976 for 1976 data.

MAP 8-1. "ABASOLO DEL VALLE" ZONE, 1950



MAP 8-2. "ABASOLO DEL VALLE" ZONE, 1976



in Isla or Cordoba, and farm supplies and machinery parts in Isla or Cosamaloapan. Banking and cattle registration take place in Playa Vicente.

The colonists are quite interested in staying in touch with life outside their immediate sphere. With completion of the new road, this integration should become complete.

Agriculture

The change in agricultural production has been the most impressive in Abasolo. Chart 8-1 shows the changes in amount of land used in the colony between 1950 and 1976. Up until the late 1960s the system was essentially one of shifting cultivation, with no more than 2500 head of cattle in the colony, important mostly for draught power (6).

Only about a third of the colony--7000 to 9000 hectares--was cleared, due to the financial and mechanical inability of the colonists to exploit fully what are really fairly large properties (6). Technology, rate of land clearing and crop selection had remained pretty stable at a low level from the conception of the colony until the late 1960's.

By 1976, 10,000 more hectares had been cleared, totalling about 80 percent of the available land area. Most was planted to pasture and there are now about 10,000 head of cattle (6).[1/] Chart 8-2 shows that while the composition of crops has changed little over this time the total land in crops has diminished.

One estimate is that of the 500 or so lots in the colony, 100 are now dedicated to agriculture, 250 to cattle and 150 to mixed cropping and livestock. Ten to 15 percent of the colonists own more than one lot, but four to five lots is the maximum[2/] (9).

Most ranchers have some cultivated pastures and all use tick control. No one is yet using artificial insemination techniques, but three ranchers in Abasolo have learned the technique in Isla training classes.

Economic Diversification

Probably the most important shifts in employment in Abasolo have come from the increase in number of landless agricultural workers, and consolidation of landownings. Chart 8-3 shows the approximate shifts in land ownership patterns since 1968. Outside ownership has become much more important.

Outside of agricultural production and cattle breeding and fattening, there is very little economic activity. Buying and selling of cattle on commission is a side occupation of about a dozen people. Major commercial

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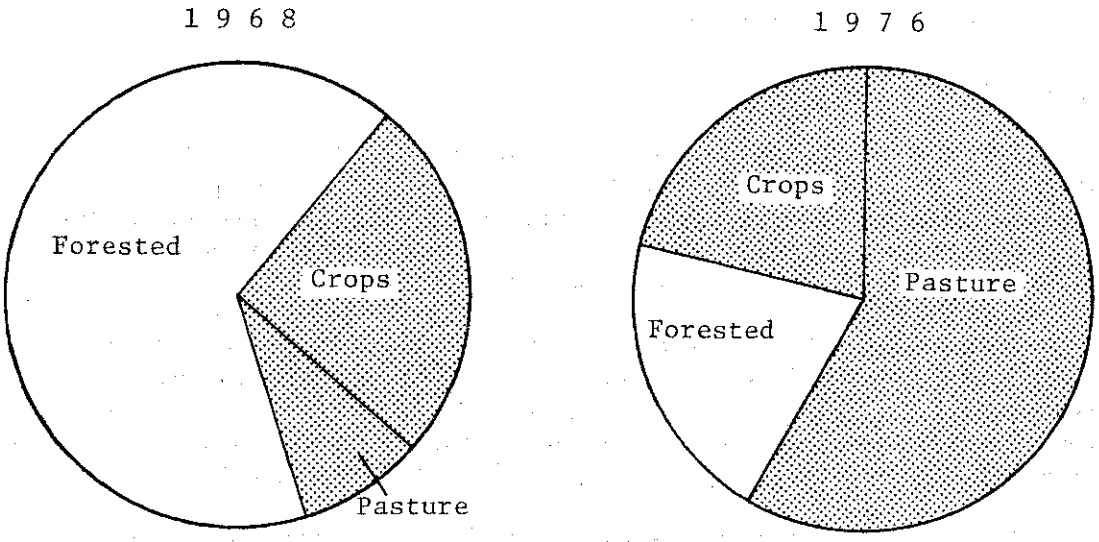
1/ The estimates range from 8000 to 14,000 animals.

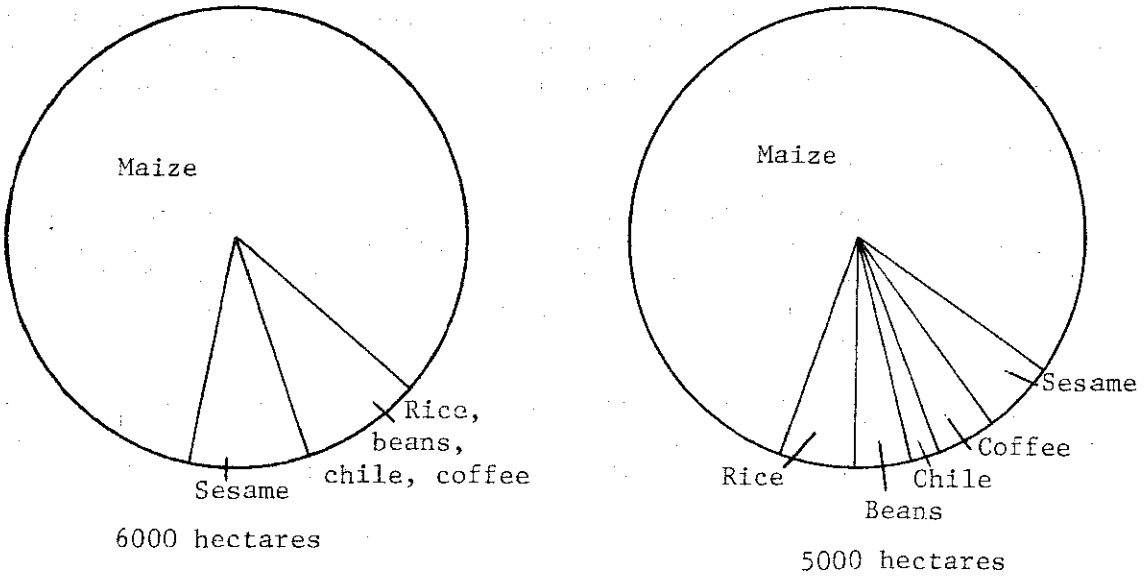
2/ If one assumes that 15 percent have three lots, then there are about 60 colonists with multiple lots and 330 with single lots. This is a very rough estimate.

CHART 8-1. CHANGES IN LAND USE IN ABASOLO DEL VALLE*



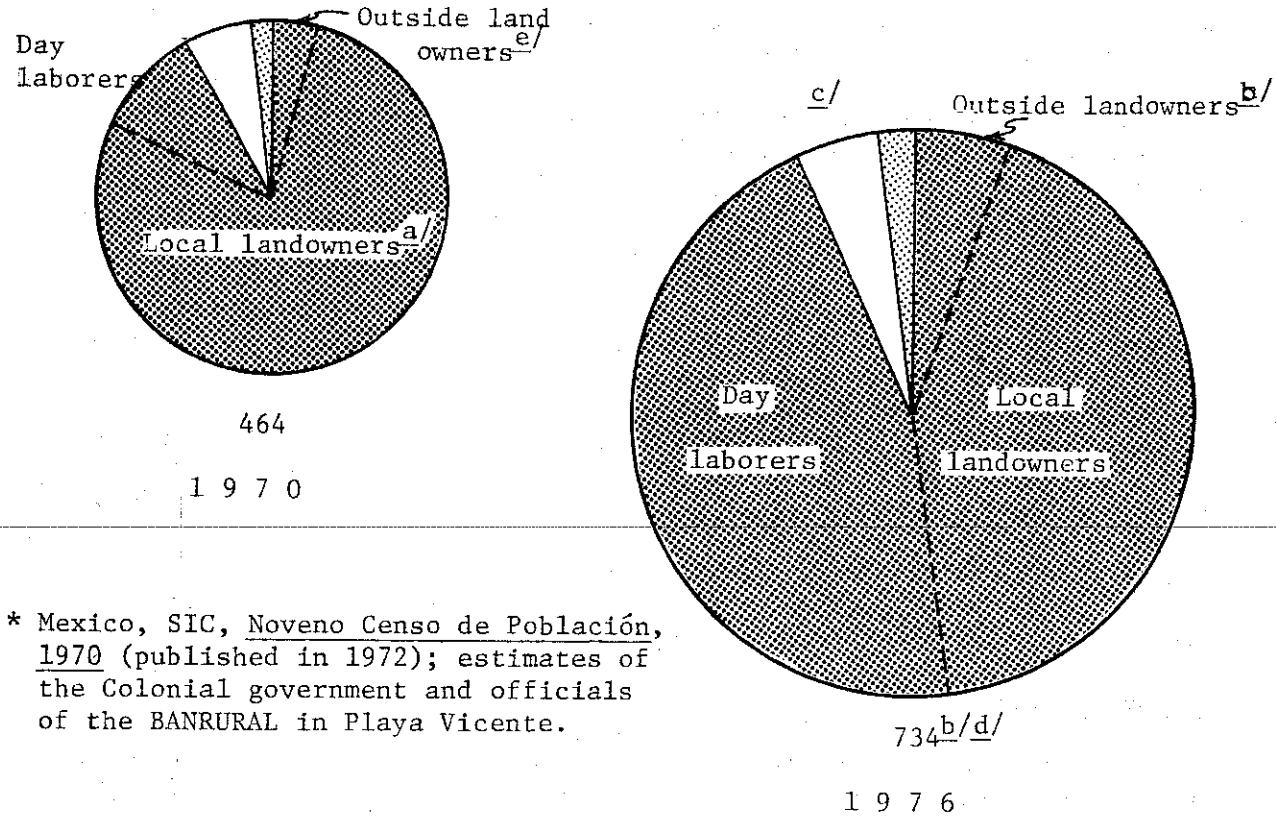
* Estimates from the Colonial government, BANRURAL officials and several Abasolo farmers, 1976.

CHART 8-2. CHANGES IN THE CROP COMPOSITION IN ABASOLO DEL VALLE*



* Estimates from the Colonial government, BANRURAL officials and several Abasolo farmers.

CHART 8-3. CHANGES IN THE ECONOMICALLY ACTIVE POPULATION OF ABASOLO, 1970-76*



* Mexico, SIC, Noveno Censo de Población, 1970 (published in 1972); estimates of the Colonial government and officials of the BANRURAL in Playa Vicente.

Agriculture and Livestock Sector

Industrial Sector

Commercial and Service Sector

a/ Officially, each parcel of 40 or 50 hectares has an owner. In reality, many colonists control several plots in the name of relatives, etc. This figure is an estimate.

b/ To estimate the number of workers, we used 25 percent of the total population estimate given by the Comisión para la Eradicación del Paludismo.

c/ Local people estimated than there has been an increase of ten workers in industry and commerce. Here we divided the ten equally between the two sectors.

d/ This figure does not include the 700 to 800 day laborers estimated to be working in Abasolo who come periodically from neighboring colonies.

e/ The estimate of outside land ownership was given by authorities of BANRURAL.

activity is controlled by a single man, one of the original settlers. He has a big store that provides most of the needs of the colony for what are judged to be fairly equitable prices, little higher than Isla's. He is an important middleman for agricultural products, although this role has become reduced in recent years.

There are perhaps twenty other stores in the urban center, only a handful of any importance. In 1976, there were about 22 people working in commerce, only four or five more than in 1970. There are three mixtamal mills, a handful of home-style restaurants and one canteen/billiards hall (9). About five masons work full-time on home construction.

Industrial activity is minimal. In 1955-56, three sawmills were erected, the proceeds from which the former Colonial President intended to help pay for the land. These closed in the early 1960s without having had much effect on the colonists. Barbasco collection used to be very important in Abasolo as supplemental income until 1974. Despite control laws, overexploitation wiped out most nearby supplies. PROQUIVEMEX has a small barbasco collecting plant in the entrance to the colony now (9).

Since there is little chance that any industry would choose the Abasolo locality over Isla, or even Playa Vicente, for a site in the near future, the colony is likely to remain agricultural for some time.

Living Standards

Life in Abasolo remains lacking in most of the modern conveniences and infrastructure, but what is there arrived only in the last few years. Chart 8-4 shows 1970 census information on various standards. The colony is served by a government-paid physician on duty as part of her social service graduation requirement. A potable water system was installed in 1971, but broke down shortly afterwards due to lack of maintenance. Electricity was put in in 1973, so at that time a few refrigerators and sewing machines started to trickle in.

The first primary school in Abasolo had been built in the mid-1960s; a newer version was completed in 1972. In that year, a secondary school was initiated, but for political and financial reasons it was never completed. Only a portion of the colony's school-age children are enrolled. Children of the more prosperous families are often sent to Isla or Cordoba for secondary school, and even a few to primary school in Isla. There are maybe 10 "rich" citizens. The wealthiest is also considered the most hard-working and a great benefactor locally--paying fair agricultural prices and providing cheap goods in his store.

While all the children in the colony are said to be fluent in Spanish, a number of the older people who came from the Oaxaca area still speak Mixtec at home, and only enough Spanish to get by. Polygamy is common among both Oaxacan and Veracruz groups, as in most rural areas.

Evangelist missionaries--Jehovah's witnesses and Pentecosts--came to Abasolo at some time and succeeded in converting a majority of the colony. Among these are the present Colony President. The new religion seems to

CHART 8-4. LIVING STANDARDS IN ABASOLO, 1970*

Percent of the population:	
Literate	56.0
Of children 6-14 who attend school	57.2
With a primary school education	6.6
Percent of population in dwellings with:	
Non-earthen floor	7.4
Radio	54.9
Television	1.1
Potable water	26.0
Sewage	3.0

* Mexico, SIC, Noveno Censo de Población, 1970 (published in 1972).

be encouraging "forward-looking" and hard-working behavior.3/ The rest of the colonists are Catholic, but nominally so. There is neither priest nor church in the colony. In general, the colonists speak proudly of the integrity of the local people.

The Sources of Abasolo's Changes: Political Unification

Abasolo's advances of the past decade had two important sources: internal political unification which inspired strong community cooperation, and a credit/technical assistance program by the government bank which provided capital, funds and guidance for production expansion.

To understand the political situation in Abasolo in the late 1960s and early 1970s requires first a look at the history of Abasolo's founding and development.

The Establishment of Abasolo

The original movement to colonize Abasolo came from a group of Oaxacans near San Juan Mixtepec who were looking for land. In 1950, 70 families formed the La Luz Congregation, headed by Domitilo Lopez and Felipe Rojas and migrated first to Francisco I. Madero near Cordoba, Veracruz. Their search parties came upon Abasolo del Valle, where only a few scattered groups from parts of Veracruz and from the Temascal area were settling. They solicited government approval and made arrangements to purchase 11,700 hectares at relatively low rates from the owner, Sr. Espino Barros Luis. The Congregation officially organized as a colony under the regulations of the Direccion de Colonizacion Federal (3; 5).

The original colonists invited groups from other parts of Mexico to join, including San Luis Potosi, Sinaloa, Zacatecas, and, in particular, Oaxaca. Since that time there has been considerable heterogeneity in the colony, although Oaxacans comprise the majority.

In 1952, about 250 settlers and their families (a population of about 1250) arrived in Abasolo, where each colonist was granted fifty hectares of land. When friends of the original Oaxaca settlers began to join them in Abasolo, the colony officials solicited in 1954 for another extension of land. An additional plot was granted and Abasolo reached its present size of 519 lots.4/ In 1960, President Adolfo Lopez Mateos came personally to the colony to give out the last few lots (4).

3/ I encountered this situation in all my interviews with campesinos. They attribute the attitude in great part to their religion.

4 Officially there are 236 separate lots of 50 hectares and 271 lots of 40 hectares.

Problems of the 1960s. All through this time, the sense of community remained strong under founder Lopez, who kept the office of President continuously.

In the late 1950s, the President worked out a plan to finish payment to the previous owners of the land and provide legal titles to all the colonists. Although he collected money from all for the purpose, in 1961, the owners came back to Abasolo insisting they had never been paid (3; 9).

Friction developed, as those settlers from Veracruz state--about 15 percent of the colony's population--demanded an explanation from the President. Not satisfied with his answers, this group, called the Agrarian Department, asked for his removal. However, the Oaxacans had the majority and voted to keep him in office.

In 1962, then, the Veracruz group of 81, which included many "gente de razon" separated politically--unofficially--and chose their own representatives. They went directly to the owners to pay a second time. By 1969, they were all officially titled, and hence, eligible for credit and other official support (3; 9).

Unification in the 1970s

As the titles started coming in, other colonists were attracted to the group until a majority was reached in the general Colonial Assembly. The SRA then named a Commission to change the Administrative Council and in 1972, the new President was chosen. The office is for two years, and he was reelected in 1974.

For the first two years, the new government was concerned chiefly with unification. There are now friendly, if cautious, relations between the former groups and many Oaxacans are included in the government. During 1975/76 several improvements were financed by the colony: a park, colony meeting house, three offices of the municipal agency and a jail.

The Council is now looking into other matters. Highest priority in the monthly Colonial Assembly is legislation designating an official "urban zone" which will permit taxation for potable water, a secondary school and a sewerage system. The Veracruzan colonists have spearheaded most development efforts and are still the leading participants in Abasolo's growth.

The colony remains fairly autonomous. Abasolo has little to do with Playa Vicente other than its sporadic payment of taxes and some cooperation for municipal road improvements.5/

5/ Abasolo has never had to pay any urban property taxes. There is no treasurer in the colony, but Playa Vicente won't register cattle if taxes haven't been paid. For this reason, registration was formerly done in Isla, which was both more convenient and cheaper. Since 1972, the Playa government has prohibited this and made an arrangement with Isla so taxes are now paid more consistently (4).

With land divided into plots the size of small private properties, and the built-in cooperative system of self-government in colonies 6/, progressive activities at both levels are facilitated. Abasolo's organization is now better than on most ejidos, according to the Playa Vicente Municipal President, while each individual retains a great deal of independence and flexibility.

Sources of Abasolo's Changes: The Public Credit Project

In coordination with this new-found political activism, the special credit program designed by the public banks for Abasolo found a warm welcome.

Before the middle of the 1960's, almost no one in Abasolo worked with outside credit. At that time the Veracruz and San Andres Tuxtla government banks began to finance cattle expansion, and the Banco Agropecuario in Loma Bonita and Isla financed crop production for a few colonists.

The Plan Benito Juarez

The first project worked under the SAG's national Plan Benito Juarez--"Infrastructure works for territorial benefits"--which was originally designed for northern Mexico. Its purpose was to build penetration roads and small dams on the many lakes in Abasolo to provide watering holes for cattle--the lack of which had prevented many lots from being converted to grazing. The ponds were to be used also for fish breeding. Work was begun on cattleguards for the main roads to Abasolo. The plan was active 1970-1972.

Because very little had been accomplished, the program was stopped. The major positive influence of the program was its important stimulus to labor demand in the area for construction jobs.

The Coordinated Development Project

Around 1965, some credit in Abasolo for cattle came from as far as Villahermosa. Very few colonists were involved.

The comprehensive credit program was begun in 1968/69 by the BRAPSA (Banco Regional Agricola del Papaloapan, S.A.) in Isla and was transferred to the BANRURAL in 1974 after the bank unification. Chart 8-5 shows the amount of credit disbursed from 1968 to 1977.

At first credit was only given for titled land. Later, a coordinated development approach was devised specifically for Abasolo by the Bank to regularize land tenancy, clear jungle and initiate medium-scale commercial ranching. At the time of the political unification of Abasolo, 70 percent

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6/ Because of problems with land concentration, which is becoming evident also in Abasolo, the Mexican government stopped colonizing lands under this system in 1965.

CHART 8-5. THE CREDIT PROGRAM OF THE OFFICIAL BANK IN ABASOLO*

1969 6 credit societies organized

1970 11 credit societies organized

1971 14 credit societies organized

1972 19 credit societies organized

1973/74 33 credit societies[a/] in operation:

58 agricultural holdings in five societies

152 ranches in 28 societies

1975 THE OFFICIAL BANK LEFT ABASOLO IN AUGUST

1976 ALMOST NO CREDIT WAS DISTRIBUTED

Total credit distributed between 1973 and 1976:

M$6,570,435

1977 32 credit societies in operation, receiving[b/]:

$5,602,049	long-term credit
898,915	short-term credit
6,500,955	total credit in 1977

[a/] During 1973 and 1974, 14 new societies were organized, while many of the old ones had either disappeared, or reorganized.

[b/] In 1977, the Bank estimated there would be a total value of production in these societies of $9,136,550; their combined property value was estimated at $10,038,000.

* Mexico, Banco de Crédito Rural, Playa Vicente branch, July 1977.

of the colonists still did not have title to their land and did not have high enough incomes to manage the land payments. Many plots were being abandoned because of this. Most farmers were working with only a small portion of their lots (6).

Cattle production was stressed because of the ecological suitability of the zone and improving markets for milk and meat. The natural pasture was already fairly good for cattle production, and rain and soil water absorption is high, which keeps pastures at high quality levels for most of the year. The native grasses support one animal per hectare, but Bank officials claim wishfully that up to five head per hectare may eventually be supported. The soil is not particularly apt for crop production and the topography offers only limited expansion for mechanization.

In 1968-1972, only production credit was provided. The program began to operate in full force in 1973. The land regularization scheme was the only one of its kind in Playa Vicente. The Bank worked with SAG to get the topographic studies needed for border determination; these were then legalized by the SRA. A special program was designed for untitled farmers to receive credit, who otherwise would have been ineligible. About half of this group participated. By 1976, only 35 percent of the colonists remained without titles (6), some of whom were still waiting for Domitilo Lopez to make arrangements for them separately.

The massive land clearing was primarily done on land without title, and there was no charge to the colonists. Flat land (about 5000 hectares) was cleared by machinery; the hilly land by hand. The intention was to use the higher-cost machine-cleared land for intensive agriculture, since the bulk of it had no available watering holes, and save the parts with water for livestock. The costs per hectare of the clearing was $1500-2500 in 1974, $3,000 in 1975, and $5000 in 1976. Eighty percent of the colony's land is now cleared, nearly all the flat land (6).

Agricultural Credit

Most of the titled farmers received credit as "small private property owners of scarce resources" under the FIRA Designation. They are organized into societies.

The first agricultural credit was disbursed in 1973 by BRAPSA. Most has been for maize and rice, on land recently cleared. The Bank also sponsored 200 hectares of mechanized sorghum production with one society. The CONASUPO office in Juanita bought some of the grain in 1975, but as their pice for maize was little better than the local one (because of quality discounts) the organization did not attract many sellers. CONASUPO's entrance into the bean market, however, has been very successful because of competitive pricing. Rice is now sold to the Tuxtepec rice mill, which picks up the grain in Abasolo, or to Cordoba.

Credit covers 80 percent of the costs of cultivation. Interest is charged according to the experience and capacity of the farmer--from 6.5 to 12 percent annually. Fertilizers, insecticides and seed are provided by the Bank and discounted. Full use of the credit designated for agriculture has not been possible due to a shortage of machinery (6).

Almost all farmers are soliciting credit to buy their own tractor or to share one with their credit group. There are only five or six tractors now in the colony; about 100 farmers must rent, mostly from the BANRURAL machinery center in Tierra Blanca. Bank officials say they do not expect major agricultural profits until 1978, when the machinery component of the investment is fully integrated.

Although Abasolo farmers have been enthusiastic about using the new inputs, they have not been impressed by the extensionists of technical advice of the bank agronomists, due to some major failures where the advice was followed.7/

Considerable interest was expressed in Abasolo in increasing commercial production of sugar cane, peanuts, sweet potatoes and cassava, if credit for these crops could be arranged. When the new road is finished, Abasolo will be within the 60 kilometer distance limit of the Isla packing plant, and some farmers hope to produce pineapple then.

Ranching Credit

The quality and productivity of the Abasolo soils has been declining for at least ten years, which is a major incentive for both fertilizer use and the transition to ranching. One very good farmer noted declines between 1965 and 1970 from 3800 to 2400 kilograms of maize. The climate also makes row crop farming difficult.

Thus the bulk of the credit has gone to livestock. There are about 15 societies, mostly for farmers who had no prior experience in ranching. In 1975, about 1300 head of cattle were given to the colony. By 1976, the colony herd probably numbered over 10,000. The bank estimated a 60 percent annual increase in animals, with half the calves returned to the Bank (6). The goals were not completely reached due to a shortage of young animals. Demand from government cattle programs throughout the region was greater than supply.

There is a grace period of two to three years on repayment. Then for several years, the ranchers pay only the low interest rates. In the fifth year, they pay interest plus capital; after that the level of payments increases until the loan is paid off (6). The only major complaint made by the ranchers was that cattle were sometimes valued higher than what the ranchers expected or thought proper.

Most of the impetus has been for rearing young stock, but many fattening operations sprung up after 1974. Milk production became important

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7/ 1000 hectares were planted the first year with a new maize variety which failed completely due to bad seed and late sowing. In 1974, 300 hectares were sown with rice which never grew. The mandatory insurance that accompanies all credit paid 70 percent of the total loss, but the colonists were left with the rest (8).

in 1975, although yields are still pretty low--2.5 liters daily per cow. While in 1970 there were seven to ten associates from Abasolo in the Playa Vicente Municipal Livestock Association, in 1976 there were about 20 (8) 8/.

Improved pastures were introduced with the credit program--Pangola in about 1971, African stargrass in 1974. Jaragua and Privilegio have been in the area a long time.9/ As elsewhere, Zebu-Brown Swiss crosses are the preferred and common breeds, with a smattering of Irish and others. Artificial insemination is not yet part of the program. Most of the ranchers with larger herds go to Isla each year for the Fair and some have bought bulls there. The Bank distributes mostly registered cattle. Some wealthier colonists have even gone to the United States to buy good cattle.

Veterinarians from Isla, Playa Vicente and Cosamaloapan are consulted for health care, with the various credit societies hiring a single vet to review their cattle at least twice a year.

Present Status of the Program

At the peak of activity, there were 32 credit societies with about 350 individuals in all, or more than two thirds of the landowners. So far, the investment in farmers without definite land guarantees has been $35 million, for those with legal rights, $65 million (6).

In 1975, the program was suspended. With consolidation of the banks under a new law there was a question as to whether this type of program was permitted. For about a year and a half the program stagnated, until mid-1977. 10/ The bank branch in Abasolo closed and the office was moved to Playa Vicente.

It appears certain that the program will be continued, however. $65 million is planned for the nonregularized groups in Abasolo for 1977, and

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8/ Several ranchers, however, said that if one sold more than ten animals yearly it paid to join for the tax privileges.

9/ Another source said that Stargrass and Privilegio were established many years ago and that Jaragua and Guinea were recently introduced.

10/ The bank had programmed some $30 million in credit for 1976, of which only $12 million came through, mostly for ranching infrastructure and some purchase of cattle. As of summer 1976, only three of the cattle societies were actually working. The BANRURAL delivered only 4000 of the 10,000 head of cattle planned for. Only three agricultural societies remained--comprising about 23 farms. This latter was also due to the declining interest in agriculture noted in the colony since the successful advent of livestock husbandry (6).

another 10,000 head of cattle will be brought in, besides the 6000 programmed for 1976, but not received. The bank plans to use more premature crop varieties to reduce losses from the rains, and to further experiment with sorghum, soy, sesame and safflower (6).

Meanwhile, other banks have become interested in Abasolo. A dozen or so ranchers get credit from BANAMEX, and late in 1976, overtures were made in the colony by the Financiera Nacional. But the BANRURAL program is well thought of by most colonists, and they are impatient for that funding to be renewed.

Improved Marketing

Meanwhile, the Papaloapan Commission PLANPA program is finishing the new road. Great outside interest has been sparked in the colony since it was begun. Due to a number of rather ridiculous delays in construction of the new road, it will not be finished until 1979, despite an original estimate of early 1976.11/ Once it is completed, the average driving time to Isla, the nearest town, will decline drastically:

	Dry Season	Rainy Season
	(in number of hours)	
Old road	2	Impassable
New resurfaced road (half complete)	1 1/2	2-3
New road (completed)	1/2-3/4	1/2-3/4

The cost for fertilizer transport from Playa Vicente to Abasolo was $.20 per kilo in 1976. Once the road is completed, this is expected to drop to $.04 - .05 per kilo. Transport costs in general should decline by half, according to the head of the credit program.

The change in product prices are shown in Graph 8-2. The change due to transportation is most evident in milk marketing. A few colonists worked with the Nestle plant in Acayucan in the early 1970s. Now dozens are selling milk outside the colony. Some ranchers sold to the San Andres cheese factory in early 1976, but the enterprise failed in March. Most others have sold to the Nestle collecting plant in Mata Limones since the 1975/76 season. In the dry season they also ship to Tierra Blanca.

For basic grains and products, the number of middlemen has increased. Many truckers are willing to come in now. The Bank has assisted in marketing of maize, beans and rice. Chile is still being sold to compradores

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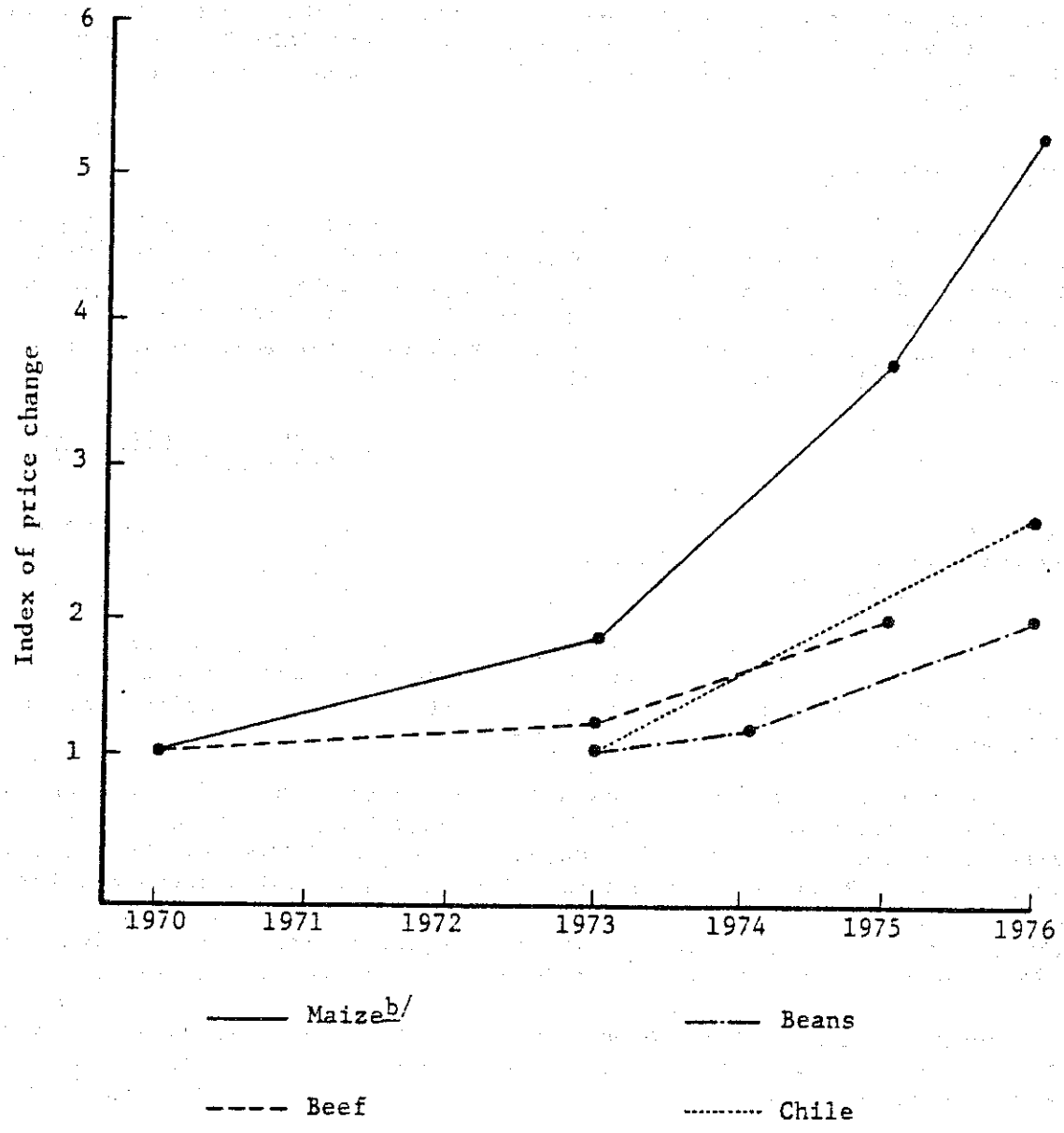
11/ A road is planned under the World Bank project to connect Los Tigres with Abasolo and Isla. But the two roads were begun simultaneously, the Los Tigres one from the isolated end, such that when funds were cut off for the projects, there were two half-finished, useless stretches which together would have made up one complete, less costly road. Apparently, this was a bureaucratic problem at the Mexico City-World Bank level.

GRAPH 8-2. RELATIVE CHANGES IN AGRICULTURAL PRICES IN ABASOLO DEL VALLE*[a/]



[a/] The prices marked are weighted averages of survey responses.

[b/] In 1975, the price of maize varied considerably: $1.50-1.60 per kilo from the leading middleman in the colony, 1.90 official and 1.70 actually received from CONASUPO; $2.00 purchased in the local store.

* Data from survey carried out in 1976 by the author.

who come to Abasolo in their own trucks, but improved accessibility has increased competition, and the price more than doubled between 1973 and 1976. Sesame is almost always sold to the factory FARO in Cordoba for vegetable oil, through an Abasolo merchant and dealers in Isla.

Employment Patterns in Abasolo

Certainly in the short run the new programs have had a very positive effect on employment and incomes. Chart 8-6 gives the detail of employment patterns on Abasolo Case Study Farms.

Land Clearing

About 10,000 hectares of land were cleared and put into permanent production in Abasolo during the 1970s. Assuming that most of this was planted to pasture, supporting one man-equivalent for approximately 20 hectares, the clearing should have brought about 500 new jobs. Some 60 tractor-drivers have been involved in clearing operations and are living in Abasolo for at least a five-year period.

Half the clearing was done by machine, which provided no temporary local jobs, but local workers were paid for the hand clearing work, fence building and other infrastructure work, such that particularly during 1973 and 1974 there was a very high demand for manual labor.

Changes in Intensification and Seasonal Distribution of Labor

Meanwhile, the intensification of agricultural production and the change in ranching methods required more work. Chart 8-7 presents the seasonal labor distribution in Abasolo. Because of an extra long rainy season, there is more cropping in general and a higher demand for labor in all but three or four months of the year. Also, the longer rainy season means that the period of high milk production is extended as well.

Now that most of the land preparation work for crops is by machine, the major labor input is for cultivation and harvest. This has greatly facilitated double cropping of large acreages. Where mechanization plus chemical inputs increased yields, harvest labor requirements increased.

One full-time farmer in the survey had two to three workers full-time before mechanization and afterwards had two full-time and four to five part-time May to September and January/February. In addition, two full-time machinery operators worked for the six lots in his credit society.

The transition of ranching to use of cultivated pastures and more emphasis on milk production doubled labor requirements per hectare on the old pasturelands.

Type of Holding

There is little correlation of employment with size of holding, cropping pattern or type of livestock production. However, the most

labor-intensive farms were the full-time cropping units, and all the high-employment, high-income holdings have some commercial crop production.

Agriculture definitely employs more people per hectare than does cattle production in Abasolo. Labor required for herd expansion and land clearing on ranches largely offset this problem. Also, the full-time nature of ranching employment is more stable. One of the best farm managers in the Colony used to hire 10 to 12 workers for short periods when he work in agriculture; now, with a herd of 230, he hires six full-time workers, and is planning to hire two more workers as his herd increases.

But the long-term implications of having chosen to encourage ranching over agriculture may not be as positive. Expansion in two agricultural units led to labor requirements increasing by a third and quadrupling respectively, while two cattle ranches in stable production both had registered slight declines, of over a fourth. One farmer expressed concern that crop prices will have to increase to encourage intensification production, if employment in the primary sector is to increase.

Labor Patterns by Class

Other effects of the new changes in production in Abasolo have been shifts in labor requirements and ownership patterns among the different classes.

Most resident landowners work on their own lots and have some reciprocal help agreement with their neighbors. Most are full-time workers and those that are, have the highest employment ratios, indicating greater interest in intensification. The colonist group is very diverse, with some aggressive and highly interested in profits, and others mostly seeking security.12/

Very few of the colonists have much off-farm income other than trucking for those without vehicles, or the buying and selling of cattle. Most of them aspire to having their children work with them on the farm, although some of the wealthier colonists are more "ambitious" for their offspring, educating them outside and encouraging them to work in a relative's business, as a secretary, in government construction jobs. Those who travel often outside Abasolo do a brisk business in goods and soft drinks.

12/ The most prosperous colonist seemed markedly different from the rest. He had originally come from Coahuila in the north, but had been living ten years in Playa Vicente. He was an avid reader and had a large assortment of technical books on agronomy and animal husbandry. He had experimented with several products on his own, and was very interested that the government provided an agronomist to start major experimental program in Abasolo.

One possible threat to the relatively favorable employment situation in Abasolo is the sharp increase in the number of outside landowners that has accompanied the construction of the road and the Bank's interest. There has always been a relatively important amount of land owned by people living outside Abasolo. Perhaps an eighth of the lots were so owned back in 1965; now between a fifth and a third do (6, 9). Most of the outsiders come from Veracruz, a few from Michoacan and Oaxaca. The head of the BANRURAL credit program estimated that by 1978, their share would increase to 50 percent. They, however, will not be eligible for the low interest credit program and will have to use regular credit.

According to the laws of the colony, land can be bought and sold freely, unlike ejidal land, only requiring permission of the Colonial Assembly.13/ Officially, one person can own only one lot. With local and absentee owners investing their new profits primarily into land, land prices have soared in recent years. Land costs per hectare have changed as shown below: (3)

1950s	M$ 39	
1960	60	
early 1960s	100	
late 1960s	200-250	
early 1970s	300-350	
1976	2500-3000	medium quality
	3500	high quality
	5000-6000	improved quality

This is definitely placing land out of reach of the landless workers of Abasolo, many of whom traditionally replaced older colonists retiring, by saving money as wage laborers.

About half the men in the colony now work as jornaleros (9). Over half the total labor requiremet is for part-time work, which means that there is a pretty low level of work security. Wages, about $10-12 per day plus food in 1960, by 1968/70 had risen to about $34-35 daily plus part of the product, and by 1976 to $50-60 as money wages. The Bank paid $35 per day in 1974, and $60-70 in 1976. Hundreds of workers from neighboring areas do seasonal work now in Abasolo, returning to their homes when no work is available. With population statistics, we can estimate that close to 190 workers and their families have permanently moved to Abasolo.14/

Many colonists insisted there was no excess labor problem in Abasolo. However, some workers (one estimate was 50), especially young ones, do go

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13/ In addition, the entering colonist in 1976 paid $1000 for a lot to the Colonial authorities and the former colonist paid $500.

14/ If EAP rose at a rate of 3.0 per cent per year (which is a high estimate, considering population in the 1960's grew at only 2 percent yearly), then an additional 83 workers would be added to the labor force. Statistically, however, about 270 new workers were added.

to Sinaloa and Baja California for the two to three slow months of the year. Even children can reputedly earn up to $80 to $100 daily there. Most return, but a handful stay away permanently each year. When the older people leave Abasolo, they go primarily to the cities, not elsewhere in the country, for "retirement."

However, if the credit expansion program continues as planned, for a total of fifteen years, the present strong demand for labor should continue. Once land is in stable production, requirements for permanent work may slack off, causing problems unless alternative employment is found, or cattle production can be more highly intensified.

Summary: Rural Prosperity and Change

The Abasolo experience is instructive as a prototype of successful rainforest development, particularly in comparison with other directed and spontaneous colonization projects. It shows that cattle credit for small properties is definitely feasible, and gives an idea of where the line can be drawn between government and local responsibility for improvements in colonizing areas. It particularly shows that programs of intensification financed by credit can provide high levels of employment.

Transfer of Resources

The Abasolo program was designed to provide initially a net transfer of resources to a group of poor farmers, letting them organize much of the subsequent production decision-making. The net transfer was about $30 million in terms of land clearing, plus the subsidy involved in low interest capital loans for machinery, agricultural inputs and cattle.

Credit recuperation has been good, and the original transfer in land looks like it will be paid for rather quickly in increased production, from the national perspective. It does seem unlikely that the program would have been successful had the colonists initially been personally responsible for the costs of clearing.

Now, however, because of the marked increase in local incomes, most of the social infrastructure desired by the community is being paid for by them. In this case, a direct transfer of resources to the productive sector was much more efficient than an alternative transfer of the same financial resources to a supporting infrastructure.

Success in Cattle Enterprises

The first advantage in having chosen to encourage cattle production in Abasolo was that it is ecologically suitable, and that the opening of the new road facilitates marketing of the more valuable products such as milk and meat. Cattle was a low-risk, high-return investment as compared to crops, especially since some local expertise in small-scale livestock production was already in the colony. While the Bank supervised clearing and pasture seeding, the subsequent technical advice on livestock management was fairly easy to provide with Isla vets and local cooperation.

There is still considerable room for intensification, as average herd size now is only about half the probable carrying capacity of the land in cultivated pastures. There is certainly the potential for fattening operations to be more labor-intensive here than rearing, while more remunerative. Great care must be taken to ensure this development. The said experience of cattle expansion in the Chontalpa tropics does not suggest this will happen spontaneously.

Program Flexibility and Politics

The biggest advantage of the entire program was that it was highly flexible, took place over a reasonably long period of time, and was tailored specifically to Abasolo. Important local nuances of power and resources could thus be exploited.

Another factor illustrated by Abasolo's experience is that the only constraints on development are not economic. Political stability, coherence and support are necessary to the success of any credit program that focuses on a group.

The Problems

The real ramifications of the present trend in land tenure patterns for the efficiency of government investment "for low income farmers" remain to be seen. If the new, richer absentee landlords continue to hire local labor at reasonable salaries and at high productivity, the only loss will be the transfer of profits from a low to a higher-income strata. If the emigrants are moving out to stable, productive jobs, the exchange is even less important. But Mexico's past experiences give reason to worry that absentee ownership will instead lead to capital, rather than labor intensification.

Until information is obtained on the nature of this interchange, authorities should probably try to technify the local farmers, rather than attract outsiders who are already knowledgeable. The object should be to modernize farmers as well as farms. The programs have been successful in this sense so far, and there should be no need for the bureaucrats to want to artificially inflate results by attracting outsiders of another class.

There is the corollary danger of rapid land concentration as well. Two or three plots together is a healthy holding, but there could be no compelling reason for a long time for further concentration, considering the productivity gains still to be obtained on the single plots.

There were also problems with the technical advice that was given on crops. The local farmers here were willing to experiment, and already had substantial experience in the zone, certainly more than the consultant agronomists. Some of the farmers did express interest in having a local experimental station--which should be quite feasible to provide through PLANPA or some other program.

The real test of the program will come once the land area now opened has been incorporated to full production. By then, the local experience

should be quite enough and experimentation on a permanent basis be established such that continuing improvements both with and without credit incentives and provisions should be possible, if the program continues to allow local flexibility.

Application of the Abasolo Model

Certain aspects of the Abasolo model are certainly transferable to most newly opened areas. Its applicability is limited mainly by ecological considerations. Not all rain forest land can be cleared without productivity declines. Then again, overgrazing has ruined many appropriate sites elsewhere.

For zones in which there are no untapped land resources, alternatives such as cattle, machinery or trucks would probably do as well for direct transfer of resources, particularly through subsidies, but also through low-interest loans. This is more complicated primarily because some judgment must be made as to the real benefits of such resources in the area, their effects on labor, on product prices, and such.

The program of credit should transfer fairly well to ejidos, where individual parcels are twenty hectares or larger or in small credit societies. Indeed, a very similar program[15/] is now being carried out all over Playa Vicente municipio in both colonies and ejidos. Those particularly well organized politically would be most successful. The site-specificity which marked the management of Abasolo's program is probably the most vital factor.

15/ BANRURAL credit in Playa Vicente was increased six times from 1975 to 1976, and will increase two and a half times more by 1977. Most is earmarked for cattle investment. About half of the ejidos and colonies are now working with credit. In 1977, the Bank plans to clear 20,000 hectares free of charge for ejidatarios. In the Basin, only Acayucan municipio has any programs with colonies like those in Abasolo.

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CHAPTER 9. IXTLAN AND THE TUXTEPEC PAPER MILL

The Greater District of Ixtlan, Oaxaca is the predominant political area of the Sierra de Juarez in the Upper Papaloapan Basin. The area is extremely mountainous, with peaks up to 4000 meters, such that the climate is temperate, rather than tropical, with frosts in the winter.

The numerous small communities that form the loose District association have been extremely isolated during most of their history, due to these topographic barriers. Over the centuries, very solid-looking permanent towns of adobe were built, adorned with flowers. They nestle picturesquely amid the huge peaks and pine forests, hiding for a time the extreme poverty in which their inhabitants often live. The photos show a few of these towns and their surroundings. Ixtlan, the cabacera of the District is by far the most prosperous.

Some of the soils in the concave parts of the mountains and in the valleys are fairly rich, and these are used by the Serranos for permanent agriculture. Most of the soils, however, are Lithosol-Rendzinas, fairly infertile and very susceptible to erosion. The slash-and-burn agriculture that is practiced extensively on these lands and the overgrazing of small livestock have created enormous erosion problems. This appears extraordinary to the outside visitor; it is rather like seeing the Rockies stripped bare of their foliage in some places.

Rainfall in most of the region is less than 1000 millimeters annually, only increasing toward the northeast. Because water resources are so deficient, there have been primitive irrigation systems in these mountains for centuries. Map 9-1 shows Ixtlan rainfall patterns.

Logging has been an important activity for decades, and mining began with the Spaniards. The people of Ixtlan, like those in most of the Oaxacan Highlands, have a distinctive, indigenous life style. There is extraordinary cultural diversity even here, where most are from the Zapotec culture, and are more acculturated than other Oaxacan Indians.

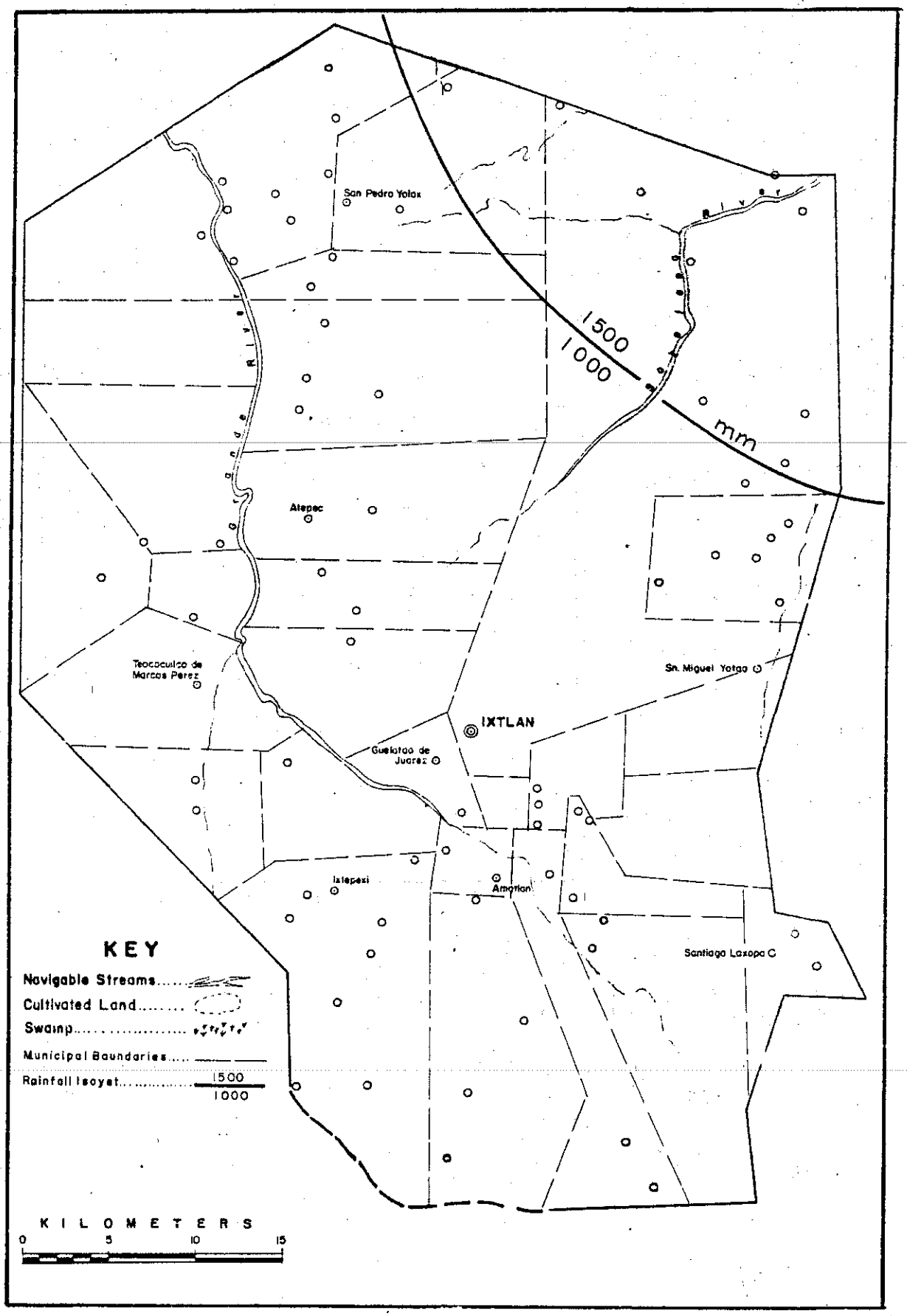
The Nature of the Changes

While Ixtlan remains poor relative to the other zones studied here, there has been a remarkable turn-around during the 1970s in the long-term District trends of wholesale emigration and declining living standards. The local infrastructure has been strengthened and so many new jobs have been generated that some who had emigrated before are coming back. Average incomes in several of the communities have risen sharply.

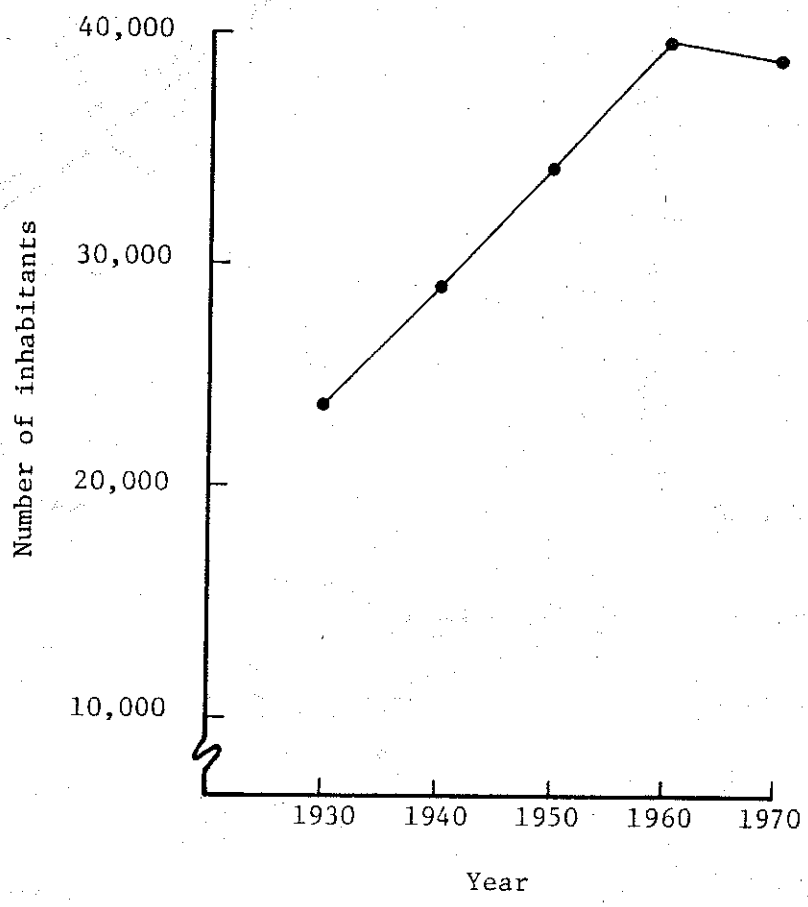
Population

Graph 9-1 shows the population changes in Ixtlan since 1930. The rate of growth has always been slow, less than two percent yearly, until 1960. Then, there was net outmigration and population actually declined.

MAP 9-1. "IXTLAN" ZONE: MUNICIPIOS AND RAINFALL



GRAPH 9-1. CHANGES IN POPULATION IN IXTLAN, 1930-70*



* Mexico, SIC, Quinto, Sexto, Séptimo, Octavo y Noveno Censo de Población for 1930, 1940, 1950, 1960, 1970.

Since many still return to their communities for the Census and are registered as "comuneros" in the books, this is probably an overestimation. 1/ Of the four communities interviewed extensively, three reported having at least half nonresident population, and one about two-thirds. Those who stayed reportedly did so for their great love of the land, and a lack of financial resources or skills that would permit them to find outside jobs.

In 1972 the turnabout began. Two of the communities reported that ten to twenty men and their families had returned from the cities. Different statistics show the population of the town of Ixtlan increasing between six and 20 percent in the past few years (13).

Communications

Map 9-2 shows communications in Ixtlan in 1950--there were no all-weather routes at all. In 1960, the road to Oaxaca was built, and it was paved in 1969. The road to Tuxtepec was built in 1958 and paved in 1976. Not until then could a real effort be made to build branch roads. During the 1970s many were constructed at a cost of about $250,000 per kilometer, about twice as much as for the average all-weather road in the lowlands. By 1976, ten of the 35 communities in Ixtlan had good roads (15), as shown on Map 9-3.

Agriculture

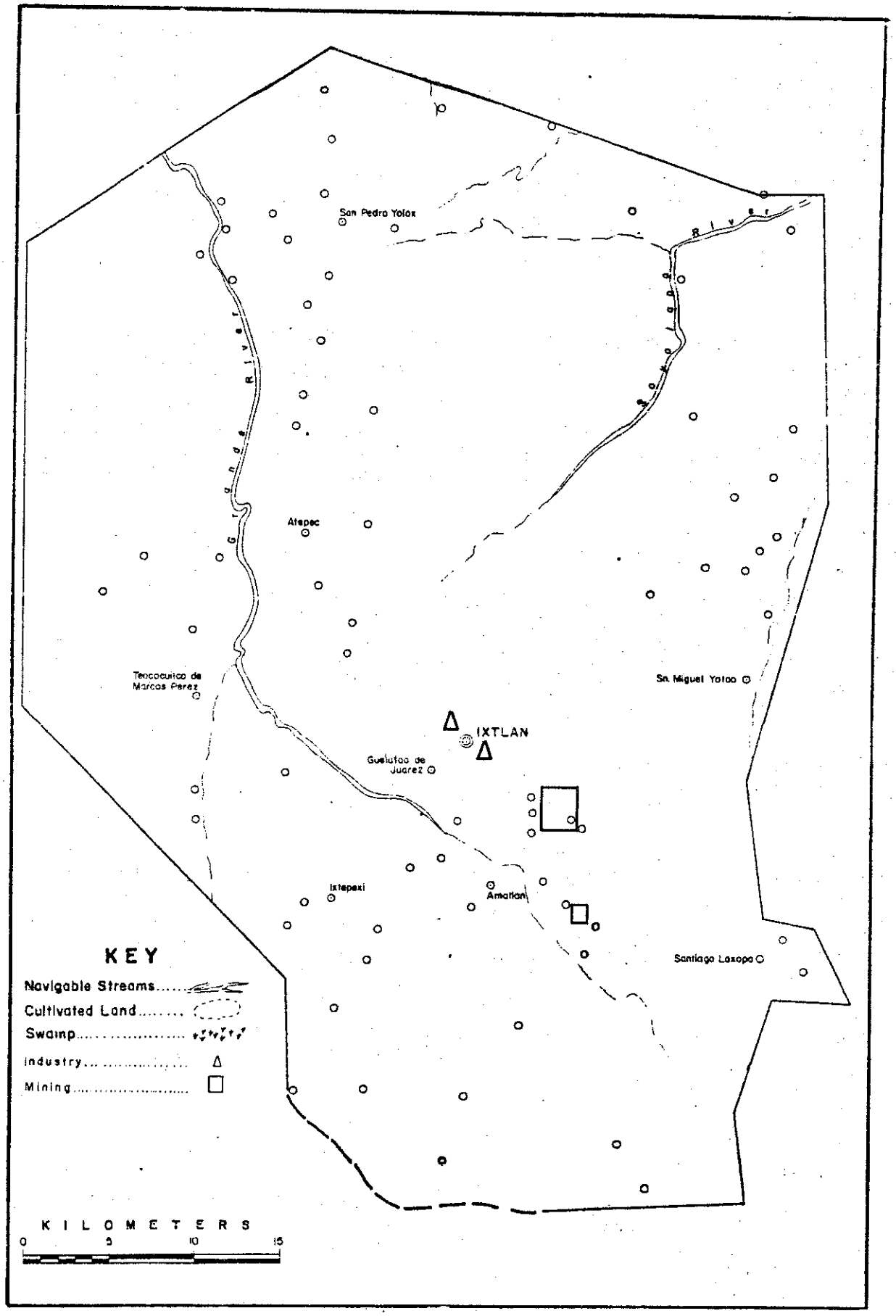
Land has been taken out of agricultural production continuously since the 1950's. Chart 9-1 shows that the decline was by nearly half. In the Ixtlan community, some 2000 hectares were sown in 1955, 1500 in 1965, only 1300 in 1976. Yields have been declining and the loss of the wheat market of the early 1960s hurt commercial production greatly.

Chart 9-2 shows changing crop composition. As the comuneros turned towards more subsistence agriculture, maize production increased. Peas replaced beans as the most important pulse. Even coffee, a commercial crop around the Yolox area, declined in importance.

The 1970s brought no reversal in these trends. Indeed, the government programs tried consciously to reduce the importance of agriculture and there was about a five percent decline in land cultivated (18). With the advent of stricter forest control, slash-and-burn agriculture is at a minimum, and erosion has slowed down somewhat. There have been some terracing and other conservation methods introduced, and small-scale programs in diversified livestock production were begun with bees, rabbits, poultry and fish. Sprinkler irrigation systems were introduced, along with some more advanced technology. There is some technical assistance provided in most of the communities connected by roads (Specific sites are shown on Map 9-4).

1/ Their sense of community remains so strong that in the larger cities, there are neighborhoods made up strictly of folks from a single community--"New Jaltianguis," in Mexico City, for example.

MAP 9-2. "IXTLAN" ZONE: COMMUNICATIONS AND INDUSTRY, 1950



MAP 9-3. "IXTLAN" ZONE: COMMUNICATIONS AND INDUSTRY, 1976

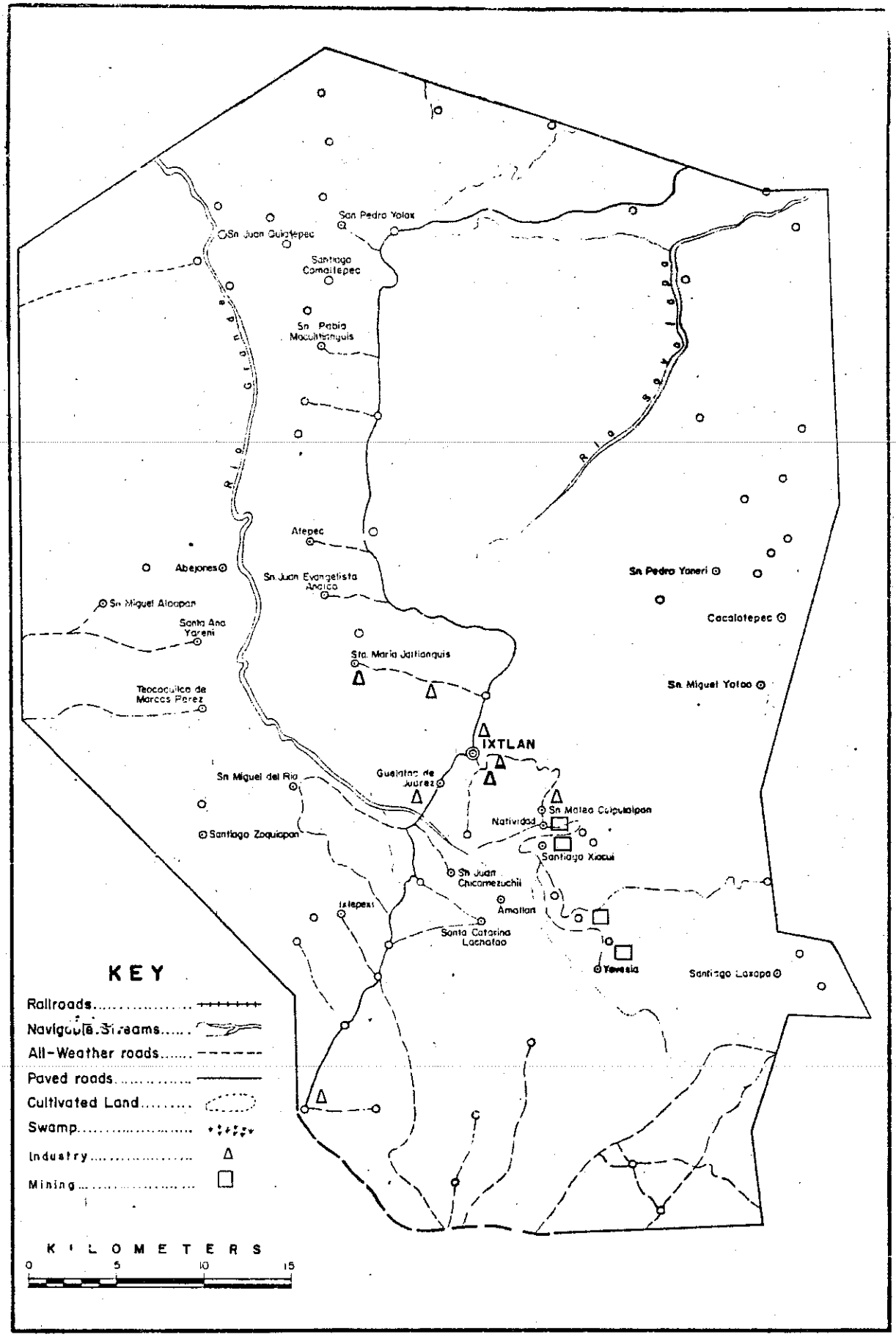
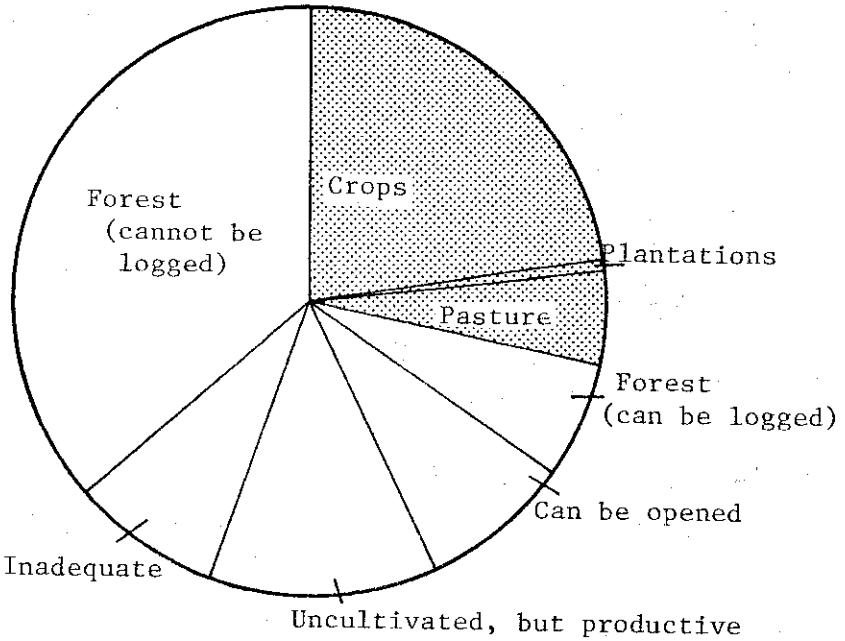


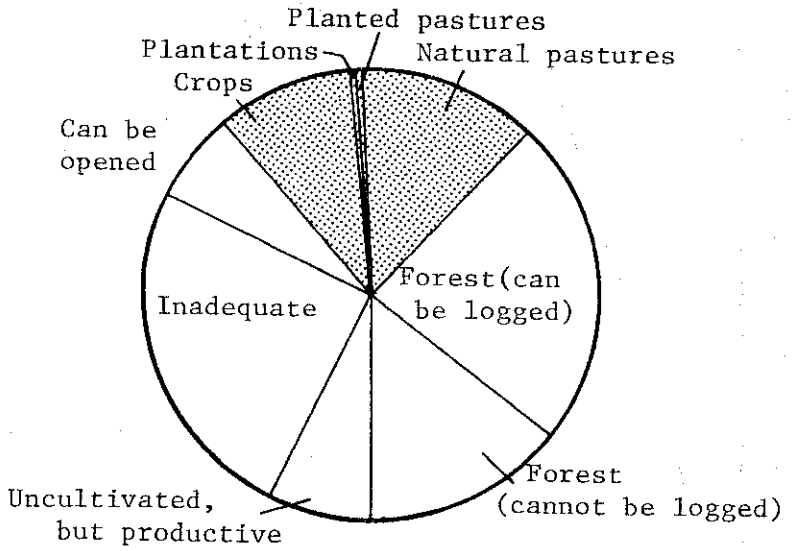
CHART 9-1. CHANGES IN LAND USE IN IXTLAN, 1950-70*

1 9 5 0



Hectares
Censused: 550,468

1 9 7 0[a/]



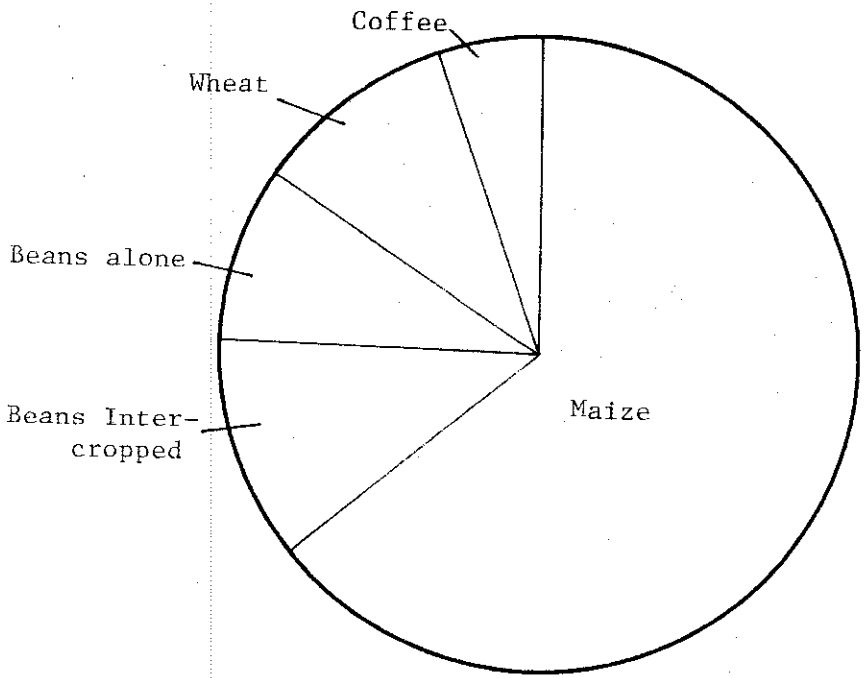
143,504

[a/] Apparently, much less land was censused in 1970 than in 1950. The land area in crops in 1950 appears to be greatly overestimated.

* Mexico, SIC, Censo Agrícola y Ganadero, 1950 y 1970 (published in 1955 and 1975).

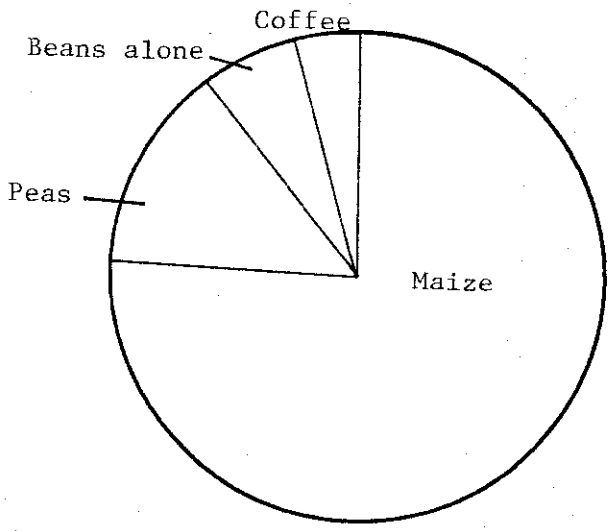
CHART 9-2. CHANGES IN CROP COMPOSITION IN IXTLAN, 1960-70*

1960



6450 hectares

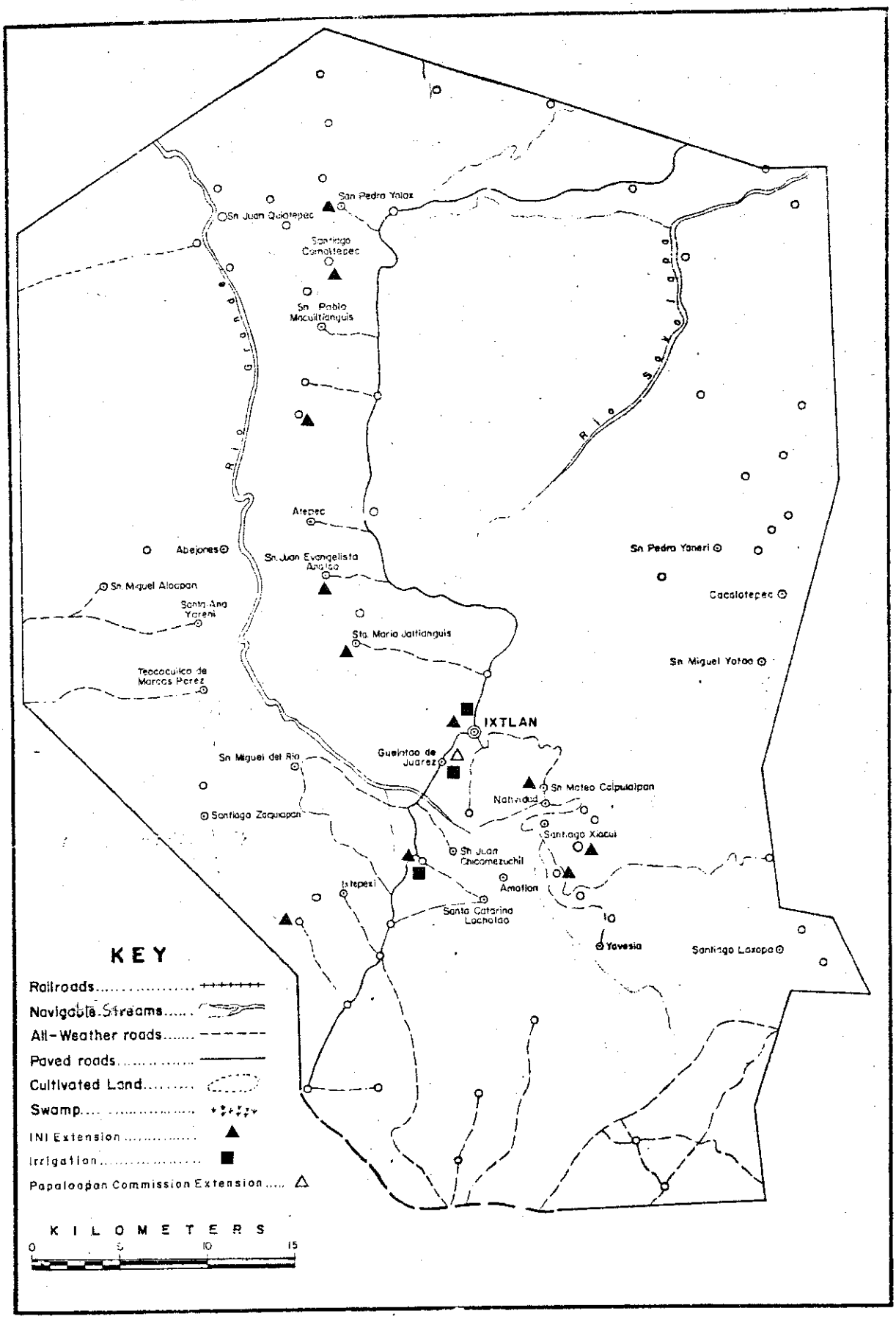
1970



5720 hectares

* Mexico, SRH, Comisión del Papaloapan, "Cultivos, 1961," "Frutales, 1961," "Cultivos, 1970", Frutales, 1970," (unpublished).

MAP 9-4. "IXTLAN" ZONE: AGRICULTURAL PROJECTS, 1976



Before the mid-1960s, almost no chemical inputs were ever used. Now there are some members of all the communities interviewed who used fertilizers, primarily those on humid or irrigated land. In Jaltianguis, perhaps 15 percent had used fertilizers since the mid-1960s. The rest began in the past two or three years. Almost no one used pesticides. All varieties of maize are criollo.

Cattle were at one time important, particularly in Jaltianguis. With the hoof-and-mouth disease, herds were decimated, and today comuneros have only two to six head apiece, if any. Very primitive technology is used.

Economic Diversification

The most important changes in Ixtlan were in nonagricultural employment. In 1950, there was some important industrial activity. The centuries-old mining in Natividad (for gold, silver, lead and copper) was more active then, employing nearly 1000 men. Two sawmills had opened in Ixtlan in 1949 and two more in 1953, by private companies. In 1953, 200 men worked in the forest year-round, and about 180 in the factories, all from the community of Ixtlan. At this time, many people began to abandon agriculture to work in the forest (13). The mills operated until 1957, when the Tuxtepec Paper Mill came to the Sierra and, by Presidential Decree, they had to leave.

In 1962 the Paper Mill began to employ loggers, but on a much smaller scale. About 1500 workers had about four-weeks work each in logging. In 1970, only 11 of the 20 communities in the Tuxtepec concession were producing (17). The Maderas de Oaxaca S.A. Mill to the southeast and the Unidad Silvicola de las Magdalena to the northeast also logged in the Sierra, but from these as well as the Tuxtepec Mill, there was almost total leakage of forestry income outside Ixtlan. The former is no longer in operation.

The 1970's brought a renewal of industrialization. Chart 9-3 lists the new enterprises that have come in. The first eight are all fairly small-scale, but in sum employ nearly 500 workers in four different municipios.

But by far the most important impact has been made by the step-up in production of Tuxtepec Paper Mill, which began around 1972. In that year, about 1950 comuneros were employed in the woods in the Sierra de Juarez; in 1975 that number had doubled to 3497. The number of communities involved rose from 10 to 65 (17). While in the older communities, the total work per comunero remained at four weeks, in the new communities, work averaged 8 to 10 weeks. Map 9-5 illustrates these changes.

Mining is still important, employing about 700 men. In Natividad, almost all men work in the mines; in Capulalpan, Xiacui and Trinidad, 50 percent of workers; in Yatuni and Yavesia five to 10 percent. Chicoquichil still aims most of its economic activity to supplying the mining communities with food and other commodities (17).

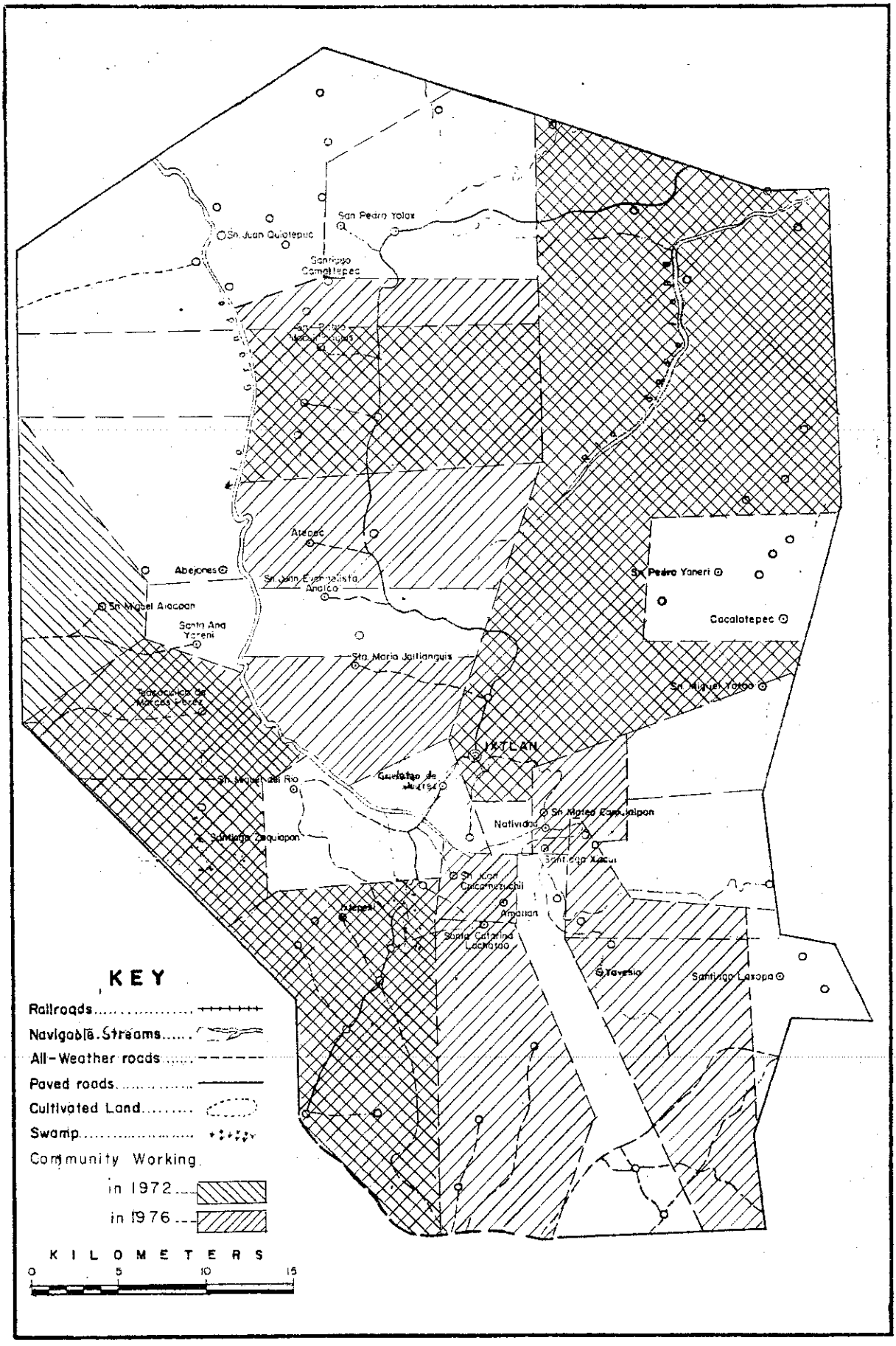
The communities of San Juan del Estado, San Miguel Aloapan, Zoquiapan, Ixtlan, Teococuilco and Ixtepeji continue to sell firewood, coal and flowers to nearby Oaxaca. Capulalpan sells encino logs to the mine for construction work (1).

CHART 9-3. NEW INDUSTRY IN IXTLAN

LOCALITY	BUSINESS	TYPE OF PRODUCTION	DATE OPENED	EMPLOYMENT	DEVELOPED BY
13 Communities in the Sierra de Juárez	Lumbering for Fábricas de Papel Tuxtepec, S.A.	Pulplogs and sawlogs	Expansion 1972-1976	1972-1956 1975-3497 (average five weeks per year per worker)	Fábricas de Papel Tuxtepec, S.A.
Ixtlán (also owned by Xiacui, La Trinidad, Capulalpan	IXCACIT Cooperative sawmill	1200 m^3 sawn wood sold to communities and Oaxaca City	1973	48 workers 4 administrators	Fábricas de Papel Tuxtepec, S.A.
Ixtlán	Wooden tool handle factory	Wooden tool handles	1975	20-factory workers 250-loggers 12-others	Financiera de Oaxaca, S.A.
Ixtlán	Cooperative carpentry shop	Wooden furniture	1976	15 to 20 carpenters	Financiera de Oaxaca, S.A.
Ixtlán	Shop factory	Shoes for sale locally and in Oaxaca City	1976	5 workers	Financiera de Oaxaca, S.A.
Capulalpan	Clothing factory	Sold locally	1976	12 workers (primarily women)	COPRODEO
Capulalpan	Furniture factory	Furniture made from scrap wood of IXCACIT sawmill	1977	25 workers (plan to employ 50 in second stage)	Papaloapan Commission and Fábricas de Papel Tuxtepec, S.A.
Jaltianguis	Clothing factory	Uniforms and folkloric Clothing	1974	20 workers (primarily women)	COPRODEO
La Cumbre	"La Comerza" (private sawmill)	2000 boardfeet daily	1974	10-loggers 15-factory (22 during peak periods)	Private interests
San Miguel del Rio	Clothing factory		1977	6 workers	Private interests
Guelatao	Factory for fruit crates	Crates made from scrap wood of IXCACIT	1976	6 workers	Private interests

* Data from: Fabricas de Papel Tuxtepec, S.A. offices in Oaxaca, Oaxaca; Sr. Uvaldo Jiménez, former manager of the Financiera de Oaxaca, S.A., and factory managers interviewed in 1976.

MAP 9-5. "IXTLAN" ZONE: LOGGING COMMUNITIES, 1976



Because more money is available to spend, commerce has picked up. Particularly notable is the increase in meat consumption in the commuities which participate most in logging.2/. Ixtlan and Capulalpan both provided work for new entrants in the tertiary sectors. Only a few of the stores are new; growth is mostly represented by larger volume sales.

Chart 9-4 shows the changes in EAP over this time period. While industrial employment had declined from 1950 to 1970, it nearly doubled in the next six years. Chart 9-5 shows the characteristics of the Case Study Communities in Ixtlan. Economic diversification is found in only certain communities, and there are important differences between them. Chart 9-6 describes their economies in greater detail.

Living Standards

The Sierra was always one of the poorest areas in Mexico. But, except for Huautla, which has considerable tourism, it is the most prosperous area in the Highlands. In 1950, six percent of the people spoke only Zapotec; the other 60 percent were bilingual, but the "Spanish" of most was only used for trade or government purposes. A quarter always went barefoot (10).

Two thirds of them lived in the tiny municipal seats, which ranged in size from 400 to 1750 inhabitants. A third of the population had a drinking water system. President Cardenas put in electricity. In 1950 there were only 47 schools in the whole District, six of which were in Ixtlan, and only about half the population was literate (18).

By 1970, about 80 percent of the adult population was literate and 85 percent of school-age children attended school. The only education past primary schools available was a trade school sponsored by the National Indigenist Institute (INI). Many more had access to drinking water systems. Between 1960 and 1970, the real value of personal income increased by 16 percent, income from the primary sector by only eight percent (23).

The changes from 1970 to 1976 were most notable. In 1976, most of the logging communities had a health center. All had electricity and Ixtlan had sewage. Several new schools were built, including three secondary schools. The Tuxtepec Forest Technology Institute is also open to young people from Ixtlan. Chart 9-7 gives some indicators of living standard changes.

The interviews in Ixtlan and Capulalpan noted significant improvements in personal incomes for the municipio. In Jaltianguis, incomes were reported not to have changed, but financial stability improved. Only Ixtepeji, which had a very small share in logging, complained of a

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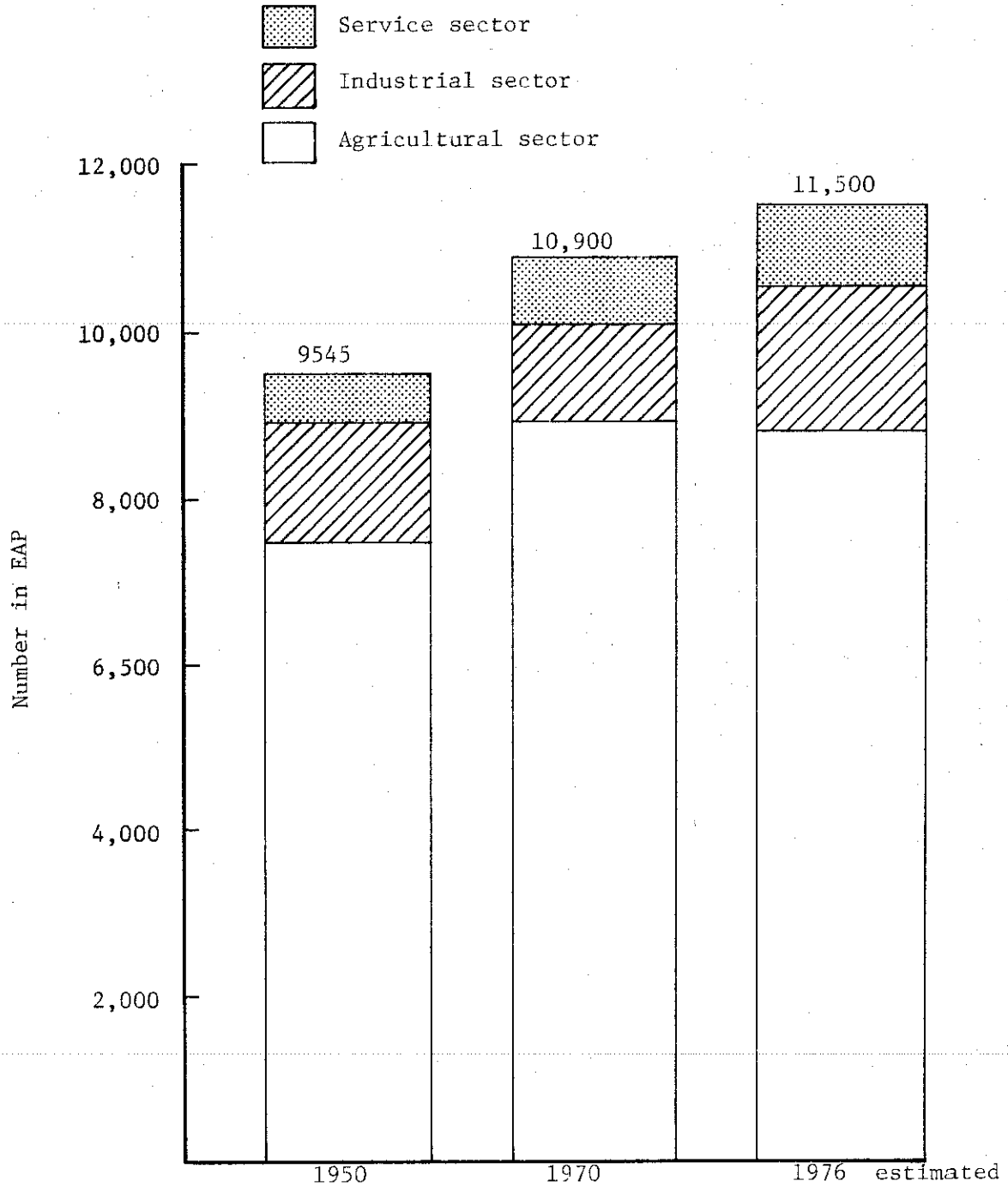
2/ Elsewhere, there are real malnutrition problems. One of the communities, which is still better off than the average, said the availability of high quality foods had declined in the past ten years.

CHART 10-4. CHANGES IN THE ECONOMICALLY ACTIVE POPULATION IN IXTLAN*



* Mexico, SIC, Censo de Población 1950, 1970 (published in 1952 and 1972); for 1976 data, author's estimates used.

CHART 9-5. CHARACTERISTICS OF SIX COMMUNITIES IN IXTLAN

COMMUNITY	SIZE (hect.)	POPULATION[a]	ECONOMY	LITERACY	MONO-LIN-GUAL	BILIN-GUAL	HEALTH CLINICS	ELEC-TRI-CITY	POTABLE WATER	ROADS[b]	USE OF FERTI-LIZERS	OTHER INPUTS
Jacaltianguis	1214	1400	Fruits Logging Clothing and note-book fac-tories	770/837	909	902	YES	YES (1940)	YES 1963/64	Began constr. 1969	15% 10 yrs	Some pesti-cides-10 yrs.
Ixtepeji	-	1500	Firewood Agricul-ture Logging (little) Flowers	1343/ 1553	574	560	YES (Social Security Insti-tute	YES	YES (but poor service)	1973	Few	NO
Ixtlán	-	Town 2100 Municipio 4000-5000	Firewood Logging Factories Commerce Agricul-ture	2401/ 3481	3256	2528	YES (12-15 years)	YES 1800s	YES	1950 to Guela-tao 1960-Tuxte-pec - Oaxaca 1970 - paved	Last 2 yrs.	Few irriga-tion
Capulalpan	2800	1500	Agricul-ture Mining Clothing factory	727/ 835	131	All	NO	YES	YES	1950	Began in 1975	Few; irriga-tion
Macuiltianguis	-	1000	Agricul-ture Logging	870/1010	1216	1206	YES	YES	YES	1960-65	FEW	FEW
Trinidad	-	±1200	Mining	?	12	10	NO Dispen-sary of Pap. Comm.	YES	YES	1960	FEW	FEW

a/ Data from the Fábrica de Papel Tuxtepec, S.A., Oaxaca, Oaxaca, 1976. (abbreviated here FPTSA).

b/ This refers to roads passable throughout the year.

* Data from a survey carried out in 1976, by the author. Information about literacy and language are from the SIC, Noveno Censo de Población, 1970, published in 1972.

CHART 9-6. PROGRAMS AND EMPLOYMENT CHANGES IN SIX COMMUNITIES IN IXTLAN

COMMUNITY	PROGRAMS IN PROGRESS	EMPLOYMENT CHANGES	COMMENTS [a/]
Jacaltianguis	FPTSA since 1961; help with road from Caminos de Mano de Obra; with fruit production, from INI; COPRODEO	40-50 work with FPTSA; 10% work as day laborers	Much cattle before the hoof and mouth disease; Don't want credit; More live outside community than inside $.1 million in FONAFE funds.
Ixtepeji	FPTSA: Logging for private sawmill	Little change; 50 work with FPTSA; 25% have stopped working in local agriculture	Extremely poor CONASUPO helps with food supplies; 1.5 million in FONAFE funds.
Ixtlan	Irrigation by Comm.Pap; CAP-FCE,SSA; INI; paving of town streets	80% income from logging 20% from agriculture; Emigration about 2% year, by 20 have returned since 1970.	Highest annual wood extraction; Richer, since taxes are concentrated here from the whole Great District
Capulalpan	Irrigation; FPTSA since 1973 Credit from INI in Guelatao and BANRURAL; Indeco building auditorium. INDECO	Little emigration since 1973; 40 work with FPTSA (half year) 8 in factory; 100 in mines, 10 in commerce	Half of community lives outside Have a cooperative; $.8 million in FONAFE funds
Macuiltianguis	FPTSA; Soil conservation by Pap.Comm.; INI	Little change; same number working in agriculture as in 1970; many braceros to USA.	Have a lot of wood resources New Agricultural Secundaria (2-3 years old)
Trinidad	FPTSS since 1974; Soil Conservation by Pap.Comm. INI	60 work in FPTSA; Agricultural production has increased	New Agricultural Secundaria (1976)

a/ Most of the cutting rights paid to the communities are channeled through the Fondo Nacional de Fomento Ejidal (FONAFE), to be used for community improvements.

*Data from survey carried out in 1976 by the author.

CHART 9-7. CHANGES IN LIVING STANDARDS IN IXTLAN*

	1950	1960	1970
Percent of the population that:			
is literate	57 [a]	65 [b]	79 [b]
attends school (ages 6-14)		?	80
has potable water	34 [c]	?	59 [d]
has sewage	____	?	1.4 [d]
Gross regional product	____	?	$ 112 m
Personal income	____	$ 33.6 m	49.5 m (16.5 real increase [e])
Personal income in the primary sector	____	21.6 m	29.6 m (8% real increase [e])

[a] Of the population 6 years or older

[b] Of the population 10 years or older

[c] Of homes.

[d] Of individuals in 1973.

[e] Using inflation indices of the Papaloapan Commission in which: 1974 = 100; 1970 = 151; 1960 = 191.

* Mexico, SIC, Séptimo, Octavo y Noveno Censo de Población (published 1953, 1962, 1972).

continuing downward trend in personal incomes. Overall, the semi-urban towns such as Ixtlan, Capulalpan, Xiacui, Natividad and Guelatao are slightly better off than the other villages, which have similar standards among themselves.

Sources of Changes: Personalism in Politics

Change came about in Ixtlan almost entirely through the interest of certain powerful people. Their interrelations with the Serranos are somewhat unique and opened the bridge for federal money to make really effective contributions.

The Early History of Ixtlan

To understand the constraints that have been operative on the development of Ixtlan, requires first a look at its history. The mountains have been inhabited for thousands of years. The land is communally held under an organization that became standard hundreds of years ago.[3/] The people belong to the Zapotec culture.

The Spaniards had an effect on the region mostly through intensifying the local mining operations. For many years this was a source of wealth for the foreigners, but few settled there and Indian resistance was very strong against outsiders.

The Serranos have a tradition of hard work and independence which enabled them to survive in a very difficult ecological niche. Furthermore, their attachment to their homes is reknown through the whole country. There is another strong tradition of the communities--which have few everyday ties--that of working together in a crisis.

The famous President Benito Juarez was a poor Indian boy who came from Guelatao, and is their most cherished figure.

During the Porfiriato, the Serranos were little affected by the land takeovers elsewhere, but were very supportive of the Revolution. The Serranos invaded the city of Oaxaca and wrestled power from the corrupt state governor, occupying the city for some time. They eventually returned to their homes, but the Oaxacans haven't forgotten, and remain aware of the potential threat from the mountains (18).

After the Revolution, Cardenas made some improvements in their living conditions, but minor. The Sierra remained isolated, with little interest in the outside, and little outside interest in them.

3/ Capulalpan, for example, was founded in 1400 (3).

Economic Changes After the War

In the 1930's, according to the old men of the towns, yields were quite good in agriculture, and a variety of crops were produced and bartered. In 1944 the cyclones which produced the Papaloapan floods brought a deluge to the mountain and destroyed parts of several towns. The communities got together to clear roads and repair bridges, with little outside aid.

The Serranos insist that the flood marked a dramatic change of weather, after which there was a severe lack of water for a number of years. Just as the weather began to "right itself," the hoof-and-mouth disease hit and finished off most of the cattle, hurting agriculture as well because of the scarcity of oxen teams. At this time, people began to abandon agriculture to do logging work. The community of Ixtlan received some $7 million from the factories in cutting rights and other charges (13). The respite was brief. When the factories closed, there was a marked economic decline in the area.

"Bracerismo" began, and many from the Sierra went to look for work. When they returned to Mexico from the U.S., many just stayed in the Central Plateau. With their help, others in the villages found work outside. Despite accelerating emigration, the sense of community remained strong in both residents and emigrants.

Their Present Political Outlook

Today, there is a Union Fraternal de Ayuntamientos (Municipal Brotherhood) for intercommunity cooperation that meets infrequently when a common cause arises.4/ The Sierra has a strong sense of cohesion and independence from the rest of the country.

Under normal circumstances, they want to be left alone. There are many squabbles between communities, particularly over land and water issues, and there is a minimum of intermarriage.

Most of what the municipios had in terms of physical infrastructure as of 1970 they had built themselves. Ixtlan put in their own drinking water system, as well as irrigation in the 1960s. Most of the passable roads that were in existence at the start of the decade (except logging roads) had been built by hand labor by the comuneros. The high literacy

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4/ The most recent example was in 1975 when they went to Mexico City to protest the takeover of an electricity generator by the CFE. This had been a present to the Sierra from Cardenas, and they insisted on and won, the right to control it (18).

rate is a result of school attendence being universally mandatory. Parents whose children do not attend are put in jail.5/

They have little faith in the national government. Until recently, there were very few government programs to assist the Sierra, except for INI. One interviewee sighed, "Of all the Presidents, only Cardenas kept the promises he made to the Sierra. We no longer believe in Presidents to help us, only in God." Also because they live so close to subsistence level, they are unwilling to take risks that might threaten that subsistence, least of all for an outsider they don't trust.

The Personal Link in the 1970s Program

Because of these attitudes, which for the most part have been adopted by for the comuneros, government programs were difficult to organize and implement, even when the will was there. An overwhelming part of the credit for Ixtlan changes goes to the personal influence of a trio of dedicated powerful men who had an intimate knowledge of the Sierra, and held the confidence and respect of its inhabitants.

The aim of these three was clear: to get as much money as possible flowing into the Sierra, and staying in the hands of the Serranos themselves. The first was Ing. Jorge L. Tamayo, the mastermind of the forestry program. Tamayo was a Oaxacan by birth and had been active all his life in affairs of the State. A hydraulic engineer by training and a geographer of national standing, he had a working relationship with the Papaloapan Commission for many years, and had become an expert on forestry besides.

Tamayo was called in the early 1970s to make a planning study for the Tuxtepec Paper Mill and soon after was named its Director. At about the same time, he was named Vocal Ejecutivo of the Papaloapan Commission. He held both roles actively through 1977. He was very interested in technified, efficient industrial production, and large-scale development projects, and was a canny businessman. He saw the forest as the resource of most potential for Oaxaca and wanted to put the area into production as quickly as possible.

Tamayo was an avowed Socialist, and he pushed for industrial production mainly to provide benefits to the workers involved. In the name of the Paper Mill, and with the profits his management produced, he built most of the new infrastructure in Ixtlan. As Director of the Commission, he supported extension and credit programs. His personal relations with the Sierra were excellent, and his approval validated most programs in the communities' eyes.

5/ There are two reasons behind this: they feel that they have no opportunity to better themselves or go to the outside world without education; and a certain level of attendance is necessary for the Ministry of Education to maintain a teacher in such isolated towns (22).

Ing. Victor Bravo Ahuja was from Tuxtepec. When Governor of Oaxaca, he marked an era of progress for the state, as described in Chapter 6. He was the first governor to have some success in attracting industry to Oaxaca. Most of the investments not related to Tamayo's empire, such as COPRODEO (The Committee for Production in Oaxaca) and Federal government programs such as CAPFCE, CFE, INDECO, etc., were drawn to the Sierra through his influence.

The third of the trio was Sr. Uvaldo Jimenez, a native of Ixtlan. Jimenez was, until he retired, Manager of the Nacional Financiera de Oaxaca, S.A., probably the most important financial institution in the State. Even after his retirement, he had a lot of influence on bank investments.

With a strong personal interest in the welfare of the Serranos, Jimenez got a whole series of projects approved for credit with the Financiera. Among these were the tool handle factory, the furniture shops, fruit box factory, shoe factory--particularly for the long-term loans for machinery. He also arranged commercial credit for several of the shops in Ixtlan. He was in charge of the renovation of the beautiful old church of Ixtlan, as both a source of local pride and as a tourist attraction.

They were all activists, concerned about the Sierra, and together succeeded in attracting a huge amount of capital to the area. Through their understanding of and respect for the comuneros, they were able to help draw the Sierra more fully into the national systems, and get their cooperation.

Sources of Change: Projects to Stimulate Employment

The various projects that were devised to assist Ixtlan--the Forest Complex activities and the Commission's agricultural programs--were based on utilizing intensively valuable resources, and providing more local jobs to reverse the trend to urban migration.

History of the Forest Complex

Before the Fabricas de Papel Tuxtepec, S.A. opened in 1954, most wood logged in the Sierra was being sent to paper mills in the southeastern United States. The first important industry in the State of Oaxaca, it was located in Tuxtepec, along the railroad line built in the 1930s for bananas. The foreign-owned firm was located there because of the good water supply from the rivers, energy from the Temascal Dam, and the possibility of future use of cane bagasse and tropical woods. Construction of the plant began in 1956. In that year, a Presidential Decree approved the forest concession of over 261,000 hectares of pines from the Sierras de

Juarez and Miahuatlan-Juquila, and Playa Vicente tropical woods.6/ Before 1972, only Juarez had been logged (4).

The original plan was to use only 100 persons in a mechanized logging operation. There were strong petitions from the Sierra against this plan, however, and the comuneros won rights to do the cutting. This involved about 1,000 persons. The price of wood for the factory rose drastically as a result.

Nevertheless, the Mill began producing newsprint in 1958. In 1959, they began production of paper for sale to the National Commission of Free Textbooks. In 1962, the plant hit capacity production--30,000 tons per year, and decided to put in improvements to raise capacity to 45,000 7/ (4).

But besides the high price of wood, there were other problems: old logs destined for initial cutting were too large, often hollow, had too much lignin and needed excessive whiteners. Thus, the plant was operating continuously at a loss, and in 1965, its owners sold all stock to the Mexican government for $185 million 8/ (5).

The government put in a number of minor changes and capacity was increased to 55,000 tons by 1971. Since 1969, the entire staff has been Mexican.

The main problems of wood supply and inefficiency were not solved, however, which was reflected in the fact that from 1963 to 1972, the plant ran at a loss. From 1968 to 1972, newsprint production operated at three-quarters capacity, and textbook paper at one-fifth capacity. Newsprint quality still did not meet international standards.

Bad labor relations with the Sierra meant an irregular supply of wood, and the cost of extraction was high. Road building was pretty inefficient, with the real cost more than double the competitive cost,9/

6/ The breakdown for the concession is as follows (4):

	1956 estimates(in hectares)		1972 estimates
Juarez	139,225	(79,608 forested)	65,246
Miahuatlan-Juquila	82,600	(34,395 forested)	103,204 (39,958)
Playa Vicente	30,000	(12,000 forested)	Not in use now
	251,825	126,003	

7/ Newsprint is bought by PIPSA, the Productora e Importadora de Papel, S.A.

8/ The Nacional Financiera, S.A. owned a part already.

9/ The cost of wood placed at the factory was (1):

49% extraction	9% taxes
12% roads	30% trucking

because of poor equipment maintenance, poor worker efficiency and above average labor costs (1).

Logging techniques were very primitive, with power equipment rarely used except for uphill skidding of logs. Crosscut saws were used to fell trees and buck them. The pulp logs were then rolled down to a track and peeled by hand, split, and stacked by the road for handloading onto trucks.

Since the contracts had to be made yearly, and there were frequent hassles, the loggers often stopped work. In 1972, the factory had to stop for 40 days for lack of wood. Only 11 of the 20 communities in the Ixtlan concession were under contract at all.

Meanwhile, conditions for Maderas de Oaxaca, S.A. and Unidad Silvicola de Magdalena were hardly better. The former had a concession of 38,000 hectares, but extracted only 10,000 cubic meters of wood each year.

Solution of the Paper Mill Supply Problem

Before Tamayo was asked to take over the Paper Mill in 1972, he had made a series of studies on the Mill's problems, and formulated a plan which he began to put into effect once he became Director.

Factory Efficiency. In 1973, the Secretaria de Hacienda y Credito Publico gave the mill a loan of $40 million to be repaid in two years, to carry out expansion plans. The main change was that the old stone grinders were replaced by refiners which could be fed wood chips, rather than whole logs. Because all parts of the tree can be chipped--not just the trunk--the potential cost of cellulose should decline markedly, and the quality of the mechanical paste improve. By 1978, the plant will be using 100 percent wood chips (16).

The new addition included a wood chipper, a pneumatic chipping system, pressurized filter, press drainer and other minor parts. An electronic control system was installed to coordinate production, such that the increased capacity--70,000 tons per year (200 tons per day)-could be handled by adding only six new employees (16). In September 1975, the mill--now relatively modern and efficient--normalized the new operation and in December began to operate at full capacity.

A few problems still remain. Imported cellulose for chemical paste (which is 20 to 25 percent of total cellulose) continues to increase in cost. To keep the cost of mechanical paste down, they are using up to eight percent bagasse, but the technology to utilize a higher amount is not yet available (16).

The price of paper remains subsidized. The price received is the international price, plus transport to Veracruz, plus ten percent. Federal taxes are lower than for importers. There are no municipal taxes, but the factory gives a "cooperation" of $7,000 per month to Tuxtepec, in addition to an extremely high (property) tax of $1 million paid yearly to the State and Federal governments (16).

Because the Mill is paying much higher prices to the Sierra for their wood supply, it still operates in the red, but the entire complex of Mill, logging and diversified industries has a net profit.

Supply Stability

In 1971, changes were made in the 1960 Forestry Law, whose net effect was to provide for a more equitable distribution of income from forest output in favor of the landholders (5).10/ Under the Forest Law, all concessions must also pay a contribution for reforestation to INIF (National Institute for Forestry Research) and to the Forestry Commission of the State. Of all federal taxes collected, 15 percent were returned to the State and 5 percent to the municipio of origin.

The role of ejidos and communities was adjusted to fit in with the new Agrarian Reform Law. Tamayo had been instrumental in getting the law passed, and used it to justify his change in policy in the Sierra.

The immediate objective was to use all the land in the temperate zone concessions and to convince neighboring communities to incorporate to the Mill, to stabilize the supply of pulpwood.

The first incentive was an increase in pay. In 1972, cutting rights were $22 cubic meter for pulp logs cut to 1.25 meters; by 1975, the fee had increased to $32.62 per cubic meter (17). Thirty percent of this money is paid directly to the community; the other 70 percent goes into a fund set up by FONAFE. Some of the communities have accumulated over $1 million in their official funds, and have started to put the money to work in new infrastructure projects. The size of the annual contract is prescribed by the Mill foresters, for selective cutting, to ensure continuous production and protection from erosions. Ixtlan has the highest quota--16,000 cubic meters (17).

A "Public Relations with Communities" department was set up as part of the Mill Offices. The representatives, often accompanied by Ing. Tamayo, travelled to all the towns to give the new policy line of cooperation with the communities. They tried to convince them that the mill wasn't out for huge profits, just efficient operation.

They introduced motorsaws and winches in Atepec, Macuiltianguis and Comaltepec, providing $8000 to $9000 of credit (18). With a motorsaw, one man can cut 15 cubic meters per day versus two cubic meters per day for two workers with a hand saw. In response to community complaints, raingear and huts for protection during the rainy season were provided at a cost of $585,000. The wood quota contracts had not previously corresponded with the calendar year, which was a problem; so in 1975 the loggers petitioned

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10/ When the law passed, the estimate was that the income of villagers from forestry exploitation in general was only about 7 percent of the price paid by the industries; and only .2 percent of this was rediscounted to the municipios.

for and received the change for 1975. To give the comuneros confidence in the financial transactions, their own representatives are to witness all sale of wood to the mill (5).

Now, work per man averages about four weeks, and there have been increases in price per cubic meter and production per worker. This gives an income supplement of about $3600 per worker for the 1547 new workers. For the original 1950, this meant an income increase of $2400 from the $1200 paid in 1968.

As a result of these programs, total wood extraction in the Sierra increased by 50 percent. A similar approach in the Sierra of Miahuatlan-Juquila resulted in a tenfold increase there. Six outside communities were incorporated in 1974. Graph 9-2 shows the change in wood production after 1972. All is selective cutting, causing minimal erosion problems. While there have been restrictions of agricultural clearing for 10 years, there has been especially strict control the last three years.

Industrial Diversification. The Forest Complex was set up to permit more intensive use of the forest resources. Now, probably 40 percent of all logs are going for sawlogs and plywood, which pay higher cutting rights ($66.80 per cubic meter and $72 per cubic meter respectively) (2).

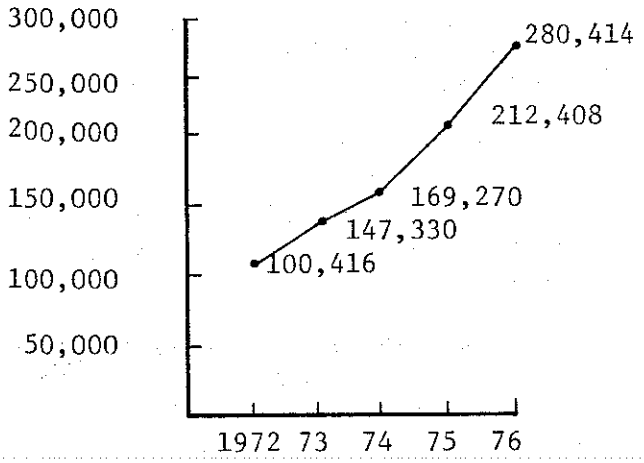
The concession area has a potential of nearly 500,000 cubic meters, while the Paper Mill needs only 150,000 cubic meters yearly. The Forest Complex was organized to utilize this extra wood. Silvicola de Magdalena was acquired in 1973. Etla, S.A. and Maderas del Isthmo, private sawmills about eight years old, were bought by the Mill in 1974. The first produced 80,000 cubic meters per year of specialized wood products; the other, in Cempoaltepec, had a capacity of 35,000 cubic meters yearly of tropical wood for industrial use (furniture, boards) and also had a wood chipper. The Compania Industrial Ayotla on the Tierra Blanca-Aleman highly produces cellulose based on bagasse of sugar cane (5).

Two new sawmills were organized: IXCACIT in Ixtlan and one in Papalos. Both are communally run. The comuneros paid 40 percent of the original investment ($1.2 million in IXCACIT, $1.1 million in Papalos). FONAFE paid 9 percent and the Paper Mill 51 percent. The latter two are obliged to sell their stock to the community within five years (13).

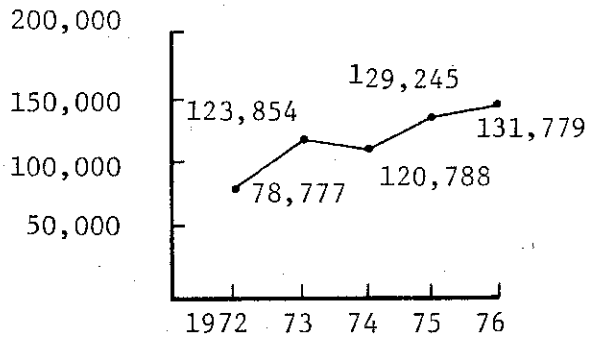
The idea for this was born in 1973, during a conversation between Ixtlan community leaders and Ing. Tamayo, and was set up as an experiment. The cooperative includes Ixtlan, Xiacui, Capulalpan and La Trinidad; each had a representative in the Administrative Council, of which Tamayo was President. The Paper Mill sold them the logs produced by the four communities. About 20,000 cubic meters are used, half of which come from Ixtlan. An additional 4000 to 5000 cubic meters are brought from surrounding communities (13).

In its first year, IXCACIT made very low profits, because they were selling the worst quality wood in the holdings, while a nonlocal person with poor community relations was managing it. In 1975, under local leadership, they did turn a substantial profit. The Papalos Mill had losses its first year, small profits the second (13).

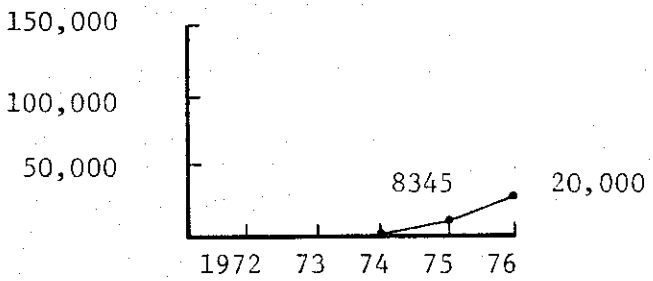
GRAPH 9-2. CHANGES IN WOOD PRODUCTION OF THE LOGGING CONCESSIONS OF THE TUXTEPEC PAPER MILL, 1972-76*



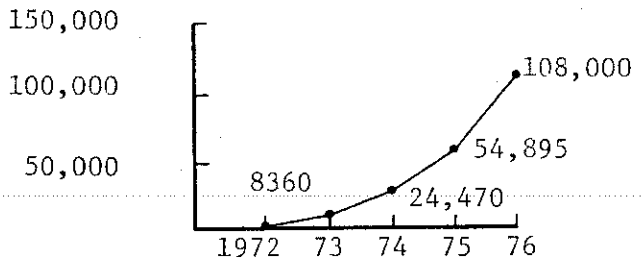
Forest Complex



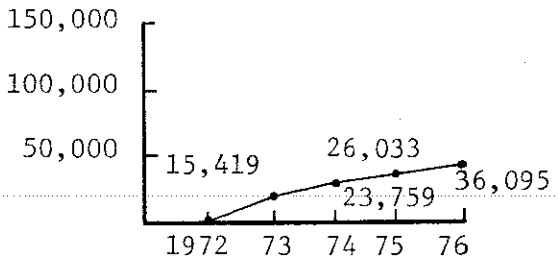
Sierra de Juárez



New Communities



Miahuatlán-Juquila



Magdalena

* Jorge L. Tamayo, "Una Experiencia Forestal Industrial," Mexico Agrario, Año IV #2, Marzo-Abril.

The Mill also helped support a few new forest-related enterprises in Ixtlan--a cooperative carpentry shop and a small wooden tool handles factory. These were financed through the Financiera Nacional, S.A. with the help of Sr. Jimenez (14).

Community trucking was encouraged by the Paper Mill. Trucking unions were started in Ixtlan and Mitla and provided with credit for the purchase of vehicles. The Ixtlan union had 200 members. There were at least 120 trucks with minimum two workers per truck. There are strong restrictions now against non-communal trucking companies (18).

Finally, the Mill sponsored a vast reforestation project in the Mixe region of the Basin, in La Sabana, under the Fideicomiso para Desarrollo del Plan de Estructuracion de Bosques Artificiales.

Planting began in 1974, of 10,000 hectares--75 million trees of pinus caribea and oocarpa--to be finished in 1980. By 1984, the Mill hopes to use this wood (only 100 kilometers away) as their primary cellulose source, cutting raw material costs in half (5).11/

All the wood coming from Juarez will be directed from pulp use to higher-value processed items. The points and branches, now being left in the forest, are to go for pulp or particleboard, or a similar product. By 1977, the Mill will hopefully obtain enough wood to expand the factory to 100,000 tons and maybe begin to produce imprint paper.

Social Benefits. Apart from productive investments, the Paper Mill has invested quite a lot in social infrastructure for the communities, both to show their good faith and for development purposes. Their biggest investment was in a permanent road to replace the temporary logging routes which served the communities. They also helped to build schools, auditoriums and health centers, and helped the communities build stone roads to beautify the towns. Ing. Tamayo started an experiment, ordering some 200 latrines for the comuneros of Ixtlan to install in the homes (14). Nearly all the concession communities now have drinking water, electricity and telephones.

While some of this construction was shoddy and some projects were imposed on communities, these investments certainly mark a positive change in the material well-being of the comuneros.

Agricultural Programs and Other Government Aid

The Papaloapan Commission had a lesser influence on development in the Sierra. But in the sense that the projects were experimental, there

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11/ 20 million cubic meters are expected to be produced from the area. About 1500 persons, mostly native Mixe, are now employed in the planting and care of the plantation, and are earning wages up to M$100 daily. To minimize disruptive social effects, the work is spread parttime among all interested workers, rather than full-time for a selected few (9).

were some optimistic results. Map 9-4 (p.202) shows the location of these projects.

The Commission had tried to get funding in the late 1960s from the national government and in the early 1970s from the World Bank, for special projects in the Upper Basin. These were all rejected. Nevertheless, the small-scale plans of the late 1960s were carried out. Since 1973, their funding has been reduced.

Technical Assistance

The sprinkler irrigation systems built in Ixtlan, Capulalpan, Guelatao, Xiacui and Yahuiche in the last 12 years were received with a lot of enthusiasm. This was due to the marked improvement in the security of harvests.

In the 1975/76 cycle, 246 farmers were irrigating. For 1977, 1362 hectares have been planted, out of 2146 "promoted." The main crops irrigated were maize, a little garbanzo, peas and wheat, produced primarily for subsistence.

PLANPA tried to do some work with fertilizers and new varieties in 1976, but results cannot yet be measured. A new BANRURAL opened in Ixtlan that year.

Their other activities include pisciculture, apiculture, rabbit raising, soil conservation and livestock extension. Fish ponds of various sizes are now found in about 15 communities in a program that began in 1974. The fish Tilapia nilotica is used for food and fed maize, purina feed or manure. The ponds are used to irrigate vegetable gardens as well. Yields up to half a ton of fish in two years have been taken from very tiny ponds. They hope to stock rainbow trout in the rivers as the next stage of the program (19).

Apiculture programs are just beginning in Analco, Yehuiche, Capulapan and Lachatao. There are rabbit raising operations in Capulalpan, Comaltepec and Ixtlan. A goat program in Capulalpan failed. Poultry work has gone on mostly with private initiative, and only occasional help from the tecnicos. The economic effect of these programs has been minimal, particularly since they hardly got off the ground before funding ran out. In general, the impetus of the technicians is needed to encourage cooperation among the local people.

A small program of soil conservation is going on in La Trinidad, Analco and a few other communities. The chief crops in the terraces are wheat and fruit trees. Yalalag is planting maguey (a succulent that provides pulque, an alcoholic beverage popular in many parts of the country.) In the livestock field, the PLANPA workers acquired breeding bulls for several communities and are doing research for genetic improvement in goats.

Other Government Investments. Other government agencies invested in the Sierra during Echeverria's administration. Chief among these was INI, which did a lot of work planting fruit trees, educating, introducing

fertilizer and managing CONASUPO supplies. There are about 50 promotores in the Sierra. Although they had a positive impact here, their influence declined due to declining national interest.

CAPFCE, CFE, SEP and SOP also work in their respective fields. The source of support for this funding appears to be Ing. Bravo Ahuja's influence in the Federal government. These were part of the development plans applied in Oaxaca, including Tuxtepec and Oaxaca cities.

The State of Oaxaca has several programs of its own. COPRODEO (The Committee for Production in Oaxaca) was responsible for the small rural industry projects in Jaltianguis. This group began working in the 1960s promoting artisan industry. INDECO (Instituto de Estudio de Construccion) is a federal program helping to build and adapt municipal buildings, schools, etc.

Changing Labor Patterns in Ixtlan

Certainly the biggest change in Ixtlan during the 1970s was labor patterns. These mostly affected the logging communities, but have implications for expansion outside the concession area.

In Logging Communities

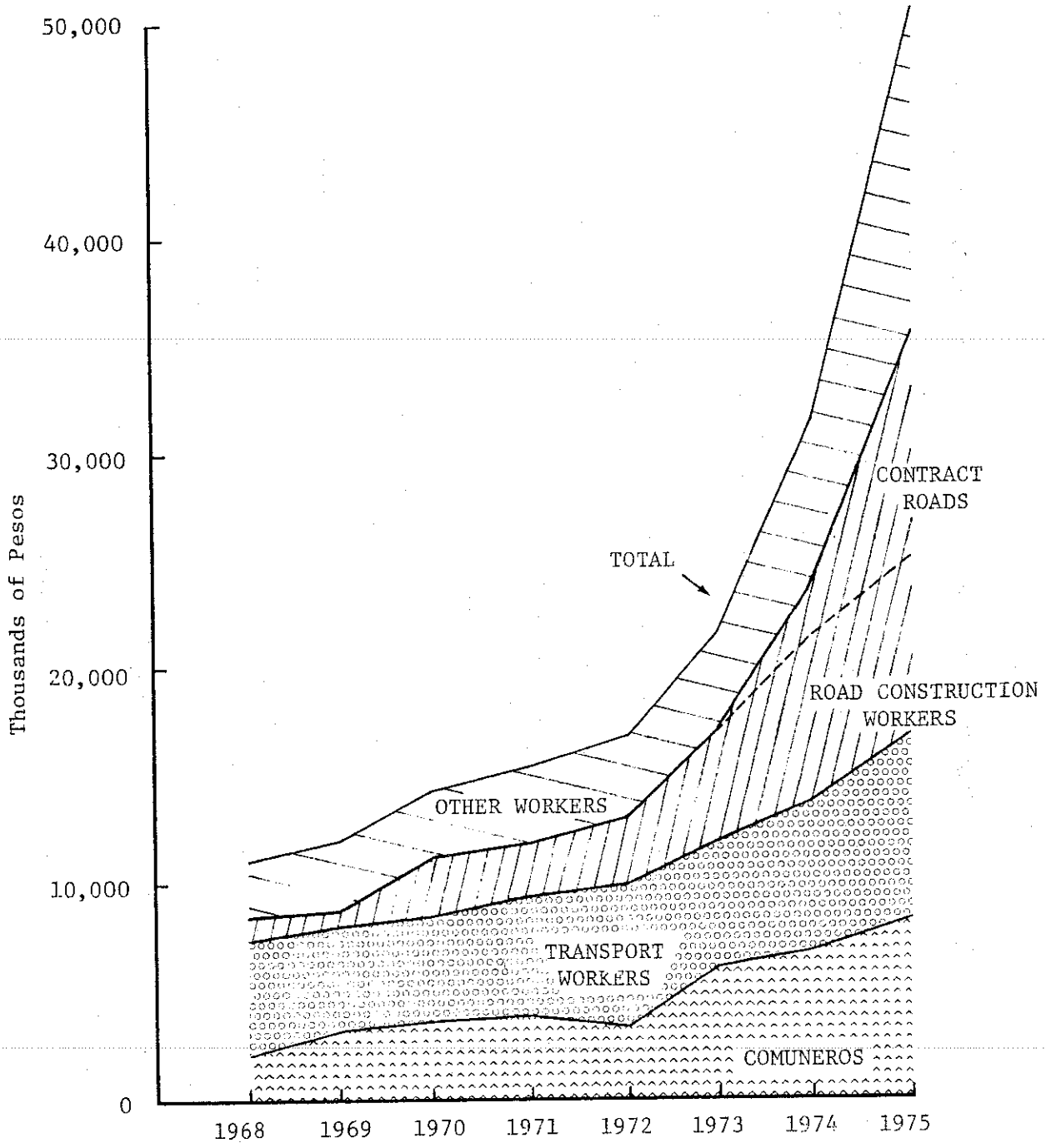
The communities with extensive logging activities provide the most employment possibilities, and the highest incomes. Most of the comuneros continue to work one or two hectares of agricultural land for subsistence production, but money for outside expenditures and higher quality food comes from the logging payments. In some cases, workers have ceased agricultural cultivation altogether. Over a third of the EAP in the district now earns supplemental income. In Ixtlan community, 80 percent of all income is said to originate in forest industries. It is estimated that these groups work about 200 days per year. Graph 9-3 shows total salary increases.

At least ten percent of the resident labor force must seek seasonal work outside the communities. They go most often to Tuxtepec and Oaxaca, but also to Mexico City and the north. Chart 9-8 shows the seasonal distribution of labor in the Sierra. Most logging work takes place during the off-season in agriculture, the dry season. More and more, some rainy season logging takes place. The biggest change in the past five years is that work is far more regular. The extent of the employment effect of logging depends entirely on the resource base, the forest. The pay rate tripled in current terms, and increased 50 percent in real terms. In 1977, an increase in the amount of wood to be cut in the communities is to begin in coordination with forestry studies to maintain reproduction rates.

Other Communities

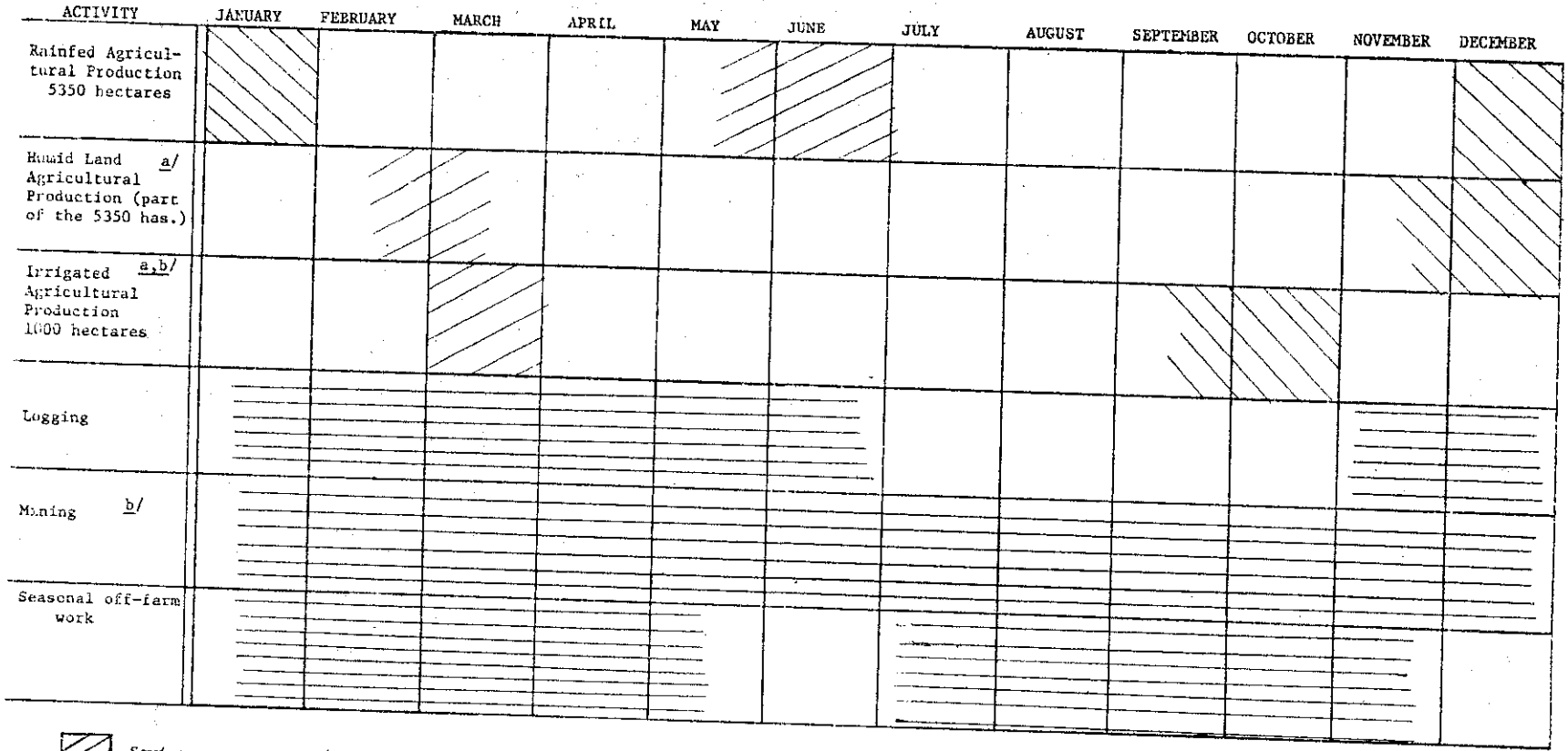
For those communities with little wood, the main advantage of the Paper Mill program is through community infrastructure benefits. Their only sources of income are in agriculture or mining. Obviously, because

GRAPH 9-3. SALARIES PAID BY THE FABRICA DE PAPEL TUXTEPEC, S.A. IN THE SIERRA DE JUAREZ, 1968-75*



* Mexico, Fábricas de Papel Tuxtepec, S.A., "Informe Financiera de 1968-1972" and "Informe Financiera 1973-1975."

CHART 9-8. SEASONAL DISTRIBUTION OF AGRICULTURAL LABOR IN IXTLAN*



a/ In total, there are in Ixtlan: 4346 hectares of maize; 778 of peas; 444 wheat, 405 beans; 237 coffee; 52 sugar cane; 20 alfalfa; 20 avocado; according to the Censo Agricola y Ganadero, 1970, SIC, Mexico.

b/ The communities which work in mining are: Natividad, Xiacui, Capulalpan, Yavesia, Yatuni and Trinidad.

* Information from interviews with comuneros of Ixtlan, in 1976, by the author.

of poor agricultural resources, the ability of the land to support a growing population is almost nil. In these areas, emigration has continued in full force, and those who remain depend heavily on outside earnings, either their own or money sent by relatives.

Mining is still a powerful source of income for the Sierra, although wages are much lower than for logging work, and it is more dangerous. The work is year-round, so that in these communities, outside work in minimal. About six percent of the EAP is directly involved, apart from the communities whose livelihood depends on trade with the miners.

The Effects of Small-Scale Industry

The effect on the individual communities which have had some small-scale industrial investment has been very positive. In Ixtlan, for example, 100 new jobs were generated from this sector, out of a total EAP of about 1600. In Jaltianguis, 60 out of an EAP of about 350 worked in them. In Capulalpan, in 1977, there will be 37 out of an EAP of about 310. The jobs are year-round and provide fairly high incomes.

Over the whole Sierra, however, the effect has been minimal. There are perhaps 225 factory workers out of a total EAP of nearly 12,000, or less than 2 percent. Another 2 percent are employed in forestry for the woodworking operations.

The Effect of Agricultural Intensification

The net effect on employment seems to have been minimal for the new programs in agriculture. Worker productivity and incomes increased. Small livestock production was primarily for supplemental income.

Summary: Economic Diversification for the Highlands

The activities in Ixtlan present examples of many different ways to diversify the economy of highly populated, mountainous regions. Whereas planning in most places seems to be directed to actively driving the Highlanders out of their homes to more productive employment in the lowlands, in Ixtlan the reverse occurred.

The Future of Agriculture

Obviously, continuation of the traditional system of slash-and-burn agriculture under high population pressure is unfeasible because of fertility losses, and erosion which affects the entire watershed. The agricultural programs undertaken in Ixtlan attempted therefore to intensify production, making it particularly land-intensive--small livestock projects, and irrigated and fertilized cropping of high-value products. The success of these programs depends almost entirely on good product markets, which would make such intensification--generally also more labor-intensive--competitive with logging or outside employment for wages. This approach expressly encourages only a portion of the work force to be involved, in order to protect land resources, and perhaps increase the total land area worked by each individual. The reduced level of agriculture exploitation, and better methods, should diminish directly the erosion problem, and its effect on the Lower Basin.

Opportunities Outside Agriculture

Employment for most the population must thus come from outside agriculture--in some industrial work or services. If the area is to be productive, industry will have to come first. In Ixtlan, this was resolved by putting into operation a number of small-scale enterprises, and by expanding logging operations. In both cases, the initiative came from outside the communities.

In order to foment this diversification, there are several preconditions: transfer of some resources from outside to finance operations, adequate technical assistance with good public relations, and a relatively high return to labor.

In Ixtlan, the first precondition was satisfied by the Paper Mill providing credit and work aids directly to the loggers. A much higher price was paid for use of the local resource in the form of cutting rights. The resource essentially became more valuable overnight. This is something that can hardly be created by local initiative. There are two points of view about this type of transfer--that it is a direct welfare subsidy to a poor area, or that for the first time a just payment was made for the use of a valuable resource.

Generous bank or government agency financing of the small factories, which may appear to be a welfare measure, may be viewed at the level of national goals as a reasonable local investment with the positive externality of reversing migration patterns.

To modernize logging operations or even to set up small factories, whose profits are to accrue directly to the workers, requires very effective local organization and good public relations on the part of the outside experts involved. In Ixtlan, these problems were overcome mainly through the personalism of leading politicians who wielded enough power to overcome local factionalism.

Labor-Intensive Inputs with Capital-Intensive Processing

Finally, such programs must be profitable to the workers, or the exercise in employment generation is hardly worth the effort. The solution for the logging communities in Ixtlan was quite complex. For the Paper Mill to suddenly raise their raw material price in 1972 would have created severe economic losses for the factory. In order to pay higher wages and prices in the mountains and still break even, the plant had to be made much more efficient and profitable.

Since this was only possible by reducing the input of expensive pulplogs, further plans had to be made to provide alternative markets for the comuneros' wood. The Forest Complex, with its diversified products provided this new market, such that by the time the Mill reverts completely to low-cost wood chips and plantation pines, the rest of the Complex should be sufficiently strong to buy up most of the high quality wood from the Sierra.

The smaller forest-related industries in Ixtlan and Capulalpan are based on the idea that wood is the Sierra's major resource, and that there is a good market for wood products. Whether these markets would remain available without the contacts of the three leaders is subject to question. The COPRODEO and other factories are not close to raw materials or markets and may experience problems because of this. If marketing problems can be solved, small-scale industry is a very hopeful solution to Highlands unemployment.

Applicability of the Ixtlan Model

Since Mexico as a whole has a shortage of wood and paper products, it would appear that expansion of these types of programs, along with communications improvements could be successful. The Paper Mill has begun expanding to the Sierras of Etla and Miahuatlan-Juquila and similar programs would operate effectively in many wooded areas. Again, success would be dependent upon the willingness of the government to support resource transfers, efficient industrial operations, and good community relations--which may be the most difficult to achieve.

The growth of Oaxaca City would be a great boon to small-scale industries that do not work with a local resource, because at least the market would be fairly close.

Because so much of the population of the American tropics resides in the mountains, and its potential for agriculture is so limited when compared to the lowlands and valley areas, Ixtlan's program deserves a closer look by policy-makers involved in tropical development.

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CHAPTER 10. DEVELOPMENT, EMPLOYMENT AND EQUITY IN MEXICO: THE CASE OF THE PAPALOAPAN BASIN

The Potential of the Humid Tropics in Mexico

With the exception of intermittent financing of the tropical river basin commissions, there has been no concerted effort for progress in the Southeast zone, such as there was in the North. Now, however, the potential for major investments in the drier parts of Mexico is diminishing. As the population grows in the arid portions, the pressures on water supplies for purposes other than irrigation are becoming a limiting factor. The excessive population (in relation to land) of the Central Plateau must either be absorbed into cities or attracted to agricultural lands elsewhere.

Another major Mexican economic center could be developed in the tropical Southeast. The humid tropics have many different physical problems than are encountered elsewhere (different soil characteristics, road maintenance problems, health care) of which planners must be acutely aware.

But the tropics can be a healthy and comfortable place to live and certainly a productive one--as the Papaloapan Basin has revealed.

And here is an opportunity to promote more equitable development. The experience of the Papaloapan Basin was traditionally similar to that occurring in tropical areas worldwide. Economic growth was slow--the main benefits shared among a very limited group 1/: foreign investors who exported their profits, while paying relatively low local wages; Mexican investors who behaved similarly; and local ranchers and caciques who controlled large extensions of land and other resources, or local markets.

But the communities described here, in recent years underwent rapid development in the classical sense, with substantial improvements in living standards (even for the poorer classes), and benefits distributed widely among different social groups. This was accomplished through a pattern of investments which stimulated employment among small farmers and the landless. The multiplier effects of their greater consumption expenditures then triggered more employment of workers with modest means in commercial and service activities.

The history of the four zones discussed in the previous chapters suggests that there is a relatively wide range of options for development planning that achieves such "growth with equity." There is not one unique strategy, but rather an approach to development whose concrete facets must be based on specific local circumstances, background and resources. This approach emphasizes employment generation, provision of urban service to

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1/ With the important exception of improvements in health standards through eradication or control of endemic diseases.

the rural population, and mutually beneficial economic integration of towns with the countryside.

Agricultural Development and Employment

Because Mexico's poverty problem begins in its rural areas, "development with equity" is particularly crucial in agriculture. In the Papaloapan Basin the "marginalized" groups studied which did experience notable increases in incomes and living standards included:

1) ejidos specializing in sugar cane, situated near mills, who benefitted from price increases;
2) ejidos and colonies working with special credit programs for pineapple, rubber, coffee and tobacco, where underemployment of resident labor has diminished;
3) ejidatarios working with the Banco de Credito Rural on high-priced products such as rice and chile;
4) permanent wage labor on the more productive farm ranches, who are receiving higher salaries, and whose numbers have increased;
5) landless labor from the mountains working in the lowlands agriculture and intensified ranching (particularly in clearing and fencing) who, while still not earning minimum wage, find much more continous work than previously
6) loggers in Ixtlan whose incomes rose substantially from increasing pay rates

These results were due to a series of factors which affected price levels and product composition, land area expansion, intensification of production and migration patterns.

Prices, Products and Intensification

The first major factor in agricultural dynamism was production of profitable crops, which spurred both farmer incomes and intensification of production. Farmers in the Papaloapan Basin have proven quite responsive to real price incentives. It appears that while high (profitable) prices do not guarantee intensification and modernization of production, they are a very necessary condition. A rural revival will be possible only while agriculture is as profitable as other endeavours. High prices are an excellent vehicle for transferring income to poorer farmers, if credit and marketing facilities are such that the extra value is indeed channelled to them. We have already mentioned that agrorelated industry promotes increased production and farmer living standards only if the price offered is profitable.

Rubber, pineapple, sugar cane, many fruit trees and cattle can all be very profitable.

Diversification is to be encouraged. Products should be chosen in accordance with soil maintenance requirements. Much tropical land is simply best left in cattle: the key is to intensify operations.

On ejidos, mixed cropping/livestock systems provide income increases from livestock without affecting agricultural employment, because of the closed system.[2/] Land on ranches can be farmed intensively, with livestock operations integrated to reduce costs for both.

A major problem is excessive emphasis on maize. Because of the physical conditions of most tropical agricultural lands, maize is among the least productive and most expensive crops to produce and store in relation to its price. Even in the dynamic zones studied here, maize farmers were the one major group which was always "left behind." The major difference between them and their neighbors who produced rubber, cattle, or pineapple, was government assistance in establishing the more profitable but investment-intensive crop.

Traditionally, the number of hectares per man-equivalent employed has been excessively large on ranches and excessively small on ejidos and minifundia. Through intensification of production, however, this is changing. Size of holding is becoming less important. Small holdings are likely to be more labor-intensive than large ones, but this is mainly a function of internal management. From the case studies, the only conclusion that could be drawn was that less than four hectares per man-equivalent provided insufficient income unless it was of unusually high quality, or produced a very high-priced crop, or large inputs of capital were used. This is partly due to capital limitations, poor marketing conditions and emphasis on maize. The maximum cutoff was around 200 hectares total, after which labor intensity dropped off significantly due to the problems of managing so many laborers. This may also apply to collective situations.

Land Expansion

The second aspect of agricultural dynamism in the Basin was land expansion. This took place in response to the introduction of sugar cane, clearing for cattle, road-building which inspired immigration to unused lands, and active promotion of colonization to unused areas.

Recently, now that most land in the Basin has been claimed, land expansion has involved the use of lands previously held in fallow or not cultivated because of lack of funds and time. In part, this expansion was a result of private attempts at intensification in response to price incentives. In great part, it was due to public and private credit expansion and government subsidies for land clearing. Even at a low level of labor intensity, these combined to multiply that Basin's demand for agricultural labor.

But policy-makers must resist the temptation for quick returns from new lands development. Soil fertility decline is common, and other ecological problems are inadequately understood. Sustainable systems of

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2/ Excessive emphasis on livestock however may result in concentration of ownership with consequent decline in labor demand.

intensifying tropical land use on already opened land (usually better than uncleared) should be the immediate goal.

Capitalization of Agriculture

In the Papaloapan, intensification of production did not necessarily mean technology. When the incentives to increase production came, underutilized capacity of pastures, labor and care were employed.

The level of technology in the sense of using "modern" inputs did not seem to correlate with incomes or employment.

But at the present general level of productivity, technology should justify a marked increase in employment levels. Specific management principles need to be developed to assure that use of advanced technology systems are both profitable and labor-intensive.

Most capitalization of agriculture in the Papaloapan that has taken place was due to resource transfers of one kind or another. Cattle expansion by large landholders has traditionally been financed through profits in nonagricultural businesses. In Isla, capital lending and transfers were accomplished by wealthier members of the community, under special conditions of community cooperation and cohesion. Capitalization on minifundias and ejidos had been negligible.

Recently, this has changed, with the major sources being private banking credit (which is a response both to price increases and government pressure), government credit and direct transfers.

The effect of credit on cattle production, use of improved pastures, and fertilization and mechanization of field crops has been extremely important. This is despite the numerous problems of timing input deliveries, poor coordination of personal, irrational production requirements and lack of management experience by farmers. Of all those in the case studies who reported that their incomes had improved "significantly" in the last years, all but one had used credit. Under the traditional money-lending system there is far more flexibility for the farmer as to how he used the money--a negative aspect of official credit which still prevents wider and more effective use of credit. But lower rates of interest and the act of breaking loose from traditionally exploitative ties are real advantages.

Credit repayment in some of the agricultural programs (livestock credit is still not being repaid in many private and public programs) is fairly good. The main problems have been in recuperation of maize credit, for reasons discussed earlier. Along with subsidized land clearing programs, credit availability has led to exploitation of thousands of unused hectares, usually at a somewhat higher technology level than before credit was used, and was an important element in increasing general demand for labor. One particularly interesting example was the effect of the upsurge in government ejidal livestock programs on private ranching: so many calves were in demand that the local price surged, cattlemen intensified production and markedly increased private ranching demand for full- and part-time labor.

Machinery use has been promoted privately and publicly by credit institutions. Tractor use seems to be justified for use in seedbed preparation throughout the Basin, because this task occurs at a peak period in labor demand. Extreme weather fluctuations in tropical environments make timeliness of some operations very important. The main precaution that must be taken is to mechanize on only certain soil types. Many tropical soils have severe structural problems when heavy machinery is utilized. In Vertisols and Fluvisols, for example, mechanization of such crops as rice or chile is reasonable; in Acrisols, perennial plants are preferred, which need minimal tillage.

Before using harvest or cultivation machinery (on a permanent basis), however, a careful examination of labor patterns must be made, because of the relatively greater importance of these activities to part-time labor incomes. Such machinery as grain driers for postharvest use, etc. are certainly indicated, as is truck ownership, for its advantages in marketing and timeliness of input deliveries.

The other aspect of capitalization of Papaloapan agriculture has been the large infrastructure projects. Roads have been vital to integrating the rural and urban economies, and are probably the single most important investment there. The big dam and irrigation projects, however, seem to have been premature and are still far from properly exploited.

Undoubtedly, flooded areas need protection, and the constraints of seasonal rainfall fluctuations must eventually be mediated by supplemental drainage and irrigation works that are highly productive. But these are very costly investments which, in view of the immediate gains they have registered, do not appear to be the best use of scarce capital. Programs (including price support) to help farmers intensify production are preliminary conditions to insure that gains from large infrastructure projects will be exploited by farmers whose yields will justify the investment.

New Migration Patterns

These conditions have created very new patterns of labor demand in the Papaloapan. The expansion of land cultivated, intensification, diversification of production and improved rural communications have combined to encourage a very mobile work force. Off-farm income in the survey ranged from 15 to 50 percent of total income for landowners.

Products adapted to ecologically or temporally diverse areas has proven to be one of the keys to Papaloapan development. Multiple product development in the region resulted in a broad seasonal distribution of labor demand. Use of the full-time labor force was expanded, as was the potential of the areas for absorbing part-time labor from other ecological zones at various times of the year.

Those primarily affected have been landless workers--and those ejidatarios and minifundistas near the main production zones. But Mexicans who own land have a remarkable attachment to it, and the latter groups most often leave to work part-time during their slow seasons only, even when salaries off-farm are considerably higher.

Migration for the cane harvest is still very important, but on the decline, being substituted in some places (particularly those newly in production) by the ejidatarios themselves. Labor in the pineapple fields is almost all local, comprised of the landless and seasonally unoccupied maize farmers. Rice transplanting and harvesting in the Rio Blanco irrigation zone attracts similar groups of workers from within and outside the Basin.

These patterns have important indications for agricultural development planning. The choice for any zone--for example, between development of dairy or fattening operations in cattle; or use of harvest machinery or nearby migrant labor--should partially be determined by evaluating the characteristics of the labor force which feeds or could feed the area.

Moreover, employer attitude is a very important determinant of the absorption of labor. Mexico needs new institution and traditions for rural employer-employee relations and an orientation to increase land and capital efficiency, as opposed to labor efficiency. Certainly, those farms managed by agronomists, agricultural technicians and veterinarians are now the most efficiently run in the Basin and often the most labor-intensive. The schools for agricultural technology are likely to have a great impact in the near future; labor management should be incorporated into their curriculi. Meanwhile, projects such as the annual agricultural expositions can be exploited much more fully to assist small farmers and ranchers, and provide management, and technical information.

Industrial Development and Employment

For too long, the Mexican tropics have been examined through blinders which see only banana plantations and sugar cane. In reality, the future tropics will be urbanized and industrialized. This was so even before the oil boom but the petroleum industry development ensures it.

Oil has already brought a great deal of wealth to parts of the Southeast, and promises to bring more. So far the distributional effects of development based on oil appear to be very limited. Agricultural development, as discussed above, and other types of industry will be necessary to counter the marginalization process there.

Industry and towns are more likely to attract workers from other regions (partly for climatic reasons) than is agriculture. There is adequate water in the Southeast for industry as well as a relatively advanced support system for beginning a diversified industrialization drive there. Special programs to incorporate the Highlands can be devised as in Ixtlan.

Industrialization can be one of the most effective means of modernizing the countryside. It introduces a middle-income class of workers with different patterns of consumer demand and greater politicization than traditional local groups. The educated management and technical strata may form a more "progressive" upper class than the more conservative local largeholders.

The numbers of workers directly employed in industry, however, tends to be very small in relation to the population, especially considering the capital invested. An industry that uses no inputs from the region will have minimal employment effects, even in services, because of this. The tendency is for heightened differences between the urban and rural areas, and reduced economic and social integration. As much as possible, this type of industry should encourage substitution of manpower for capital, to maximize employment and hence the distributive effects.

On the other hand, industrial investment oriented to the use of agricultural products has enormous potential for both urban/rural integration, improved distribution of benefits and creation of a dynamic service sector. It is essential that this type of industry be managed internally as efficiently as possible to permit maximum payments to the agricultural input producers. Agro-industry is effective in raising farmer incomes only while the price it offers is profitable. This was well-illustrated by the history of the sugar cane mills, the Tuxtepec paper mill's logging operation, the Tuxtepec rubber processor and rice mill, and Isla's pineapple plants. A good transportation system uniting the producers with the processors then serves to connect outlying areas with a commercial center which can benefit from rising farmer consumption.

Large construction projects can also encourage the growth of a service sector because the wage workers are paid from outside funds. If this is merely floating labor which leaves after a short time, the stimulus is short-lived, unless the benefits of the investments (in roads, flood control, etc.) are quickly forthcoming.

Much construction work meanwhile, can be performed by local labor which is either unemployed or seasonally employed. For both municipal-sponsored construction and industrial projects, new methods of financing must be found--such as was used with the Isla slaughterhouse and roadbuilding. Programs to facilitate local control and expand opportunities for local government initiative must be designed. Combining local funds and initiative with federal government supervision or assistance is one strategy that should be examined fully. It may be preferable in cost terms, and encourages economic decentralization. On the other hand, decentralization of government offices into these places is a step toward better integration and official planning.

The experience of the Papaloapan suggests that towns of 15,000 to 50,000 inhabitants provide a relatively comfortable rural/urban transition for the populace, and closer integration with the rural areas. This is not to suggest that government and other resources be directed to create a large number of economically stagnant towns. Rather, a few medium-sized centers should be encouraged in every region, through concentration of investments and communications, to integrate surrounding rural areas commercially, politically and economically. These can exploit local advantages in resources, geographic position or political antecedents.

Urbanization of the Countryside

The fundamental element which promotes wide distribution of developmental benefits is employment creation for uneducated workers. Although there is still a marked potential for agriculture to employ many more workers than are presently occupied, the combination of extremely rapid population increase and limited land resources requires development of alternative occupations as well. Industry's high capital requirements create a similar problem. Thus while creation of greater surpluses in these producing sectors is fundamental to growth, the service sector dependent on them has an enormous potential for job creation.

Improved living standards depend in large part on one's ability to exchange one's own product for a variety of others'. Provided there are good communications routes for prospective consumers, the concentration of services in towns provides important economies of scale. There are some services which are prohibitively expensive to provide to disperse agricultural communities. A certain level of concentration of population in turn tends to promote a more dynamic economy.

Furthermore, the chronic lack of services and generally the "amenities of life" in rural areas is a major factor in the massive rural-urban migrations. Certainly, reverse migration will not take place until such amenities are more widely available. In the Papaloapan, one of the main sources of attraction to places such as Tuxtepec, and Isla (once their economic base was established) was their "civilization"--paved streets, moviehouses, cultural events, good schools. There is no reason why many such towns cannot become centers for productive immigration: certainly the extraordinary urban growth in the Lower Papaloapan testifies to this.

On the other hand, if agriculture--which must continue to be a major source of employment--is to be strengthened, the rural communities must enjoy some of these amenities as well, or as soon as incomes and educational levels rise, emigration will accelerate. Rural inhabitants must be able to live as well as urban ones to prevent this.

Initially, government subsidies may provide many of the services, as well as communications networks and other investments for urban and rural areas. But in the long run, the growth of a service and commercial sector presupposes net income generation from other sectors, and consequently, local initiative and financing for community improvements--both rural and urban--should be possible.

The Future of the Tropical Development Commission

The main purposes of the Papaloapan Commission as originally planned--integration of the Basin with the rest of the country, and stimulation of its economy--have to a large extent been achieved. It is time for reevaluation of its role--and of the role of the Southeast development agencies.

If the regional planning institutions are to continue to exist, they must first relegate the large hydraulic projects to their proper perspective as only one of many instruments that can be used for the region's

development. From now on, development in the tropical river basins will depend on the growth of towns, and the successful incorporation of rural citizens into their economies, more than any series of engineering projects. That development must take into consideration the economic effects of southeastern petroleum development.

The Commissions' role should be to encourage and assist local municipal government planning for infrastructure works and industrial and commercial investments, through technical aid and organization of financing. They should play a leading role in record-keeping and evaluation of projects both government and private. This would enable the Commissions to responsibly guide investment with care to distribution of benefits and spatial distribution among towns.

In the Echeverria sexenio, considerable experience in more sophisticated rural development planning accumulated. The PLANPA and PLAMEPA programs and the Alianza para la Producion, at least in spirit, reflect a new approach. The initiative in agricultural experimentation, while still grossly inadequate, is a major step forward, as is the preoccupation with basic agronomic advances in fertilization, population densities and such. There is still a marked lack of programs for minifundistas and for marketing control in general, which is one area with which the Commissions should be able to deal effectively. The Fruit and Forest Complexes provide good models for integrated agricultural planning.

Efficiency improvements in program coordination (there are far too many government and private groups providing the same services, at cross purposes) and in program implementation (such as timing of input provisions) should have priority.

Administrative and political provision for more local participation in decision-making must be made. With the coming Rainfed Agriculture Districts and stronger Irrigation and Drainage District programs, excessive control from the top is likely to become a real problem. Responsible local administration takes time to cultivate.

Certainly the day has come for a serious effort to develop Mexico's humid tropics. Prospects appear quite good that the above policies could duplicate the cases of Papaloapan dynamism elsewhere in the Southeast. These guidelines, while developed from experiences in the tropics, should also be considered for application to other parts of the country. Strong support for the agricultural sector, integration of rural areas with new urban centers, and emphasis on employment generation are basic to Mexico's future development.

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