AN ANALYSIS OF LAND USE IN THE RÍO SAMALÁ REGION
OF GUATEMALA

DISSERTATION

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By

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INTRODUCTION

In the United States it is extremely difficult for the average citizen to comprehend the desperate struggles of men trying to improve their lot in life. Although our government is presently engaged in this universal problem, the attitude of our citizenry is largely one of indifference. Our trials were of another day.

This world-wide struggle encompasses, by far, most of the earth's peoples. It is not only a striving for tangible objects such as food and land, but involves a search for immaterial things among which freedom and self-respect loom important. It should be noted that it is impossible to deal with these aspirations solely in terms of seemingly pure technical, economic, or political logic, for in dealing with man's aspirations, it is necessary to cope with his attitudes. We must not rely solely on improving what to these people may be the superficialities of life. There is a need to help them meet their spiritual as well as their corporal needs in life.

To the stranger, the foreign mind frequently wheels about in occult and illogical machinations. Such things
occur because of disparities in cultures which make a meeting of minds more difficult. Consequently, an understanding of the motives of man involves a thorough consideration of cultural problems which are far more complex and, in the long run, certainly as fundamental as those of a technical, economic, or political nature. This point is stressed because there is a tendency to consider only the material needs of man since they are more easily detected and provided for than the immaterial needs.

In Latin America, the struggle to acquire a higher level of living continues as it does elsewhere. The problem of providing a greater per-capita share of the amenities of life is complicated by a net increase in population, the rate of which defies comparison. In terms of the people and area involved, the rate of growth cannot be duplicated elsewhere upon the surface of the earth.

Initially, European settlements in Tropical America tended to be concentrated in the highlands. This merely followed the traditional pattern of pre-Colombian settlement. The forces imposed upon the indigenous population also directed the European to settlement in the uplands.

With the passage of time, rapidly growing upland concentrations of population have made it imperative that
these nations of Tropical America seek out means whereby added numbers might be sustained. Furthermore, their national welfares demand that more foodstuffs be supplied for added numbers and for those who are becoming dependent on other than agricultural activities. From the Altiplano of Bolivia northward to the Meseta Central of Mexico, governments have been grappling with this problem.

Inertia has thrust the highland societies of many of these nations into what is now a relatively less advantageous position. The forces which originally heavily favored settlement in the highlands have become increasingly dispassionate. In more recent times, advances in medicine and technological progress in agriculture, industry, and communication have made the economic development of tropical lowlands more feasible. Whereas these advances are also of import to occupied upland areas, they are of greater relative significance to empty tropical lowlands. Throughout most of Tropical America, an appreciation of this situation is exemplified by the attempt being made to integrate such areas into the various national economies. To the south, in Bolivia, the landlocked Chaco is being tapped to support the populace of the Altiplano. In Mexico, east and southeast of the Meseta Central, the jungle is being leveled; to the north
and northwest, tropical deserts are newly watered. And other nations of Tropical America are following suit. Unfortunately, many obstacles lie in the path of converting possibility into reality. The basic means of so doing are available, but there are varying degrees of cultural resistance to innovation because of existing elements which are basically opposed to any form of change. This applies equally to agricultural or industrial reform. The newness of this opportunity means that the task is hampered by a lack of experience in dealing with physical as well as cultural barriers. Above all, the venture is normally a costly one in terms of available resources.

The material presented in succeeding chapters involves Guatemala, a nation that is absorbed with these problems. It is a nation of Tropical America. Although most of its area lies below an elevation of 1500 feet, it is essentially a highland republic, for over four-fifths of its people reside there. With a crude birth rate exceeded by no other nation on earth, Guatemala is one of the fastest growing nations in the world. In the last 18 years its population is estimated to have increased

by 34 percent. As in other parts of Tropical America, the task here consists of providing increasing numbers with opportunities whereby they may improve their well-being. The development of lowlands is being considered as a partial solution to this problem.

To the north and south of the Guatemalan highland are low-lying areas that are empty by virtue of heretofore insurmountable physical and cultural barriers. This situation has continued to the present although in the highland an impasse has long since been reached in the effort to fulfill the needs of the people who dwell there. With attention focused upon the task of alleviating this problem, ideas for the development of the lowlands have long been considered, but most plans have been unrealistic and without sound bases. Haphazardly applied, these have resulted in repeated failures. The latest scheme for the development of the lowlands has grown out of the necessity of having to resettle many Guatemalan families who were deprived of land given to them under the agrarian reform program of the Arbenz administration. A plan has been developed and is in the process of being tested. It is limited in its intended achievements and insufficient time has elapsed to permit judgement to be passed upon

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the scheme. The United States government is expending considerable sums of money in the effort.

The purpose of this dissertation is to provide a comparative analysis of the physical and cultural factors involved in land utilization in the high and low lands of Guatemala. It is not intended to provide a plan for land use, but rather to suggest a rational approach to the considerations that should be involved in the undertaking of a program recommending improved methods of land use.

Both the upland and lowland have been considered, for where they exist within a single political unit, they are inextricably associated with one another. This is not only true in the political sense, but from the economic point of view as well. It is intended that the development of the lowlands will enlarge the economic base of the nation, yet initial development is essentially dependent upon the resources of the populated uplands. It follows that any aspect of land development in one area is of consequence to the other. The benefits derived will be shared by the entire society.

To prepare and to analyze a study of this nature with respect to the future of highland and lowland regions in all of Guatemala would have been too great a task for individual undertaking. Therefore, it was necessary to
delimit an area which would be sufficiently small for individual study, yet include both a highland and lowland zone. The basin of the Río Samalá in southwestern Guatemala was chosen, for it provides satisfactory bases in meeting both of these qualifications. Its upper tributaries encompass an extensive highland area; in its lower reaches, the river flows over the relatively flat Pacific coastal plain. The fact that the same stream passes through dissimilar regions provides a certain degree of cohesion which tends to promote a regional aspect.

In this study, the upland area is represented by the region contiguous to the city of Quezaltenango and henceforth called the "Basin of Quezaltenango" (Fig. 19). The region herein considered as the lowland involves something more than the Pacific coastal plain area generally tributary to the Río Samalá. If held within the limits of the tributary area, the lowland region under consideration would be areaally restricted beyond practicability due to the nature of stream patterns on Guatemala's Pacific coastal plain (Fig. 3).

The more thorough study made possible by confining the areas extent is accomplished at no great disadvantage, for the problems of these small regions exemplify those of the nation. The findings evolved from this material are likewise applicable on a nationwide scale. In fact,
It is hoped that the basic principles involved transcend the national boundaries of Guatemala.
CHAPTER I
A CIRCUMSPECTION OF LANDSCAPE FEATURES
AFFECTING LAND USE IN THE LOWER RIO SAMALA VALLEY

Physical Description

The Pacific shoreline of the Americas stretches from the Alaskan Peninsula to Tierra del Fuego, a distance of over 12,000 miles. The coastal plain that extends inland from this shoreline forms a long and narrow strip that is not continuous but is segmented by inlets of water, by coastal ranges that break directly upon the ocean, or by volcanoes whose flanks descend gracefully yet sharply from considerable heights to the shoreline of the sea.

Throughout the length of the Pacific littoral of the continents, the coastal plains seem to test the mettle of man. Limited in area and in places isolated, they are either too hot or too dry, too wet or too cold. As such, a large part of this area has had great staying powers against the advances of civilization. The southern lowlands of Guatemala share a portion of this littoral and consequently many of its inherent characteristics.

Site and Situation

In Guatemala the Pacific coastal strip is of
respectable width. In fact, it has greater breadth in Guatemala than in any other nation of Central America. The low-lying area extends in an essentially east-west direction from the Río Suchiate on the Mexican frontier to the Río de la Paz which serves as the boundary between Guatemala and El Salvador. The length of the plain between these two rivers approaches 150 miles. The Río Samalá, one of Guatemala’s major rivers, lies in the western portion of this plain.

The width of the coastal plain varies depending upon the criteria used in establishing its inner limits. Using a particular contour does not meet with total satisfaction, for the meeting place of the coastal plain and the lava foothills does not occur at a uniform elevation. If, for convenience the 1000 foot contour is used, one correctly obtains the impression that the coastal plain is widest in its central portion. From an average width of 27 to 30 miles in the department of Suchitepeques, the plain narrows to about 21 miles at the Mexican frontier and to about eight miles at the Salvadoran border on the east. Beyond either border it continues to diminish in width.

A better delineation of the inner margin of the coastal plain might be obtained on the basis of observing changes in the percent of slope, but insufficiency of data
permits this method to be utilized but sparingly. However, in the area of the lower Río Samalá valley there are sufficient data on this basis to provide a reasonably good idea as to how the coastal plain should be delimited.

The gradient of the coastal plain is frequently misrepresented since it is assumed that there is a uniform gradient between the shoreline and points that are considerable distances inland. Various data would seem to indicate that the lower coastal plain area has a uniform gradient of approximately ten feet to the mile or about 0.19 percent slope. In the portion of the coastal plain between the Mexican frontier and the United Fruit holdings at Tiquizate, this degree of slope extends inland to about the 200 foot contour which may range from about 13 to 20 miles inland.

Between the 200 and 500 foot contours, the gradient gradually increases. It is difficult to state precisely where a more rapid ascent begins. At an indefinite point usually somewhat above the 500 foot, but in few places above the 600 foot contour, the slope reaches 0.5 percent. Thereafter the gradient increases quite rapidly. In the area flanking the Río Samalá, the gradient is approximately two percent at 775 feet, three percent at 1100 feet, and four percent at 1250 feet above sea level. This sharper rate of ascent is marked, to a degree, by rapidly
increasing stream incision (Fig. 1). The changing nature of natural vegetation and cultural patterns along this line also reflect a change in the quantity and distribution of precipitation. The zone in which the more rapid ascent begins to take place also marks a transitional area for certain cultivated crops of the highlands and lowlands. A soils map of this is being prepared for publication.\footnote{Departamento de Suelos, Instituto Agropecuario Nacional, Ministerio de Agricultura, "Mapa de Suelos del Departamento de Retalhuleu (Estudio de Reconocimiento Publicación Preliminar Sujeto a Revisión)," Guatemala, C.A., 1949.} On this map, the inner limit of soils classified as coastal plain (Planicie Costera) generally falls between 500 and 600 feet above sea level. The steeper surface above is classified as "Piemonte Baja" or the lower piedmont surface. Because of the foregoing evidence, the 600 foot contour has been chosen to represent the approximate northern limits of the coastal plain in the vicinity of the Río Samalá.

The portion of the coastal plain generally tributary to the Río Samalá involves a strip of land which averages about 12 miles in width. Setting the 600 foot contour as the approximate inner limit of the coastal plain, this width of land extends southward to the Pacific Ocean, a distance of nearly 24 miles (Fig. 3). Bounded on the
Fig. 1.—The force of the Río Samalá as it crosses the Pacific piedmont is well illustrated by the terrace of boulders formed along its margin.

Fig. 2.—Upon the outer Pacific coastal plain, 30 miles downstream from the above scene, the Río Samalá flows in a wide channel and is normally no more than knee-deep.
east by the Río Sis and on the west by the divide between the Río Samalá and Río Bolas, this area, encompassing approximately 260 square miles, lies within the confines of the three southeasternmost municipios of the department of Retalheleu, San Andrés Villa Seca, Santa Cruz Muluá, and Retalhuleu. To the north of the area lies Retalhuleu, the departmental capital.

The Landscape

Relief and Hydrography

To say that the coastal plain exhibits a uniform gradient does not mean that it is without relief. Near streams that flow or bodies of water that exist throughout the year, the nature of vegetative associations clearly demark upper surfaces. This is true even though these areas are only slightly elevated above the surfaces which flank directly upon streams, lakes, and other surfaces of water. Near the ocean, the interfluvial areas are slightly elevated above stream level. With increasing distance from the ocean, the river banks and terraces become more marked. Logging roads, and other routes and pathways which criss-cross the coastal plain reveal further refinements in the texture of the coastal plain. These routes of communication pass, for the most part, along level surfaces. However, the routes are interrupted by
numerous ravines (sanjones) which are usually narrow and frequently quite steep-sided. These narrow defiles may drop 15 to 20 feet below the prevailing level of the immediate area. For the most part, they are empty channels during the dry season. After the frequent and heavy downpours of the rainy season, they channel raging torrents of water toward main streams such as the Río Samalá, Río Oc, and Río Sis. During these periods, normally innocuous streams suddenly become impassable and may remain so for hours at a time. As one approaches the coast the sanjones become less pronounced.

Lakes and other small bodies of water are commonplace in the portion of the coastal plain tributary to the Río Samalá (Figs. 4 and 5). There are numerous elongated ponds and small lakes left in abandoned stream channels. Flanking the Río Samalá are numerous estuarine-shaped lakes. Some of these are quite large. During extended periods of exceptionally heavy precipitation (temperales), the Río Samalá is supplied with a great load of debris which is aggraded in its course across the coastal plain. Numerous streams flowing across the western portion of the Guatemalan Pacific coastal plain originate on the southfacing slopes of the volcanic range which borders the coastal plain on the north. These streams are much shorter than the Río Samalá which gathers in tributaries
from the area north of the volcanic mountain chain. Many of the streams which originate on the south flanks of the volcanic range become tributary to the Río Samalá in the outer portion of the coastal plain. These shorter tributary streams with lower over-all gradients and with smaller drainage areas normally receiving fewer inches of precipitation are not aggraded as rapidly as the main stream. Consequently, their valley mouths become barred by deltaic-like formations deposited by the larger and more powerful Río Samalá. Behind these formations water is impounded and lakes are formed.

A large number of ponds and lakes are also to be found at the outer edge of the coastal plain. It would appear that during the dry season the flow of water from many small streams to the ocean is greatly reduced. As a result, bars are thrown across the mouth of these streams, resulting in the formation of shallow lakes. Behind the shoreline bars, the water may flow sluggishly for considerable distances before reaching a break and passing out to sea.

The extent of these lakes varies with the season. During the rainy period, streams overflow their banks. Flooding of the low-lying areas, especially near the Pacific, is so extensive as to give the appearance of a merging of the ocean and the flooded regions. After the cessation
Fig. 4. - A view of the Laguna de Oc, one of the major bodies of water in the Río Samalá sector of the Pacific coastal plain.

Fig. 5. - Many surfaces of water abound on the coastal plain. For the most part, these bodies of water are surrounded by dense masses of plant growth. The species which make up this rank peripheral growth vary from place to place.
of rain in November, the streams recede and the lakes gradually diminish in size.

No matter what the season, these bodies of water on the coastal plain are of significance in the cultural as well as the physical aspect of the region. To an extent, their history is recorded in the present distribution of soils and natural vegetation. The activities of the populace are frequently in response to the distribution of these water surfaces. The future utilization of the coastal plain will surely be abetted or restricted by the simple matter of the existence of these hydrographic features.

**Natural Vegetation**

It is somewhat difficult to assess the nature of natural vegetation in that sector of the Pacific coastal plain crossed by the Río Samalá. Much of the area has been cut and burned-over. Even those areas which would appear to be well-nigh inaccessible have been disturbed. The Pacific coastal plain of Guatemala is not characterized by a uniform aspect of plant cover. The pattern of vegetative growth which exists in the lower reaches of the Río Samalá is not necessarily duplicated in areas to the east and west as has been
indicated by Sapper and McBryde.  

A journey through the lower Río Samalá coastal plain area is undoubtedly more easily made during the dry season and is, perhaps, more revealing with respect to vegetative associations. In the rainy season vigorous growth provides a degree of uniformity in density and coloration of vegetation. This tends to create a sameness of aspect. With the advent and extension of the rainless period, diverse vegetative associations are affected to varying degrees. Some remain as green as before; others defoliate to the extent that new and heretofore unseen aspects become important, and other associations come to resemble the leafless expression of our temperate broadleaf forests in winter (Figs. 6 and 7). Inasmuch as this discloses refinements in vegetative patterns, it reflects pertinent materials with respect to climate, soils, and the watertable.

The cover of natural vegetation is at a minimum in the inner portion of the coastal plain. It is least disturbed near streams and lakes and predominates in the

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2 See Felix Webster McBryde, "Cultural and Historical Geography of Southwest Guatemala," Smithsonian Institution Institute of Social Anthropology Publication, No. 4, 1945, Map No. 7; Carl Sapper, "Grundzüge der Physikalischen Geographie von Guatemala," Petermanns Mitteilungen, Ergänzungsheft, No. 113, 1894, Tafel 3.
Fig. 6.—On upland sites where there is less available moisture, semi-deciduous forests prevail. Only a few species of trees, shrubs, and vines retain any verdure during the dry season.

Fig. 7.—Branches of a conocaste tree in full leaf serve to frame the upper portion of the picture. In front of the hut is a leafless tree. In the forest behind the dwelling are many more. The scraggly appearance of the forest will disappear with the coming of the rains.
seaward margin of the coastal plain. On the outer portion of the coastal plain there is a belt of more or less continuous forest about 12 miles in width. The forest has undoubtedly been disturbed by the ravages of fire, and to a much lesser extent by shifting agriculture. The band of forest is being narrowed, for sizeable inroads are being made in the upper portion of the coastal plain as a result of the clearing of land for agriculture (Fig. 9).

Tropical forests are conspicuous by the large number of evenly distributed species which make up their ranks. Pure stands of trees as they exist in temperate forests are the exception. It has frequently been noted that the Pacific coastal forests of Guatemala are tropical in nature and that they are composed of a large variety of widely dispersed tree species. Whereas this is generally true in the tropical forests in the lower Río Samalá region, there are vegetative structures in which a restricted number of trees prevail.

Along the courses of most streams there is a strip of evergreen broadleaf forest (Fig. 8). The canopy of this forest is higher than the adjoining forest which is located on slightly elevated uplands. The canopy is closed, sealing out most of the sun's rays. Consequently, the undergrowth is not dense. It is usually at the stream's
Fig. 8. Where moisture is constantly available, there is no seasonal loss of foliage. The forest canopy is higher and more dense. Although not illustrated here, the undergrowth is sparse.
edge that passage is made difficult by rank herbaceous growth. This type of growth is common along the edges of lakes and ponds (Fig. 5). Although it varies from place to place in terms of species, the structure is similar throughout. This dense rank growth usually surrounds these bodies of water to the extent that it conceals them from view.

A small difference in elevation, frequently made perceptible by a very low terrace, is sufficient to bring about an immediate change in the nature of the vegetation. The wide assortment of species that characterizes the river-bottom association is normally present on the adjoining upland. Although the same species of trees may be found in both sites, the structure differs markedly. On uplands, the trees are shorter in stature and the canopy is more open (Fig. 6). As a consequence, there tends to be more undergrowth. And in many areas this undergrowth is a tangle of shrubs and vines. Throughout this area it is difficult to gauge the degree to which disturbance has altered the structure of vegetation. Most of the area has been cut over and so only selected large trees remain. The species remaining vary from area to area. Lumbering has undoubtedly affected the structure of vegetation, but to what extent is difficult to assay.

During the dry season, the surfaces bordering upon
Fig. 9.- Along its landward margin the band of coastal forest is constantly being enroached upon by the expansion of agriculture. From the coastal plain up into the mountains, fires are set to clear land for the planting of maize. Haze hangs heavily in the air blotting distant points from view, and one finds it difficult to avoid the pungent odor of burned and burning vegetation.
streams and lakes bear green vegetative growth, but on the uplands there is a startling change in aspect. The trees, shrubs, and vines defoliate and there remains only a scattering of curled and scorched brown-rimmed leaves. This leafless brush and scant herbaceous cover offer exceedingly poor grazing conditions for cattle.

It should be made clear that what has been described is commonplace, yet there are exceptions. To the west of the Río Samalá, the trees in the upland vegetation appear, for the most part, to be dwarfed compared to those to the west. A short scrub forest with tangled undergrowth prevails. This tends to be related to droughty conditions which are amplified by traits of the soil. The area may be edaphically arid because of soil that is higher in clay content or it may be due to large areas of soil underlain by beds of gravel. Again the appearance of less vigorous growth in the forests west of the Río Samalá may be exaggerated as a result of excessive lumbering, the significance of which cannot be fully determined.

A scattering of soils high in clay content gives evidence of former ponds, lakes, or marshes. In the scrub-like forests, such areas are unerringly marked by a herbaceous cover in which piñuela (Bromela pinguin) and various cacti gain aspect dominance (Figs. 10 and 11).
Fig. 10.—In many places naturally open areas in the forest evince changes in soil types. The concentration of certain tree species and a herbaceous cover in which piñuela gains aspect dominance, indicate a high concentration of clay in the soil.

Fig. 11.—The deeply cracked surface revealed in the foreground of this illustration characterizes areas of clayey soils.
Such areas are also marked by a high concentration of certain species of trees. In many places dry conditions are induced by excessive drainage effected by underlying beds of gravel which may represent areas formerly washed by running water. In such instances, the scrub forest seems to be somewhat dispersed and there is a denser cover of coarse dried grasses to provide evidence of past wet-season growth. The marked absence of corozo palms (*Orbignya cohune*) in the forest associations directly west of the Río Samalá would also seem to be edaphically induced.

To the east of the Río Samalá there appears to be a greater area of broadleaf evergreen forest and the upland forests, although largely defoliated, seem to be taller. Low open forests with entangled scrub-growth are present but seem less dominant. The corozo palm, which is essentially absent immediately west of the Río Samalá, is encountered in many places to the east and in some regions seems to dominate in the forests. All this tends to indicate a greater availability of moisture and apparently bears some relation to differences in soil.

A relatively wide area flanking the lower course of the Río Samalá is affected by the nature of stream flow. Here material is worked and reworked by a major stream which lashes back and forth across the coastal
plain. Aerial photographs of the area were taken in 1946 and again in 1952. They reveal that between the two dates the mouth of the river shifted three miles to the west of its position in 1946. This probably occurred during the *temporal* in September and October of 1949. Sand and coarser sediments cover the area. There are widely scattered clumps of low to medium-height scrub growth and prostrate mats of trailing vines and creeping rhizomes (Fig. 2).

At the ocean there is an extensive beach, but it cannot be classified as a barrier beach. Nor are the bodies of water impounded behind its lagoons. However, bodies of brackish water are impounded behind river mouth bars, and in such areas, or where openings in the bar permit the entry of sea water at high tide, there are associations of mangrove swamps. Cursory investigation did not reveal these to be extensive.

The nature of upland vegetation nearer the ocean indicates increasing degrees of droughtiness. This is largely due to less precipitation and longer periods of drought.

Numerous reports cite the existence of extensive savannas in the Pacific coastal plain of Guatemala. Little evidence of natural savannas was found in the area under consideration. In several restricted areas, a dense
stand of short bunch grass was found. It seemed to be associated with a waterlogged soil high in clay content, which may or may not fully account for its presence.

The vegetation as described here does not exhaust the refinements in plant associations and structures which exist. However, it provides an over-all impression of the major categories and serves as a guide to the understanding of climate, soils, and the availability of water within the lower reaches of the Río Samalá.

Soils

Information concerning the soils of the coastal plain is somewhat sketchy; however, certain generalities may be made concerning the subject. First of all, one type of soil does not usually cover an extensive area but rather, there seems to be a veritable patchwork of soil types. As previously indicated, sedimentation in numerous lakes, the constant shifting of stream beds, the associated aggradation of coarser materials, and other factors, account in part for this heterogeneity of soil types.

The second generality to be made is that from east to west across the breadth of the lower Samalá region, the soils tend to become higher in clay content. Whether imaginary or real, this seems to be borne out by the gradual change in the structure of vegetation.
preliminary soil survey conducted by the Guatemalan government also tends to bear out this evidence. Other reports also indicate that the soil of the Pacific plan has developed from materials "that probably were deposited in salt water." This would seem to be highly unlikely. Isarithmic maps based on soil texture at the United Fruit Plantation at Tiquisate, to the east, indicate that sub-surface materials on the coast have been worked and reworked over long periods of time. The patchwork of soil types also militates against the aforementioned idea. In the past, massive amounts of debris have been dumped upon the coastal plain both directly and indirectly as a result of volcanic activity. Water has been the primary agent in the deposition of this material; however, great deposits of air-borne ejectaments

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4 Servicio Cooperativo Interamericano de Agricultura de Guatemala y el U. S. Department of Agriculture, Informe del Instituto Agropecuario Nacional, por el período de Enero, 1948 a Junio, 1949, Guatemala, C. A., 1950, p. 58. This point of view is also restated by Charles S. Simmons, "Brief Observation on the Physiography and Soil Conditions of the Pacific Slope of Guatemala," a typewritten report from the Soils Division of the Instituto Agropecuario Nacional to the offices of the Foreign Operations Administration in Guatemala City, April 22, 1955.
have also settled upon the plain. This latter factor has probably also been quite important as a constructive agent in the formation of this plain. Sapper plotted the distribution of varying depths of ash along the western Pacific coastal plain of Guatemala following the eruption of the volcano of Santa María in 1902.\(^5\) The entire coastal plain west of the Río Samalá was blanketed with from slightly less than one to over seven inches of ash. Squier tells of eruptions of Atitlán in 1828 and 1833 that "Emitted vast quantities of stones and ashes, covering the coast of Suchitepequez for many leagues, and utterly destroying all animal and vegetable life."\(^6\) Sapper indicates that for such destruction to occur there must be a deposition of ash in excess of three feet.\(^7\) Whether the coastal materials have been air-borne or deposited by water, settled in lakes or reworked by streams, it is apparent that the present soils have evolved from these materials rather than materials deposited under the sea.


\(^7\) Sapper, "Der Ausbruch des Vulkans Santa Maria," p. 42.
The idea of development of soil from materials deposited under the sea is based upon the creation of a coastal area by emergence. Although an uplifting of the area may have occurred there is no general agreement on the subject.

The shoreline at the mouth of the Río Samalá exhibits an extension of the coastal plain by deposition rather than by uplift. While this may be an isolated example, it cannot be ignored.

Generally speaking, the soils of the coastal plain area bordering the Río Samalá are of such quality that they can be considered usable. It is true that they are not uniformly good and it is also true that they are somewhat heavy textured. The soils are essentially neutral in reaction with a pH that averages about 6.5. From comparisons of reports made in adjoining areas, it would seem that the heavier textured soils in this region, although essentially neutral, tend to be more acid in reaction than the lighter soils to the east. If developed from volcanic materials long since deposited on the coastal plain, it is possible that the heavier textured soils also represent older soils. If this is true, then the lower pH can be understood in terms of length of soil development and climatic conditions.

By and large, to increase soil productivity in this
area, certain tracts need to be drained and others require an assured seasonal supply of moisture. The nature of the climatic conditions make it imperative that extreme care be taken in the use to which the land is put. Under conditions of misuse, the soil, one of the most valuable resources of the region, could quickly become a wasting asset.

Climate

It is difficult to prepare an accurate report on the climate of the coastal plain area on the basis of available materials. Records are few in number, usually short in duration, and unfortunate omissions and errors occur in recording. While records of precipitation are available, there is virtually no accurate long-term data on temperature.

In the coastal lowlands, as well as in the highlands to the north, one of the outstanding characteristics is the phenomenon of two maxima and two minima periods of precipitation (Fig. 12). Unlike the highlands, however, a decidedly greater amount of precipitation falls during the second maximum, and for some unexplained reason, the second period of heavy precipitation reaches its peak in October, a month later than in the adjoining highlands. In the vicinity of the Río Samalá the coastal plain normally receives between 60 and 120 inches a year,
depending largely upon elevation. Hard by the shoreline, precipitation is slightly heavier than it is a few miles inland. At Tiquisate, precipitation at the coast averages almost 70 inches. Between five and eight miles inland, it averages about 60 inches annually. From that point inland it increases rapidly with increasing elevation. This pattern is similar to that which has been established on the coastal plain further east and inland from the Port of San José. It is therefore assumed to be characteristic along the entire length of the Pacific coastal plain.

Rainfall seems to be least dependable near the ocean. Ayutla and Champerico, both with relatively long records, indicate years with less than 20 inches of precipitation. Stations progressively inland are less and less likely to experience drought of this intensity. For all intents and purposes, no station at the inner limits of the coastal plain has on record a year in which less than 50 inches of rain fell. All of these inland stations have recorded numerous years with well in excess of 100 inches of rainfall.

Essentially 90 to 95 percent of the precipitation occurs during the six month period between May and October. This means that the remaining six months are relatively dry. In the early days of November, the
abrupt cessation of precipitation marks the end of another rainy season. Normally, meager rainfall in April heralds the coming of the rainy season. Between November and April, there are frequently spans of three months or more with essentially no precipitation whatsoever. The outer coastal zone not only receives less total moisture than the inner sector of the coastal belt, but also experiences longer periods of drought. Consequently, the period of drought on the coastal plain also varies significantly with changes in elevation.

As previously indicated, the year's precipitation is concentrated between May and October, however, it is not evenly distributed throughout this period. There are two distinct periods of heavier precipitation. The scattered light rains of April and the increasingly heavier rains in May finally reach their climax in June, after which the downpours taper off. Before the heavier rains are renewed in September, there may be a dry period of a week or two (canícula) during which lowland roads may again become passable. Thereafter rainfall increases, reaching a peak in September and October. This second crest of precipitation is considerably higher than the first in June.
During the rainy season (*invierno*), the proverbial clock cannot be set by the daily occurrence of rain. Rain does not occur on every day, and probably not even on half of the days during this period. Again, the number of rainy days increases as one progresses inland. Precipitation usually occurs in late afternoon. However, storms of three, four, or five days duration (*temorales*) are not uncommon. They may occur at any time during the rainy season, but are more likely to prevail in June, September, or October, especially the latter two months. During such periods, ten inches of rainfall within the limits of a 24 hour period are not uncommon. A fall of 20 inches of rain as a result of one of these storms also seems not to be uncommon. If this data be true, it is of utmost significance and should not be ignored in any scheme for areal development.

Strong winds, although uncommon, create a hazard of which one should be mindful. Winds of near hurricane force have been recorded in the coastal plain region.

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As explained by Felix Webster McBryde, in "Studies in Guatemalan Meteorology," *Bulletin of the American Meteorological Society*, Vol. XXIII, No. 6, 1942, p. 256, the Spanish saw the rainy period of Central America as a counterpart of their winter rainy season in Spain. As a consequence of this, the summer rainy season in Central America became known as *invierno* (winter) in spite of the fact that the rains did not occur in the winter season.
In October of 1954, a hurricane struck near the port of Champerico. Great damage was inflicted in that region, and farmers in the surrounding coastal plain area complained bitterly about the loss of crops due to high winds and heavy rains. The storm's toll in the neighboring forests was well marked by innumerable fallen trees which lay astride paths, trails, and roadways.

The basis for establishing the nature of prevailing temperatures is fragmentary. Consequently, the subject can only be dealt with in general terms. In the western coastal plain area it is unlikely that temperatures often exceed 100 degrees F. The warmest daily temperatures are recorded in March and April, the months preceding the rainy season. Temperatures below sixty are infrequently registered and are limited to the dry season months of December, January, and February. The rainy season has the effect of reducing extremes in temperature. During this season, average highs and lows are recorded in the low nineties and high sixties, respectively. There is only one major exception to this. During the extended stormy periods previously described (temperales), the diurnal range of temperature may be reduced to two or three degrees F. for periods of two or three days running, never rising above 75 degree F. mark.
The rhythm of the undeveloped coastal economy is closely regimented by the precession of seasons. Each season heralds the beginning of some new activities and the termination of others. The reins which climate holds in affecting the activities of the area are presently very important and will continue to be so. In the future, the increasing application of technology will tend to reduce this influence. Unfortunately, a rational development of the coastal plain area should include consideration and interpretation of climatic data which, for all intents and purposes, are poorly recorded today.

Significant Cultural Aspects

Population

Numbers and Distribution

The coastal plain, as considered in this paper, is sparsely populated. In the area there are probably less than 4000 inhabitants. In terms of density, this would be on the order of 13 persons per square mile. Unfortunately, the census of 1950 does not provide a satisfactory guide for the distribution of coastal populations. Many municipios consist of narrow strips of land that extend from the piedmont to the seashore. The census

9 In terms of structure (but not function) the municipio is to the department as our county is to our state.
reveals only the population of the municipios. Therefore one encounters the problem of surmising the proper distribution of inhabitants within the municipio. For example, the municipio of San Andres Villa Seca is reported to have 6385 inhabitants. Approximately nine-tenths of this municipio lies on the coastal plain. It is highly unlikely that there are more than 1000 inhabitants in the coastal plain area. This means that over 5000 inhabitants are concentrated in the one-tenth of the municipio which protrudes into the Pacific piedmont region. Since the census offers no clear-cut evidence to support such a contention, it is necessary to gain such information through observation or implications provided by other sources.

In the area under consideration, there are no cities or even moderate sized villages. On fincas and haciendas, centers of population exist in the forms of concentrations about the "casa grande." If this type of manor house does not exist, then the concentration is centered about the humble dwelling of the administrator (administrador or mayordomo). On exceptionally large tracts of land, clusters of dwellings are spotted at intervals along the primary roadway through the holdings.

For the most part, the inhabitants of this area are concentrated on the inner portion of the coastal plain.
Fig. 13.- This homestead and Figure 7 on page 21 represent the type normally found in many areas of the coastal plain. The walls may be of bamboo or crudely sawn planks. The steeply pitched roof is thatched from the leaf of the corozo palm. The swept dirt floor of the hut is the domain of domesticated fowl as well as human beings.

Fig. 14.- Under better circumstances homes may be roofed with tile or corrugated iron. The clothing of these people indicates an abandonment of the Indian culture. This is nearly universally true of the inhabitants residing on the coastal plain.
However, it is evident that increasing numbers of people are pressing seaward. A large segment of the outer coastal plain remains unoccupied. Hunter, loggers, fishermen, and others enter the area at certain periods of the year for varying lengths of time, but, by and large, they do not reside there. The extent of penetration into the coastal plain is influenced, in part, by the factor of year-around accessibility. This is abundantly clear to the east and west of the lower Samalá river basin where all-weather routes to the coast provide for permanent occupation of the adjoining lands.

Within the area defined, the pattern of settlement is further guided by the year-around availability of water, by the demand for labor, and by the availability of land. People tend to be located at elevated sites along surfaces of water that persist throughout the year. They exist in greater number where land has been developed to the extent that a supply of labor is needed to maintain agricultural operations. The only land to be expropriated in the vicinity of the lower Samalá has now been parcelled out to some 250 individuals. The recipients of this land reside in an area surrounded by private holds which are sparsely populated. This

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would seem to indicate that more of the land would be
peopled were it delivered to them unfettered.

Although the census makes no note of the fact, the
coastal population varies considerably during the year.
The rainy season signals the arrival of numerous high-
landers who exchange their labor for the right to plant
maize. This they do to offset the meager livelihood
offered by their residency in the highlands.

Nature of Populace

Unlike the highland population, miscegenation has
been carried out to a greater extent. Unfortunately,
an accurate account of this is not revealed by the cen-
sus which tabulates the population as either "Indígena"
or "Ladino." The term "Indígena" refers specifically
to the Indian. However, if acculturated, the Indian
may also be classified as Ladino.\textsuperscript{11}

The lower region of the Río Samalá is comprised
of the seaward margins of three municipios. These
municipios and the percent of their population classi-
\textsuperscript{11}fied as "Indígena" are: Retalhuleu with 36, Santa

\textsuperscript{11} In its course of evolution, the term Ladino has
been variously defined. A most recent appraisal of the
word results in a highly satisfactory definition. If
a family unit carries on private conversation in a vari-
ant of the Indian dialect, it is classified as Indígena.
If not, then it is classified as Ladino, irrespective
of other outward manifestations.
Cruz Malua with 58, and San Andres Villa Seca with 75 percent. It should be noted that of 28,173 persons dwelling in these three municipios only an estimated 4000 or less can be regarded as inhabitants of the coastal plain. It is unlikely that many of these can be classified as Indígena. To say that 90 percent of this population is Ladino is probably a conservative estimate.

General Nature of Employment

The inhabitants of the coastal plain are primarily agriculturists. They also supplement their incomes by hunting, fishing, and gathering what is freely offered by nature. Their incomes are further supplemented by rudimentary processing of the products of their various endeavors. Other minor activities include the manufacture of salt, which is carried out at oceanside, and logging, which seasonally utilizes the labor of a small number of men.

In the upper portion of the coastal plain, especially along the Camino Verde, a number of inhabitants with small landholdings (laboros) keep shops from which may

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be purchased various beverages and the basic essentials of life. Aside from the large-scale sale of products of commercial agriculture, numerous inhabitants residing on the coastal plain sell various commodities in the market at Retalhuleu. Examples of these commodities are: tomatoes, chili peppers, corn, rice, sesame, varieties of plantain and bananas, cotton, salt, dried fish, skins of lagarto (Cayman), iguanas, and the broad leaves of several plants used for wrapping and other purposes.

The opportunity for full-time employment on the coastal plain is limited. Consequently, some men occasionally seek out work elsewhere. The degree to which this takes place is unknown. On the whole it appears that when the essentials of life are sufficient, there is little inclination for the person of this area to expend effort gaining additional income. Many seem to be unoccupied a good portion of the time.

Means of Communication

Transportation Within the Area

Within the coastal plain area flanking the Río Samalá, the movement of people and traffic is directed over routes that leave much to be desired. This is especially true during the rainy season of the year. The road pattern consists primarily of paralleling
north-south routes. These extend from the piedmont area to the seaward margins of the coastal plain. On the inner portion of the coastal plain there are a few inter-linking east-west routes, but they diminish in number and fail to become through routes in the outer two-thirds of the coastal plain (Fig. 3). This pattern is dictated by the physical characteristics of the plain and oriented by the lack of need for east-west commercial intercourse.

From west to east there is an unending succession of southward flowing streams that gather their tributaries from the mountains to the north. These paralleling streams are more easily bridged in the lower piedmont than on the coastal plain. Consequently, the main east-west routes, whether they be rail or road, lie beyond the upper limits of the coastal plain, where they can be more easily constructed and maintained. Combined with this is the fact that the interfluvial regions on the coastal plain are frequently flooded, and consequently less well suited for the construction of roads. Historically, the coastal plain has had little to offer except the factor of low relief. In the past, the region has been considered distant from the productive regions of Guatemala. This factor has also militated against a lower-
lying east-west route. 13

Any coastal plain product destined for world markets must pass northward to the lower piedmont where through east-west transportation is available. Thus the markets of the piedmont communities provide outlets and supply the simple needs of the coastal plain populace. At the present, there is little need for east-west movement on the coastal plain.

Within the environs of the Río Samalá are two main routes carrying north-south traffic. One of these leads from Retalhuleu to the sea; the other leads southward from Cuyotenango. The former, officially known as departmental route number three or "Camino Verde," lies west of the Río Samalá. The latter route, out of Cuyotenango, lies to the east of the Río Samalá. Up until recent times this latter route to the sea passed through one major private holding, the Hacienda Trapiche Grande. As a consequence, the road has not been designated as a departmental route. In fact it cannot be found on any maps of the area involved.

These two main roads are the main arteries of a

Fig. 15.—In much of the outer coastal plain region, the horse is the most reliable means of transportation. Many people possess horses and are excellent horsemen. This is unlike the highlands where the pressure of population upon the land keeps the number of horses for such use at a bare minimum.
system of routes loosely covering the area east and west of the Río Samalá. The river effectively bars linkage of the two systems. Vehicular traffic from one area to the opposite must proceed by way of the lower piedmont which lies to the north.

From the camino Verde roadways lead in easterly and westerly directions. As a rule these tributary roads offer access to adjacent landholdings. On the west they terminate in the large properties which abut on the left bank of the Río Samalá. On the west, they lead to properties which lie between the Camino Verde and the road between Retalhuleu and Champerico. To the north, in the innermost portion of the coastal plain, these roads frequently continue through to the Champerico highway. To the south, the distance between the two routes increases and the gap is not covered by through routes. The Camino Verde is open to vehicular traffic as far as Húmedo. Beyond that point, there is no road, although maps indicate otherwise. The ocean, which is five miles beyond, may be reached on foot or by horseback. Another trail leads to the ocean by way of the settlement at Las Victorias, however this route was inaccessible to vehicular traffic in 1955.

Between the Río Samalá and Río Oc, there are no through north-south routes. The Laguna de Oc (Lake Oc)
Fig. 16.—Logging trails have frequently provided the first means of access to large portions of the outer coastal plain region. They are passable only during the dry season. Where the canopy of the forest has been thinned, corozo palms frequently grow in profusion as illustrated by the above scene.
precludes the southward extension of a network of roads.

The area east of the Río Oc is served by a road which has its inland terminus in Cuyotenango. Innumerable private lanes serving large individual holdings lead off from this main north-south route. Seaward a number of roads lead off in a southwesterly direction. These roads branch out into a rambling network of logging roads that lose themselves in the forest. Generally speaking, these roads have been extended westward to the banks of the Río Oc and Río Samalá. It is reported that one of the logging roads penetrates to the ocean. The main north-south route continues southward crossing the Río Sis several miles south of the Hacienda Los Ángeles and the Río Ican just below Nisa. At a point just east of the ford over the Río Ican, it joins with the north-south route between Masatenango and Tahuasco.

No roads in this area can be considered to be of the all-weather type. They are constructed of the material which is at hand. This usually consists of soil in place, bolstered by a few rocks. During the dry season the roads are inches deep in finely pulverised dust. In many places it is necessary to drive in the rock-hard molds of ruts created by vehicular traffic during the rainy season. When it rains, the roads are impassable quagmires.
Fig. 17. - In the coastal plain area of southwestern Guatemala, very few streams are bridged. Except for a few major streams, all are fordable during the dry season. In the right background is a large ceiba, the national tree of Guatemala.
Only a few streams are bridged. On the two primary north-south routes, no streams are bridged. Every stream must be forded. Landowners may construct small wooden bridges on their own properties where streams become inaccessible during the rainy season. Even these are few in number. The ditch which is passable in the dry season becomes a mud trap with slippery inclines during the rainy season. After periods of heavy rainfall, all streams become impassable for short periods of time. Larger streams, such as the Oc and Sis, are not fordable during the rainy season. There are no fords used by vehicular traffic over the Río Samalé. The impasse created by such conditions is a source of constant complaint by the inhabitants of the region. It is one of the major obstacles to the furtherance of economic development in the area.

Communication with Adjacent Areas

Essentially all traffic of the coastal plain has as its immediate destination or origin, one of the numerous urban centers located on the lower Pacific piedmont. These cities are lined up along the main east-west routes of rail and road transportation. The coastal area with which we are concerned is served by two such cities, Retalhuleu and Cuyotenango. An improved system of all-weather roads is presently under construction,
which will shortly link these communities with Ayutla on the Mexican border to the west, with Quetzaltenango to the north, and with Guatemala City to the northeast. This, in turn, will be of considerable consequence to the coastal area.

Up to the present time, the International Railway of Central America (IRCA) has provided the most dependable all-weather means of ground communication with the rest of the nation, although it is expensive and distressfully unheeding of time. It provides the piedmont cities of Retalhuleu and Cuyotenango with service westward to the Mexican frontier, and with points eastward along the lower piedmont to Escuintla and subsequently to Guatemala City.

While air traffic does not appreciably promote the movement of commodities in or out of the coastal area, it is being utilized to an increasing degree by owners who want to keep in closer touch with their interests on the coastal plain. In several instances landing strips have been graded on the larger coastal plain holdings. A tiring 6 to 12 hour trip to the capital by car is thereby reduced to a comfortable 30 minutes by air. The domestic airline, La Empresa Guatemalteca de Aviación (AVIATECA), schedules daily flights, excepting Sundays, between Retalhuleu and Guatemala City.
The coastal plain area has been hampered by lack of communication not only within itself, but also with the outside world. This latter deficiency should be remedied within the near future. The advent of improved contact with the rest of the nation will surely spur a more rapid development of intra-regional communication. Improved contact will enhance and in turn be enhanced by the opportunity of occupying what to date has verged upon being a regional vacuum.
CHAPTER II

A CIRCUMSPECTION OF LANDSCAPE FEATURES AFFECTING LAND USE IN THE RIGHLAND BASIN OF QUEZALTENANGO

Physical Description

Boldly outlined against the horizon to the north of the lower Río Samalá region lies a succession of volcanoes that makes up the Pacific Cordillera of Guatemala. This view does not normally elicit the attention of the inhabitants of the Pacific coastal plain. To the foreigner, however, it provides a truly awe-inspiring panorama. If the air is clear, the eye can trace the successive peaks and intervening spans from west to east. And, generally speaking, each individual cone represents only the southernmost member of a short file of volcanoes lying normal to the principal line of the volcanic cordillera. To these short transverse rows, Karl Sapper has aptly applied the name "Geschwistervulkane."1

In number, most of the streams which cross the Pacific coastal plain originate on the south facing

slopes of the volcanic cordillera. However, a select number of larger streams gather their tributaries from the region north of the volcanic cordillera. Subdued in the shadows of flanking volcanic files, these streams plunge headlong through the cordillera and toward the Pacific in a series of deep narrow gorges and half-hidden falls. The Río Samalá is one of these streams. Between the Santa María and Zunil volcanic rows, it tumbles over 5500 feet in less than 15 miles.

Site and Situation

At the head of this chasm is located the Basin of Quesaltenango. It is one of a series of basins that lie hemmed in on the south by the geologically youthful volcanic cordillera and on the north by an upland (Los Altos) blanketed by older, possibly early Miocene, volcanics. The Basin of Quesaltenango is one of the more important of these basins and is correspondingly important as a center of agriculture. It provides the setting for the subject of land utilization within the basin of the upper Río Samalá.

The Basin of Quesaltenango lies in southwestern Guatemala. It is elevated nearly one and one-half miles above the Pacific which is about 55 miles to the south. Most of this upland area is located in the department of Quesaltenango, although a small portion of it juts
eastward into the adjoining department of Totonicápán.

The Basin of Quezaltenango is elongated in an east-west direction. Between the eastern and western bordering foothills there intervenes a distance of approximately 15 miles. The Basin varies considerably in width. At its eastern and western extremities the area is enlarged by projections to the north. In the center, immediately west of the departmental capital of Quezaltenango, a narrow tongue of land leads southward from the main basin area (Figs. 26 and 27). As a result of these protuberances, the Basin varies from approximately two to about eight miles in width. Its limits, thus set, encompass an area of approximately 90 square miles.

On every hand, the region exhibits the signs of past volcanic activity. The most obvious evidence is the volcanoes themselves. More subtle is the widespread occurrence of material spewed out by volcanoes. Every bank carved out by running water, each roadcut hewn by man, the pathways which have become incised, all these reveal a kaleidoscope of neatly bedded layers of ash. The Basin is, in fact, a major depression filled with several thousand feet of ash.\(^2\) The surfaces of limited

areas are blanched by the cover of ash deposited within this century. Under such circumstances farmers must penetrate the ash to an older surface in order to plant their crops. At intervals along the margins of the Basin are occasional evidences of lava flows. Where the flows have been more recent, their lobe-like forms are clearly retained.

The mountain rim which surrounds this Basin is highly diverse in character. Flows of lava, short mountain spurs, the deeply gored flanks of volcanoes, and eroded foothills impinge upon the Basin. To the north, the steep slopes of the Cumbre de Olintepeque face upon the Basin (Figs. 20, 21 and 27). The Cumbre forms a continuous ridge rising about 1500 feet from the Río Sangre which lies along the northern edge of the western portion of the Basin. Although no faulting is recorded, the continuous and sharp ascent of the Cumbre appears as the scarp front of a raised mountain block. To the west, a narrow band of hilly terrain stand interposed between the Basin and a rugged mountain mass beyond (Fig. 25). Slightly south of east, the Basin is bordered by the sharp and virtually impassable front of the Zunil volcanic row (Fig. 22 and 23). The Basin is extended for a short distance around the northern end of this volcanic row where it abuts against a rugged mountain
Fig. 20.- Looking to the northwest from a point on the north slope of Cerro Quemada, directly above the city of Quetzaltenango, one obtains this view of the Basin of Quetzaltenango. The western outskirts of the city are barely visible at the base of this slope. In the background the slopes of the Cumbre de Olintepeque rise sharply from the floor of the Basin.

Fig. 21.—This view of the Basin of Quetzaltenango is obtained from the slopes of Cerro Quemada. At the base of the slope, in the foreground, are the eastern outskirts of Quetzaltenango. Beyond the city lies the easternmost section of the Basin. In the background are the mountains which delimit the Basin on the northeast.
Fig. 22.- In the background, beyond the expanse of wheat, lies the Zunil volcanic alignment which marks the eastern limit of the Basin of Quezaltenango.

Fig. 23.- In southwestern Guatemala short volcanic alignments lie normal to the volcanic range. This is a view of the Zunil file as seen from highlands to the east. The Basin of Quezaltenango lies to the other side of this mountain range. Faintly outlined in the background are the volcanoes of Cerro Quemada and Santa María. These are members of an alignment which parallels the Zunil file. Between the two, the Río Samalá takes its course to the sea.
mass similar to that which borders on the west. In either instance, the mountains exceed 10,000 feet in elevation, and routes out of the Basin to adjoining regions, whether they be east or west, must first traverse sinuous mountain roads that carry traffic at altitudes in excess of 10,000 feet.

A series of volcanoes in juxtaposition create an effective barrier between the Basin and the Pacific coastal plain to the south (Fig. 24). Although the southern rim is made up of numerous volcanic cones in various stages of development, only three, Siete Orejas, Santa María, and Cerro Quemada, actually touch upon the highland Basin. It is possible that there are others which are presently not recognizable as volcanic cones.

The degree to which erosion has reduced the flanks of Siete Orejas leaves no doubt but that it is the oldest of these three volcanoes. Its slopes are deeply slashed by streams which flow only after periods of moderate rainfall. The material carried downstream has been deposited in great quantity in the southwestern portion of the Basin. As a consequence, the floor of the Basin slopes significantly from its southwestern margin. One of the main routes to the coastal plain skirts the western flank of this volcanic mass.

To the southeast of Siete Orejas is the towering
Fig. 24.- The southern rim of the Basin is lined by a youthful volcanic mountain range. The volcanoes Zunil, Cerro Quemada, Santa Maria, Siete Orejas and smaller cones stand as an imposing barrier between the Basin and the Pacific piedmont and coastal plain to the south. The Río Samalá, flowing in a southwesterly direction, meanders lazily across the floor of the Basin.

Fig. 25.- In the foreground is the valley of the Río Sangre which lies at the base of the Cumbre de Olintepeque. The river flows along the northern margin of the western portion of the Basin. In the left background are the slopes of the volcano Siete Orejas. To the right is a portion of the mountain mass which limits the Basin of Quetzaltenango on the west.
volcano of Santa María (Fig. 26). At 12,363 feet, it
is the fifth highest peak in Guatemala. The slopes of
this volcano ascend rapidly from that portion of the
Basin known as Llano de Pino. The volcano is one of
two presently active in Guatemala, having erupted vio-
lently in 1902 and again in 1922, 1928 and 1929.³

As a result of the 1902 eruption, a tremendous
amount of ash was deposited in the country to the west
and southwest. Since most of the Basin of Quezaltenango
is located to the north and east of the volcano Santa
María, it was not greatly affected by the fall of ash.
However, the area about San Martín Sacatepeques and the
extreme southwestern portion of the Basin, received ac-
cumulations of ash exceeding three feet.⁴

The slopes of Santa María are quite steep and are
not deeply ribbed by erosion as is the case with Siete
Orejas. However, rapid aggradation of material is taking
place at its base, and this not only aggravates the pur-
suit of agriculture but will also inevitably increase
the slope of the Basin floor as has already occurred
about the northern base of Siete Orejas.

³ In Volcanos Declare War, Honolulu, 1945, Thomas A.
Jagger provides us with the dates of the more recent
eruptions and gives an excellent account of the erup-
tion in 1929 on pp. 122-23.
⁴ Sapper, “Der Ausbruch des Vulkans Santa Maria,”
pp. 42-43.
Cerro Quemada, which lies about three and one-half miles northeast of Santa Maria, appears to be the northern extension of the Santa Maria Volcanic row. In 1784, after a long period of quiescence, it erupted violently. It has not resumed activity since that time. The flows of that eruption are clearly evident to the east of the crater. The front lobe of an older flow borders the southern edge of Quezaltenango, and a series of rounded projections along the northeastern edge of the Llano de Pino suggest earlier incursions of lava upon the floor of the Basin from the volcano (Fig. 27). The remainder of the southern rim consists of rugged terrain that lies to the east between Cerro Quemada and a ridge of mountains that comprises the Zunil volcanic alignment.

East, west, north, and south, the Basin's rim is characterized by varying degrees of slope, but a general steepness of slope is maintained throughout.

The Landscape

Relief

The Basin of Quezaltenango is not flat-bottomed, although such seems to be the case from distant heights. In the portion of the Basin previously described as the Llano de Pino, are several low north-south ridges of hilly terrain. These apparently represent erosional remnants of earlier volcanic features. In portions of
Fig. 26.- Immediately west of Quesaltenango, a sweep of land extends southward from the main Basin area. It is known as the Llano de Pino. It terminates at the base of the volcano of Santa María. At the right, slopes lead to the volcano of Siete Orejas. About the center of the left edge is the tip of an old lava flow originating from the volcano of Cerro Quemada.

Fig. 27.- Looking northward across the Llano de Pino towards the main Basin area. In the background is the Cumbre de Olintepeque. To the right are the lower slopes of the volcano Cerro Quemada.
the Basin north of San Miguel Sigüilá, east of San Cristóbal Totonicapán, and in the area immediately north of Cantel the surface is considerably dissected by stream incision. As indicated earlier, the Basin's floor slopes distinctly from the base of Siete Orejas. The city of Quesaltenango is situated in a minor depression and the same seems to be true of San Mateo. In both instances, and in other areas as well, there seem to be evidences of two distinct sets of terraces. Although the major streams, the Río Samalá and Río Sangre, do not appear to be cutting down at the present time, they flow at a level well below the general surface of the Basin. The bed of the Río Sangre lies between 100 and 150 feet below that portion of the Basin through which it flows (Fig. 25). The Río Samalá, which has cut out a wider valley for itself, lies about 75 feet below the average height of the eastern portion of the Basin through which it flows (Fig. 28).

Numerous tributary valleys leading to the Río Samalá and Río Sangre cut sharply into the fringes of the flat-topped interfluvial areas flanking these streams (Fig. 31). For the most part, these short and deeply incised valleys are occupied by ephemeral streams. Many of them have been given the appellation, "Río Seco" (dry creek). As a rule, the more sharply incised valleys lie near the base of the mountain rim, or they
Fig. 26.—Between Quetzaltenango and San Cristóbal Totonicapán the Pan-American Highway follows the valley of the Río Samalá. The valley is relatively narrow and lies approximately 75 feet below the general surface of the Basin proper. The upper surface is clearly evident in the background. In 1955 the route between these two cities represented one of the few stretches of paved roadway in the highlands of Guatemala. In spite of the improved road, large quantities of timber continue to be carried to market by human bearers as illustrated in the scene above.
flank directly along the valley of the major streams where tributaries are striving to cut through unconsolidated ash to the base level of the master stream. Dissection is apparently deeper and more widespread in the western portion of the Basin. This phenomenon is undoubtedly associated with the higher general floor level of that portion of the Basin as a result of long-term aggradation of materials from the slopes of Siete Orejas.

From a distance, the Basin appears to have an unobstructed surface. Whereas it is true that there are extensive uninterrupted uplands, numerous areas of the Basin are rent by the deep barrancas with nearly vertical walls of stratified ash (Fig. 31). These precipitous walls are frequently revealed with dramatic suddenness to those who seek them out. This acute stream incision impedes the movement of vehicular traffic to a considerable degree in certain portions of the Basin. Since land is scarce, it is cultivated to the very edge of these barrancas, and where valley walls permit, cultivation is extended downslope. As a consequence, many slopes and adjoining uplands suffer from rampant erosion (Fig. 33).

The Basin is well drained. As a result of stream incision and limited area in bottomland, it is apparent
Fig. 29.—In its course across the Basin of Quetzaltenango, the Río Samalá flows in a relatively wide but shallow channel. From San Cristóbal Totonicapán, where this photograph was taken, the river flows in a southwesterly direction to the opposite side of the Basin where it is joined by the Río Sangre.

Fig. 30.—At the southern edge of the Basin the Río Samalá becomes more deeply incised. In the vicinity of Cantal the river begins its headlong descent toward the Pacific Ocean. The size of the boulders may be gauged by comparison with individuals crossing the footbridge in the distance.
Fig. 31.—Numerous tributaries of the Río Sangre and Río Samalá, cutting through poorly consolidated ash, have become sharply incised in the uplands which adjoin the major streams. For the most part, they are ephemeral streams.
that floods are rarely of overriding importance. Much of the valley bottom flanking the Río Samalá, being poorly drained, is reserved primarily for grazing.

Vegetation

If natural vegetation can be said to exist, it stands primarily on the mountain slopes encompassing this upland region. The Basin floor is virtually free of natural vegetative growth. The only large tree is the towering ciprés (Cupressus lusitaniae) which is occasionally planted along roads or about the homes on the larger landholdings. In areas where smaller landholdings prevail, a variety of plants are to be found in the fence rows which outline the individual holdings. In certain areas, closely cropped trees, especially sauc (Sambucus Mexicana and S. creopela) and chilca (Senecio salignus) are utilized. In other regions, these are combined with bunch grasses such as pompon (Tritoma avara) and paión (Muhlenbergia sp.) or the bunch grasses may stand alone as sole guardians of the limits of the field. Giant sharp spined agaves often

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Tax, op. cit., p. 221, identifies chilca as Theritia marifolia; however, the natives in the Río Samalá valley refer to several species by the same name. Paul C. Standley in "Notes on Some Guatemalan Trees," Tropical Woods, No. 84, 1945, p. 17, indicates that the word chilca is an overworked term applied particularly to shrubs with willow-like foliage.
Fig. 32. - In the southwestern portion of the Basin the natives permit the growth of a tree called "sauc" or "sauco." This is clearly evident in the wheat field in the distance. The leaves and smaller branches of this tree are utilized to supply the soil with humus.
act as roadside barriers to prevent the incursion of grazing animals into adjoining fields. In still other areas, only footpaths mark the limits between fields. Where fence rows prevail, they usually serve the double task of delimiting an area and providing some substance of value to the owner. In addition to being located in fence rows, sauc and wild cherry trees are commonly distributed throughout the cultivated fields; however, this type of distribution is restricted to certain areas of the Basin (Fig. 32).

Aside from the ciprés and the plants found in fence rows, there are limited areas covered with widely dispersed scrub growth. In many instances, the slopes of the valley walls are unwisely tilled. Small depressions along the wall may be enlarged to gullies and these in turn ultimately secure unto themselves the entire slope. The slope is abandoned piecemeal and eventually every vestige of soil is removed. The re-establishment of a vegetative covering is painstakingly slow, for any herbage that grows is grazed by flocks of sheep. In such areas a scrubby growth eventually becomes established in which raican (not identified) predominates. In several regions pino (Pinus Ayacahuite) appeared to represent the succeeding phase of vegetative structure.

Erosion in the Basin proper is sufficiently advanced,
but it is surpassed by the degree of erosion taking place on the mountain slopes leading down to the Basin. Fields are tilled until they are absolutely worthless. After a period of abandonment, a short scrubby association asserts itself. *Haican* again appears to be the dominant species in the regrowth.

Slopes which are protected from cutting by law or physical circumstances are heavily wooded with numerous species of oak (*roble* and *espino*) and alder (*aliso*). In certain areas there are heavy stands of *ciprés* and *pino* as well. These two latter species probably represent regrowth in areas previously disturbed. Because of the great demand for wood as a fuel, more distant forests are being tapped and those nearby are gradually being reduced. All this is taking place in spite of laws passed to the contrary.

**Soils**

Little can be said concerning the soils of the Basin. Preliminary surveys have been made but the results have not been published to date. Parent material consists of detritus of volcanic origin. This material has apparently been deposited by means of wind and running water. Surficial strata give little evidence of being lake deposited.

With the exception of a portion of the Llano de Pino,
the soils are developed on fine to coarse volcanic ash. Where soil development has continued uninterruptedly over a sufficient period of time, the soil is dark-colored and friable. The subsoils are lighter in color ranging from yellowish-brown to lighter brownish-yellow at greater depths. They are somewhat heavier textured than those at the surface. The soils of the Basin tend to be fertile, although they are somewhat deficient in phosphorous and lime. Universally good drainage seems to be common to all of the soils in the area.

Soils developed on recently deposited ash are thin and low in humus. The notable use of compost in the southwestern portion of the Basin bears out this point. In the areas of recent soil development, dark surficial layers are in direct contact with underlying deposits of white ash. In these areas the heavier textured brownish-yellow colored subsoils are essentially absent.

On wooded slopes leading upward from the Basin, the soil is normally dark-colored and apparently relatively high in humus content. Much of the slope area is cultivated and erosion is attendant in most cases. Many fields are deeply gullied revealing the entire soil profile from the dark-brown surface layers to the underlying light-colored ash. In numerous areas, light-colored field surfaces indicate that erosion is well advanced.
Fig. 33.- The slope in the foreground and the opposite slope form the valley walls of the Río Sangre. In the background is the western terminus of the Cumbre de Olintepeque. As a consequence of excessive cultivation and erosion, bunch grass has become a dominant vegetative cover. On the opposite slope the scars of advanced erosion are clearly evident.
Restricted areas of excessive erosion in the Basin proper are also revealed by their lighter colored soils.

In the heavily populated upper Samalá Basin, the shortage of farm area is aggravated by improper use of the land. Erosion is widespread on the slopes leading down to the Basin. In the Basin itself, many surfaces have been needlessly destroyed by maltreatment. The quality of the soil, one of the most valuable resources of the area, is rapidly deteriorating. Little concerted effort has been made to reverse this situation.

**Climate**

The Basin of Quezaltenango and the surrounding highland are classified as "tierra fría." This is based upon a consideration of elevation, actually, few climatic data are available to substantiate the evidence provided by altitude. Unlike the Pacific piedmont area, there has apparently been no interest or effort on the part of large landholders to collect such data. The records of the Observatorio Meteorológico in Guatemala City indicate that there are no weather stations above 4500 feet in the department of San Marcos to the west. To the east, the tierra fría extends into the department of Totonicapán where there are, likewise, no weather stations. Far to the north there are a scattering of stations, but these lie in a different department and
locale so that they offer little in the way of pertinent climatic data. In all of this upland area, the only reliable evidence available on climate has been accumulated in and about the city of Quezaltenango.

The longest continuous record compiled and reported from Quezaltenango to the Observatorio Meteorología in Guatemala City dates from 1928 to the spring of 1951. Unfortunately, this record appears to be most unreliable. Therefore it is necessary to resort to a scattering of records of shorter duration. Karl Sapper is responsible for having accumulated earlier data which were occasionally reported in Meteorologisches Zeitschrift between 1891 and 1921, and were later condensed and published in Handbuch der Klimatologie in 1932.

Between 1895 and 1925, six complete years were recorded, although from different parts of the city of Quezaltenango. To this information may be added that accumulated between 1943 and 1945 at a finca several miles northwest of the city, and information gathered since September of 1952 at a station several miles due north of Quezaltenango. Both of these latter stations are at approximately the same elevation as Quezaltenango.

In spite of latitudinal position, temperatures are quite low as the result of an elevation in excess of 7000 feet. In Quezaltenango temperatures range from a
January average of 52°F. to a high of 62.5°F. in May. With the advance of the high-sun rainy season (invierno), the average monthly temperatures become stationary at slightly lower readings until the end of November when they drop off rapidly to the January low. It is also interesting and most significant to note that the absolute high and low recordings in Quezaltenango have been 83°F. and 26°F. respectively.

The normally low annual range of temperature which is characteristic within the tropics is also exhibited at this station. It is on the order of 11°F. As in the lowlands, the diurnal range in temperature fluctuates with the season. During the rainy season, especially in June and September, the daily range in temperature averages slightly under 10°F. This figure is increased considerably during the dry season months of January and February.

Extremes of temperature, especially the minima, are of greater significance, for they, rather than the average or mean temperatures, establish limits of vegetative activity. Temperatures of less than 40°F. have been reported in every month of the year. Frosts are officially recorded from November through April. Although frosts do not normally occur in April, agriculturists were beset by a number of killing frosts in
April of 1955. It is likely that frosts have occurred during other months of the year as well. It has been reported that frosts may occur even in July or August, the heart of the growing season. A normally short rainless period (canícula) in late July or Early August, may be extended. Humidity is reduced and the rate of nocturnal radiation is thereby increased. The possibility of frost is enhanced under such conditions.

The occurrence of frost as recorded in Quezaltenango is probably typical in portions of the Basin at equivalent elevations. It is probable that the incidence of frost is less likely on adjacent slopes and in the higher portions of the Basin. This point seems to be borne out by the earlier planting dates generally reported at higher sites.

The characteristics of rainfall in the lower Río Samalá region are, for the most part, repeated in the upland. In the Basin of Quezaltenango, the major exception to this is the greatly reduced receipt of moisture.

As in the lowlands, there are two distinct seasons; one wet (invierno) and one dry (verano). The dry season, which normally begins about the first of November, is usually terminated before the end of the following April. A total absence of precipitation may be anticipated for any of these months. This point may
be further emphasized by the fact that approximately seven percent, or less than three inches, of precipitation normally occurs during this six month span.

The rainfall, which is concentrated in the months of May through October, reaches two distinct crests. The first of these generally occurs in June and the second in September. On the coastal plain, especially its seaward margin, the second period of maximum precipitation was noted as being delayed until the month of October. Rainfall in the coastal area was also indicated to be significantly heavier during the second crest. In the vicinity of Quesaltenango, the quantity of precipitation received during the two maximums is more evenly balanced with a slight tendency for heavier precipitation during the June maximum. An adequate explanation of these differences might go a long way in explaining the forces at work in the complex pattern of weather and climate in southwestern Guatemala.

The various stations in Quesaltenango reporting before 1932 indicate rainfall ranging between 22 and 31 inches annually with an average of about 26 inches.  

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Two stations, one established about three miles to the northwest and the other an equal distance to the north of Quezaltenango, reporting more recently over a six and one-half year span, reveal an average annual rainfall of about 42 inches ranging from a low of 36 to a high of 49 inches.\(^7\) It will be noted that there is a difference between the amounts recorded at the stations in Quezaltenango and the two located but a few miles to the north. The constancy of records by the various stations would seem to rule out the possibility of error. In view of the small number of years recorded, it is possible that years with large or small amounts of precipitation were inopportune gathered into similar groupings thereby creating a false impression, but this is also unlikely. In all probability, the data are accurate, and if so, they provide further insight to observations made by McBryde.\(^8\) He notes that within various highland basins, great variability in precipitation frequently occurs between neighboring stations as a result of slight differences in elevation, or in position, or in direction of slope. This point is made

\(^7\) Data obtained from the records at the Observatorio Nacional Meteorológico y Sismológico, in Guatemala City and from the agricultural experiment station at Labor Ovalle north of the city of Quezaltenango.

abundantly clear by a comparison of the rainfall data of neighboring stations on the upper Pacific piedmont slope. The southern outskirts of Quetzaltenango press against the base of Cerro Quemada. Being immediately leeward of this mountain mass, the community is probably deprived of a certain amount of moisture. The more humid stations north of Quetzaltenango are further removed from the leeward rim of the Basin. Being so located, these stations are more exposed to an indraft of moisture-laden air which appears to sweep northward through a lane provided by the Llano de Pino. Cloud formations can frequently be seen swirling upward from the coast and about the flanks of Santa María where low gaps offer easy access to the Basin by way of the open Llano. It is likely that the south and southeast facing slopes of the opposite rim receive even more rainfall. McBryde indicates that the situation in other basins and valleys is probably repeated here.

The impending rains of the invierno are welcomed, but not without a degree of apprehension. The data on monthly rainfall indicate averages but fail to reveal the extremes that may occur. The year 1955 is a good example of this. The rains which normally begin in the latter portion of April were delayed well into May. This circumstance unfortunately postponed the planting
of crops, and those already planted suffered from lack of moisture. Precipitation in June was well below normal but yet sufficient to permit adequate plant growth. In July there fell a record breaking 12.6 inches of rain. Although measurable precipitation occurred on 28 days of that month, most of the 12.6 inches fell in five days. While this large amount of rainfall imposed some damage to crops, it was not as serious as might have been expected. However, the significance of this rainfall in terms of erosion was in evidence on every hand.

Rain is not the only form of precipitation occurring in the valley, for hailstorms have also been reported in the past. Crop damage has undoubtedly occurred as a result of such storms, but the degree of significance remains undetermined.

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9 Delayed planting at this high altitude is of considerable consequence in reducing crop yield. Dr. Paddock, of the Servicio Cooperativo Interamericano de Agricultura in Guatemala, indicates that there is a possibility that the delayed planting is harmful not only because of the reduction in length of growing season but also because of other complex relationships which seem adverse to plant growth at delayed seasons at this altitude. Among other things, this involves relationships between temperatures and stages of plant growth, and photosynthesis and length of period of daylight.
Significant Cultural Aspects

Population

In 1524 Cortés sent Pedro de Alvarado south from Mexico City to claim the land of Guatemala for the Spanish Crown. In the course of this successful venture, Alvarado came into contact with the populous areas of what is presently southwestern Guatemala. He became allied with some of these people and did battle with others. He found the Basin of Quesaltenango well populated with a hostile people. These natives were quickly and forever subjugated in a terrible bloodletting, in memory of which the Río Sangre (River of Blood) has supposedly been named.\(^\text{10}\) At present, the Basin of Quesaltenango makes up a part of the heavily populated area of southwestern Guatemala. Within this Basin is located one of Guatemala's major concentrations of upland population. Here also is situated the second largest city of the republic.

Numbers and Distribution

The Basin is presently inhabited by more than 80,000 persons. The department capital of Quesaltenango has 27,696 of this total according to the census of

In terms of density, the population of the Basin approaches 900 persons per square mile.

All or parts of 11 municipios of the department Quetzaltenango and two municipios of the department of Totonicapán lie within the Basin of Quetzaltenango. The capital (cabeceras) of all municipios, with the exception of Almolonga lie within the Basin. At a glance, the degree of urban concentration is surprisingly high, for approximately 58 percent of the Basin's inhabitants live in these cabeceras. Additional numbers live in smaller communities. The remaining one-third are not evenly distributed over the Basin. In certain favorable sites, large landholdings exclude occupancy. In other regions, historical antecedents have led to the exclusion of large numbers of people. There certainly are many exceptions, but it is probable that many of those not living in the cabeceras are concen-

11 Population data have been derived primarily from the Dirección General de Estadística in Guatemala City. Preliminary data on the census of 1950 have appeared mimeographed in rough form, and in Estadística which is published by the Dirección General de Estadística.

12 The 11 municipios in the department of Quetzaltenango are: Almolonga, Cajolá, Cantel, Concepción Chiquirinchapá, La Esperanza, Olintepaque, Quetzaltenango, Salcajá, San Juan Ostuncalco, San Mateo, and San Miguel Sigüílal. The two in the department of Totonicapán are San Andrés Xecul and San Cristóbal Totonicapán.
trated in areas where conditions for the pursuit of agriculture are not at their best.

**Nature of the Populace**

There is a predominance of the Indian in the Basin as there is throughout the highlands of southwestern Guatemala. About 56,000 or essentially 70 percent of the Basin’s population is made up of primarily the Quiché and secondarily the Mam Indian. The former occupy the eastern two-thirds, and the latter, the remaining or western third of the Basin. Of the approximately 24,000 Ladino, 95 percent live in three communities: Quesaltenango, 16,900; Salcajá, 3300; and San Juan Ostuncalco, 2100.

The degree of illiteracy that plagues the highlands is also characteristic of the Basin population in spite of the counterweight provided by the more learned populace of the city of Quesaltenango. Nearly 60 percent are unable to negotiate the written page. It is likely that a near majority cannot capably express themselves in Spanish, but are limited to their native Indian dialects.

**General Nature of Employment**

An indirect approach provided by various materials would seem to indicate that in excess of 48,000 of these people, or nearly 60 percent are directly dependent
upon agriculture.\textsuperscript{13} Many of these people reside in communities of varying sizes (\textit{villas}, \textit{pueblos}, \textit{aldeas}, and \textit{caseríos}). Added numbers live in the \textit{cabeceras} though actively engaged full time in agriculture. This accounts for the predominance of an agricultural population in spite of the high degree of urban concentration.

Although Quezaltenango is Guatemala's second city, it has less than one-tenth of the population of the capital, Guatemala City. The city is also rated second in terms of industrial establishments. Again, it cannot begin to compare with the capital city in terms of industrial capacity. Quezaltenango's share of Guatemala's 23,000 workers employed in manufacturing industries is not great.

Most of the Basin's remaining inhabitants are employed in various enterprises, many of which are in some way indirectly dependent upon agriculture. It is clearly evident that agriculture is the heart of the Basin's economy as it is in the region of the lower Río Samalá.

Means of Communication

\textbf{Transportation within the Area}

Although direct communication between the \textit{cabeceras}...\textsuperscript{13} This is calculated on the basis of material supplied in the census of agriculture in 1950 and the fact that there are approximately 5.3 persons per family in the Basin area.
it is not possible in all cases, they can normally be reached by vehicular traffic from Quezaltenango. The roads to these communities, however, vary greatly in quality. One road is paved, others are improved all-weather roads of packed ash and rock. Several remaining routes are best traveled only by heavier automotive units. These latter roads may deteriorate rapidly during the rainy season and are often impassable for short periods of time due to gully ing (Fig. 37).

Aside from these routes, the Basin is fairly well covered by a network of roadways which are used by man, beasts of burden, and an occasional truck, jeep, bus, or taxi. Where the uplands lie unbroken, they offer surprisingly easy access. The slightest increase in the degree of relief compounds the problem of maintaining roads. A roadway on any incline deteriorates rapidly during the rainy season and if not continually repaired becomes deeply gullied and impassable. Thus it is that movement on the uplands east and west of the Río Samalá is relatively easy. But to descend the valley wall, cross the valley and its river, and reascend the opposite valley wall provides an almost insurmountable task. To pass from one region to the opposite frequently necessitates a route by way of Quezaltenango. These are difficulties experienced only by vehicular
Fig. 34. - Women carrying fuel, fodder, and other commodities to market.

Fig. 35. - Natives on their way to the daily market in the city of Quesaltenango.

Fig. 36. - On every hand, the paths and roads are filled with burdened, walking people. Lumber, fuel, feed, and food are a few of the items carried on the heads and backs of men, women, children, and a few animals.
traffic. To the poorly shod natives, these conditions do not matter, for his path down slopes is usually straight, irrespective of obstacles which are sidestepped. He is neither guided nor expressly hampered by deeply gullied roads which wind up and down the slopes.

On every hand, the roads are filled with burdened and walking people (Figs. 34, 35 and 36). Horses, which are one of the most reliable means of transportation on the coastal plain, are less frequently seen in the uplands. The scarcity of land for grazing precludes their use. Trucks and busses are certainly coming to play a greater part in the lives of many. Nevertheless, it is probable that a good share of the inhabitants and cargo carried on the Basin's network of roadways is not borne on wheels.

Communication with Adjacent Areas

The Basin of Quezaltenango lies astride several important routes. The Pan-American Highway descends into the Basin from the mountains to the west, passes eastward through San Juan Ostuncalco, Quezaltenango, Salcajá, by-passes the southern outskirts of San Cristóbal Totonicapán, and beyond Totonicapán rises again into rugged mountain terrain (Figs. 19 and 28). At present, this is part of the primary and virtually only all-weather motor route between Guatemala City and the
Fig. 37.- Routes lead to all parts of the Basin but a roadway on any incline deteriorates rapidly during the rainy season and if not continuously repaired becomes deeply gullied and impassable.
Mexican frontier. Express busses running between Quezaltenango and Guatemala City cover the 120 mile distance in about six hours. By road, the Mexican border lies 74 miles west of Quezaltenango. Approximately the same amount of time is needed to cover that distance. It is quite likely that this route will diminish in relative importance in the future as construction of an alternate route to the Mexican border progresses.

There are two through roads for vehicular traffic southward to the Pacific piedmont and coastal plain. One route leaves the Basin south of Quezaltenango. It passes between the Zunil and Santa María volcanic files following the valley of the Río Samalá to Retalhuleu. A descent of 6900 feet is accomplished in the 32 miles between the two cities. The road rises to about 8000 feet in its ascent over the volcanic range which rims the Basin on the south. The improvement of this route is part of the work presently being undertaken to improve the totally inadequate network of roads in Guatemala.

From the southwestern corner of the Basin, a route from Concepción Chiquirichapa leads southwestward to Coatepeque. Flanked by the volcanoes Siete Orejas and Lacandón, this route achieves an altitude
just short of 9000 feet before dropping off 7500 feet in the next 26 miles to Coatepeque. Both of these roads to the coast are considered to be all-weather routes; however, either may become impassable for short periods of time.

From the Basin there is an exit which provides access to the north. The major destination north of Quetzaltenango is Huehuetenango, which lies 48 miles away. A portion of this route is slated to become incorporated into the Franklin D. Roosevelt Highway (Carretera F.D.R.). The western terminus of this latter route will shortly provide the first point of contact between the highway systems of Mexico and Guatemala.

It is primarily by means of these five major routes that the Basin of Quetzaltenango maintains contact with the rest of the nation. The quality of these routes is certainly not conducive to their utilization. Improvement of these lines of communication is indeed slow, but the present acceleration in the road building program, if carried through, bears to place the Basin in good stead.

It must not be assumed that the five aforementioned routes are the only ones serving the area adjoining the Basin. Innumerable routes radiate from the Basin. Some of these terminate at the edge. Others penetrate
varying distances into the mountains where they eventually diminish in terms of passability. As a rule, these roads resound only to the plodding hoofs of animals and the rhythmic beat of human footsteps.

Beginning in 1928, the Basin was in rail contact with San Felipe and Retalhuleu via the valley of the Río Samalá. The scheme, was, perhaps, ill-advised. At any rate, various circumstances brought about the demise of its services within four years after a much heralded inauguration.

Quezaltenango is served by the national airline, AVIAȚECA. There is an early morning flight from and to Guatemala City daily except Sunday. The tedious and wearing six hours or longer bus ride to the capital city is reduced to a comfortable 25 minutes by air. Flight by air certainly establishes closer contact between Quezaltenango and Guatemala City for many purposes, but for the most part it does not solve the region's great need for ready accessibility under all conditions at all times.
CHAPTER III

LAND UTILIZATION IN THE LOWER RÍO SAMALÁ REGION

Background of the Present System of Land Use

The Pacific coastal plain of Guatemala consists of a relatively narrow strip of land. Throughout its extent, no part is more than 30 miles from the sea, yet, until this century, much of the area could not have been more remote had distances been measured in hundreds instead of tens of miles. Fortunately, the individual physical and cultural forces which have effected this isolation in the past are endowed with changing values. In concert, these forces are now providing the wherewithal for increased utilizability of the coastal plain area. Past isolation is being supplanted by increasing accessibility.

Influence of Physical Factors

The degree of development in land utilization varies in the different portions of the Guatemalan Pacific coastal plain. The segment of the coastal plain generally contiguous to the Río Samalá can be grouped among those areas classified as being least effectively
occupied. Numerous factors account for this circumstance. Along the shoreline there are no havens providing safety to the ships of seafarers. The lack of indentations or good harbors along the shoreline is common to the entire length of coast between Mexico and El Salvador. The streams which cross the coastal plain afford little measure of access, for they are too shallow. Their seasonal floods subject considerable areas to inundation and make the penetration of the land more difficult. In the dry season the flood waters recede within the bounds of numerous swamps, ponds, and lakes. Although these bodies of water have long offered certain advantages to the occupants of the region, they impose a hardship on the more modern means of communication and make difficult the control of diseases, especially malaria.

This low-lying tropical area experiences constant heat. With respect to precipitation, no happy medium exists, for there is either an excess or dearth of moisture. To be sure, there are advantages in either aspect, but complete subjection of the populace to these extremes and their vagaries works an added hardship upon the occupants of the region.

The nature of natural vegetation and soils harbored under tropical climates is often considered to be a
further limiting factor in the utilization of land. In the lower Samalá region, difficulty in economic penetration is often attributed to the nature of vegetation. In reality, culpability lies in the nature of physical conditions which have induced the existing character of vegetative structure. For example, it is not the rank growth in swamps but rather the poor drainage which accounts for lack of utilization of certain areas. The soils in the region are, likewise, not to be held accountable for their nonuse. As previously described, the soils tend to be diversified but for the most part they are relatively good having developed from underlying deposits of volcanic materials. Only through reckless exploitation will man be deprived the benefits of these soils. The paucity of inhabitants and the lack of economic development in the area would seem to illustrate the deterrent aspects of these physical forces. The nature of land tenure and the manner of land utilization appear to supply further evidence of the resistance of cultural and physical forces to the advances of man.

Influence of Cultural Factors

Unlike the highlands, there are no remnant evidences of communal holdings. Historically, this implies the absence of a well-established society in the region.
Present landholdings encompass large tracts of land which, prior to 1900, had probably remained unused for many centuries. The size of the holdings can be ascribed to the lack of value given to much of this land and the fact that there were few obstacles to acquisition in terms of occupied communal landholdings at the time of the arrival of the Spanish. Within the century, timbering and spasmodic grazing have gradually become more important, but the restricted or virtual nonuse of the land in the past further attests to its limited value.

In view of restrictions supposedly imposed by the physical environment, it is surprising to note that this area was once occupied by considerable numbers of culturally advanced people. Of the general area, Shook tells us that "it is one of the most archeologically rich of any in Meso-America." He states further that "Vast ruins of ancient cities...line the banks of rivers and streams at short intervals from the foothills of the volcanoes to the Pacific Beach."¹ Numerous mounds containing artifacts are located in the portion of the Pacific coastal plain which is contiguous to the Río

Samalá (Fig. 38). Conclusive evidence points to the fact that this portion of the coastal plain was once occupied by considerable numbers of people, yet it had been abandoned prior to the arrival of the Spanish. The date and cause of the demise of this coastal culture can only be surmised. The various theories pro- pounded concerning this are most interesting, but of greatest significance is the fact that the area was occupied by what we would call an inferiorly equipped people. When the measure of their abilities and successes is matched against present accomplishments, it becomes evident that there is an overriding tendency to credit the physical environment with more than its due share of influence in blocking present settlement. This is not to detract from the power of physical forces, but rather to point out the significance of cultural forces as an equal partner in the developmental aspects of land utilization.

Pre-Colombian System of Land Utilization

The ancient builders of this coastal civilization were probably of Mayan stock. Once occupied by these people, this area has long since been abandoned and the remnants of the culture and its trappings have been largely obliterated by time. As a consequence of this lapse in occupancy the present manner of land utilization exhibits little or no evidence of direct heritage from pre-Colombian society.
Fig. 38.—The existence of numerous mounds containing artifacts attest to the fact that the coastal plain region flanking the Río Samalá was once occupied by considerable numbers of people.
Alterations Effecte by Spanish Conquest

The Spanish conquest of Guatemala altered significantly the nature of landholding and the manner of land utilization in large areas of Guatemala. It is quite probable that the Pacific coastal plain area was included in large land grants made by the Spanish Crown; however, these areas were not effectively occupied and consequently were not appreciably affected by Spanish rule.

It is unlikely that any law issued by the Crown or Council of the Indies during the colonial period was of significance to the coastal plain area with which we are concerned. Similarly, laws enacted since independence have had little direct bearing upon the coastal plain economy until more recent times.

The Effect of Accessibility upon Land Use

All things being equal, it is abundantly clear that the measure of accessibility is a reliable guide to the nature of activity undertaken. This is as true for the lower basin of the Río Samalá as for any other region of the world. This area, providing nothing of major economic value, remained inaccessible for nearly four centuries after the arrival of the Spaniards. This obstacle did nothing to hamper the acquisition of large holdings but did indeed encourage it. There was no need
to resort to collusion as was practiced in other areas of Guatemala and Latin America in order to create large landholdings from the small, for the coastal plain was practically unoccupied. Since the general boundaries of landholdings were established prior to the period of increasing economic penetration, these limits have become fixed and the areas within them have remained generally spacious.

Aside from a few tracks that existed between the piedmont and the coast, the first major penetration into the coastal plain area was probably the result of logging operations. Cattle have long been a mainstay in the area immediately above the coastal plain and it is possible that they may have penetrated into the coastal grassland areas, if such existed, along the margins of the inner portion of the coastal plain region. At the present time extensive areas of the lower Samalá region are without cattle. However, cattle may be found near the ocean and at various sites between the ocean and the piedmont.

The point to be made is that cattle represent a preliminary phase in the development of land utilization in this area. The introduction of livestock neither necessitates the immediate clearing of land nor does it entail more than a crude trail over which cattle may be driven to market. Furthermore, the marketable products of beef cattle can be borne to the market by the animal
Fig. 39.- These cattle started out at the Hacienda Los Ángeles which lies about midway between the Pacific Ocean and the piedmont. They are being driven a distance of about 12 miles to Cuyotenango where they will continue their journey to market by rail.

Fig. 40.- The clearing of land for grazing purposes represents a preliminary phase in the development of land use in the lower Río Samalá region.
itself, and at any time of the year. This further reduces restrictions imposed by the lack of transport facilities. It is most difficult to ascertain the date of the introduction of cattle into the area. In all likelihood, deep penetration has occurred only within the past 15 or 20 years.

As facilities for movement improve, areas come to be grazed with a greater degree of intensity. This is, in part, made possible by a greater supply of labor which has been given entry to an area as a result of improved accessibility. In turn, it is the availability of labor to clear the land that makes more intensive grazing possible.

The supply of labor is largely seasonal, for many of the laborers entertain such employment to supplement their livelihood which, for the most part, is earned elsewhere. Their labor entails the privilege of growing maize or earning either a supply of maize or money with which to purchase this coarse grain. After a fashion, their presence on the coastal plain portrays part of an effort at subsistence agriculture.

Other factors certainly are of importance and will be noted, but accessibility will continue to play a large role in the further development of the coastal economy from one of grazing and subsistence to one
entailing these and additional facets of commercial agriculture. The degree of accessibility further influences the rate of shift from cattle and maize to cotton and citronella. The latter products represent a higher degree of mechanization, an increased dependence upon labor, and improvement in the mode and reliability of transportation.

The effect which accessibility exerts in the extent and manner of land utilization is well exhibited in restricted areas to the east and west, beyond the reaches of the Río Samalá. Aerial photographs reveal that the outer coastal plain flanking the Río Samalá is well forested. To the west, a long used and now paved route southwestward from Retalhuleu provides access to the port of Champerico. This route lies in the center of a cleared swath of land that extends from the piedmont to the coast. The clearing of land in itself represents an advanced stage of utilization.

To the east of the Río Samalá region is a large area that has been cleared by the Compañía Agrícola de Guatemala for the production of bananas. This area also extends from the lower piedmont across the coastal plain to the ocean. The establishment of this plantation and its concomitant system of transportation has greatly facilitated entry into this portion of the coastal plain.
Aerial photographs again reveal the influence of this penetration, for it has brought about the clearing of large areas adjacent to the plantation. Although various factors account for this, the ready access afforded by routes maintained by the Compañía Agrícola de Guatemala is of overriding importance.

It is significant that satisfactory roadways have not been built in the lower Samalá region. The inhabitants of the area are keenly aware of this inadequacy. In the late summer of 1955, it was reported that the Standard Fruit Company had leased a section of land in the outer portion of the Pacific coastal plain from the Hacienda El Caulote which lies along the Camino Verde. It was the expressed desire of every landowner along the route that this be true so that the road out to Retalhuleu would be improved for their use.

There is further evidence that increasing accessibility plays a role not only in the nature of agriculture but also in the scale of the operation. In terms of capital and labor, it is obvious that a large landholding can be more easily used for grazing than for the production of a crop such as cotton. As the nature of agriculture evolves from a widespread to a more intensive form of grazing and then to the production of crops of commerce, it is likely that a landowner would become
less reluctant to part with a portion of his landholding, concentrating his efforts more effectively on less area. In the society with which we are dealing, parting with land is supposedly a foreign thought, yet several instances were encountered in which "land-poor" owners were selling small portions of their holdings in order to acquire capital with which they might further develop the land which they retained. The creation of smaller holdings is also abetted by the fact that as increasing numbers of persons enter the area, if only for part-time employment, they become more aware of the benefits to be derived and, as a result, they become more desirous of attaining title to land. Again, numerous instances were encountered in which small properties had been purchased by Ladinos.

In the occurrence of recent events with respect to the expropriation of land, it is obvious that the attitude of government played a major role in the policies undertaken. Yet, in spite of the widespread expropriation of land between 1951 and 1954 under the regime of President Arbenz, no area of the coastal plain tributary to the Río Samalá was affected. In this case it is apparent that inaccessibility and associated lack of development in land use was a definite deterrent to expropriation; however, it must not be assumed that
all of this is directly dependent upon the degree of accessibility.

The Influence of Agricultural Endeavor upon Land Use

Certain aspects exhibited by the nature of agricultural endeavor upon the utilization of land have been previously cited. The production of cattle, for example, is indicative of larger holdings, varying degrees of clearing, the preparation of pastures, the use of seasonal labor, and little need for mechanization. This form of endeavor is neither likely to encourage the owner of land to sell any part of his land nor does it encourage the small operator to enter the lowland area. On the other hand, the production of cotton, sesame, rice, cacao, citronella and other products is expressive of more intensive use of the land. This possibly encourages the creation of smaller holdings.

Unfortunately, the more intensive use of land may also lead to wantless exploitation of land resources. The danger of this varies with the nature of the crop and the institutions under which it is produced. Recalling the prevailing climatic conditions, it is obvious that crops offering a continuous protective covering of vegetation suffice to reduce deterioration of the soil. Crops such as bananas, rubber, cacao, and, to a lesser extent, the various cultivated grasses can be produced
continuously over a long period of time. On the other hand, under rainy tropical conditions the production of intertilled crops such as maize and cotton rapidly dissipates soil nutrients and accelerates soil erosion. This necessitates the practice of permitting land to lie fallow for longer periods of time.

Where maize is produced by hand labor, land must lie fallow for at least two years out of four. Where mechanization prevails and heavy machinery is used to turn the soil, it is highly unlikely that favorable soil conditions can be maintained by less time in fallow. Under such conditions it is probable that soil would deteriorate more rapidly if not given longer periods of rest. Consequently, the extent to which land is put to use may be dependent upon the nature of the crop and the method by which the crop is produced.

**Land Use and Land Tenure**

Large landholdings and absentee landowners have long characterized the rural scene in the Samalá section of the Pacific coastal plain. Where there is evidence of a break in this tradition, it predominates as the system under which the coastal agricultural economy operates.

Despite the fact that properties are held in large units, many of these "landed gentry" lack
sufficient capital with which to develop their coastal holdings. Those with capital may have other interests or at least little interest in their coastal landholdings, they may be retaining the land for speculative purposes, they may find other forms of investment more remunerative, or they may be reluctant to invest in capital improvements on their properties because of the unsettled political atmosphere. For these various reasons, a spirit of disinterest is engendered which is exhibited in part by absenteeism. In many instances landowners have been known to absent themselves from their properties for years at a time. A classic example of this is exhibited by the owner of one hacienda who, having rented his land for various purposes, had not visited the property in 16 years.

Under such circumstances the landholder can minimize his responsibilities and best realize some return from his property by renting to interested individuals. In the past this consisted of renting small plots of land to the subsistence cultivator of maize. In more recent times it has involved the leasing of larger plots of land for the commercial production of such crops as cotton or grasses from which essential oils are produced.

The renting of land to the subsistence farmer who planted maize with a stick has not led to excessive
abuse of the land. In general, evils of such abuse show signs of becoming more marked with the advent of commercial crops such as cotton.

For the most part, the persons active in commercial agriculture are engaged in highly speculative operations in which many risks are involved. The nature of the enterprise is not viewed in terms of long-range production. As a consequence, the land is not properly cared for, and it may be ruthlessly exploited for short-term advantages. This policy leads to haphazard utilization of land and the least effective long-range use of the soil which is one of the most valuable resources of the region.

Land Utilization as Affected by Market

In the lower Samalá region, the secular trend of agricultural production for the domestic market would probably indicate an output of steadily increasing proportions. Not only is there an increase in output of any one commodity, but also an increase in the variety of commodities produced for the domestic market. A rapidly growing population serves as a major outlet for these agricultural products, and the expansion of land under cultivation makes increased production possible.

In this area there has also been a major increase
in the production of agricultural commodities for foreign markets. Unfortunately, growth in the output of these commodities tends to be highly erratic. This is, in large measure, due to the inherent weaknesses that are associated with the sale of agricultural commodities in a foreign market. It is also due to the speculative short-run nature of farming operations that characterizes the production of these products in the lower Samalá area.

During World War II there was a greatly increased demand for essential oils, such as lemon grass and citronella. In Guatemala there was quick response to the rapidly increasing price being offered for these commodities. During the war, average production was over three times that of the prewar era, and during the postwar era, production of these essential oils increased threefold over wartime production. The occasion of the Korean conflict temporarily averted a crisis in world price, but by 1952 prices had dropped so low that costs of production could not be covered.\(^2\)

consequence, many operators went out of business, and fields of these grasses were destroyed. The land leased by many operators was abandoned, and subsistence agriculturalists were once more permitted to rent small plots for the seasonal production of maize. Although the prices of these essential oils have recovered somewhat in the past year, uncertainty as to the future has restricted extensive replantings. The higher cost of production in Guatemala is also a deterrent to effective competition with other foreign areas of production.\(^3\)

No sooner had the wave of speculation in the essential oils subsided than the coastal area was caught up in a mounting fervor of interest in cotton. An umbrella of high price held over the world production of cotton by United States governmental policy, a seclusive attempt by the Guatemalan government to become self-sufficient, and an unrealistically high support price established by the Guatemalan government between 1942 and 1954, resulted in Guatemala's shift from a net importer to a net exporter of cotton. In 1949, Guatemala produced only one-third of the raw cotton needed for her industry.

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\(^3\) Departamento de Estudios Económicos, Banco de Guatemala, "El Mercado de Aceites Esenciales," pp. 14-15; Asociación de Productores de Aceites Esenciales, op. cit., p. 5.
By 1954, and in spite of an increasing demand for raw cotton by her domestic industry, two thirds of her domestic production of cotton was available for export. 4

High prices are now encouraging speculation in cotton. Suitable areas of land are being sought out, and in many instances new leases are being acquired. With the rise of this new wave of speculation, subsistence cultivators of maize have found themselves once more deprived of limited areas. Whether or not cotton is to remain important for a substantial length of time is difficult to tell, for the continued production of cotton is based upon many unpredictable contingencies.

Vacillation in the demands of foreign markets has a tendency to act as a disruptive force in the agricultural economy of the coastal plain area. This is not only true of cotton, citronella, and lemon grass oil, but also other commodities such as bananas. The rapidity of such change is to be expected in an underdeveloped region which is being newly brushed by techniques developed by a materially advanced society. Although these changes are disruptive, they are not necessarily evil. The true danger lies in the unscrupu-

lous exploitation of physical resources and the utter disregard for the manner in which human resources are affected. There is reason to believe that the rational development of land utilization in the lower Samala region is not being advantageously effected in the fullest degree. Among many factors collectively responsible for this, the unstable nature of foreign markets for products of agriculture looms important.

**Land Use**

Technological advancements in all fields of endeavor have increased the feasibility of more rapid progress in underdeveloped areas. In the lower Samala region, this enhancement is applicable to improved use of land. It should be noted that this involves not only those factors associated with increasing agricultural production, but also such factors as improved transportation and marketing which provide a means for the distribution of the fruits of agricultural endeavor. Unfortunately, the application of modern know-how in underdeveloped areas is an exceedingly costly venture. Whether calculated or real, a shortage of capital is largely accountable for the lack of development in the area with which we are concerned.

The introduction of private capital favors the establishment of large-scale operations in agriculture.
The development of an agricultural economy based upon a smaller scale of operation is largely contingent upon aid supplied by the Guatemalan government. Until recent times very little of such aid has been forthcoming. Consequently, the pattern of future development in this area will depend, in part, upon the source from which capital is drawn.

At the present time, it is interesting to note that the introduction of capital and the consequent application of new techniques may distinguish not only the manner of operation, but also the nature of the crops produced by the large and small holders of land. The introduction of rice and sesame into the lower Río Samalá area has been relatively recent. These crops are mechanized on a minor scale but they have also become very important to the farmer with his small plat of land. These crops are easily produced on a small scale and create both diversity and extra cash.

In the case of sugar cane and the essential oil-producing grasses, the number of small operators is greatly reduced. The processing of these commodities requires considerable capital expenditures, and supplying the mills with adequate supplies of raw material involves a larger scale of farming operation than is possible in the case of most individuals.
The production of bananas and cotton is almost entirely in the hands of large operators (Figs. 41 and 42). Large sums of money are required to produce high quality marketable products. In both instances, the control of disease requires not only capital but also efficient knowledge to combat the disease. Indian and Ladino on small plots of land normally have neither of these attributes. When the planting of cotton first swept the coastal area at the turn of the present decade, it was hopefully planted by many small producers. However, disease spread rapidly with increased planting and it could be controlled only by those who could afford the expense which that control entailed.

During the 1953-1954 crop year, nearly 90 percent of those growing cotton in Guatemala made no attempt to control disease and they produced five percent of the total crop.\(^5\) They were obviously all small producers of cotton. In all likelihood, these figures do not include many producers who interplanted maize with cotton with little or no success. This is but one example that might be cited to illustrate the degree to which innovation affects the manner in which land is utilized. When, in order to produce a crop, it is necessary to resort to

Fig. 11.- Land being prepared for the planting of cotton

Fig. 12.- This scene depicts an entryway into a banana plantation. Commercial production of bananas and cotton require considerable sums of capital. Consequently, the production of these crops is the privilege of larger and wealthier holders of land.
the introduction of available but costly techniques, the production of that crop becomes a privilege of the larger and wealthier holder of land.

Of all the important crops, maize alone remains solely within the domain of the small producer. In some instances, it is produced by large-scale commercial operators in order to maintain a more stable supply of labor, since the laborers preferred to be paid in maize rather than currency. However, the large-scale production of maize is apparently not sufficiently profitable to encourage its production as a cash crop in this area.

Social Institutions with Regard to Land Use

The production and consumption of maize are the focal points about which revolve the lives of most Guatemalans. Their social institutions are predicated, in large part, upon the cultivation of this coarse grain. The significance of maize can be appreciated when one notes that the average Guatemalan consumes approximately 400 pounds a year and that the grain makes up over 60 percent of the diet of two-thirds of the populace. Charles Wagley estimates that the average highland farmer in the Santiago Chimaltenango region northwest of Huescutepeque consumes about 800 pounds of maize
per year. At Panajachel, on Lake Atitlán, the estimate of consumption ranges from 400 to 600 pounds annually. It is apparent that increasing poverty is accompanied by increased consumption of maize. The annual per-capita consumption of the grain obviously exceeds 400 pounds in the highland area of southwestern Guatemala. The large annual consumption of maize in the highlands is apparently matched by the lowland populace. The Foreign Operations Administration (FOA) in a report on the Pacific coastal community of Santa Ana Mixtán reports an annual per capita consumption of 409 pounds of maize. The report states that if young children are excluded the per capita consumption is increased considerably. The report notes further that the inhabitants of this village obtain 80 percent of their calories from the consumption of maize. The population in the coastal plain area contiguous to the Río Samalá is small and relatively little maize is produced,

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yet the influence of maize over society is such that it has a significant bearing upon the manner of land use in the coastal plain area.

By nature, the highland Indian chooses to reside within the realm of security offered by his social organization. His preferred limits are the horizons which surround his local community. The problem of inducing highlanders to work on the Pacific piedmont and coastal plain has provided a complex problem. With the introduction of coffee into the Pacific piedmont area, the need arose for a greatly increased labor force. This supply of labor was not furnished by a voluntary movement of people but by legislative decree. In more recent times, increasing scarcity of land and lack of alternative opportunity have forced greater numbers of highlanders to seek full or part-time employment in the Pacific piedmont and lowland areas. In spite of this tendency, there is probably an over-all and certainly a seasonal shortage of labor on the coastal plain.

Since many of those who arrive on the coastal plain desire only to supplement income earned in the highlands, they make various arrangements, most of which generally involve the exchange of labor for the privilege of planting maize. After the maize has matured, they return to the highlands with their harvest. This cycle of events
is most common. It establishes a unique pattern in land use and contributes to a shortage of labor.

Large numbers from a single highland group may be recruited to work on a large holding in the lowland. During the past year several farmers with large acreages in cotton were in dire straits, for the contract workers had abandoned their weeding and thinning operations and returned to the highlands en masse where they were to remain for about two weeks to tend their plots of maize. The difficulty of large-scale operation under such conditions is apparent. The importance of maize to the people and their devotion to its production are also clearly evident.

As a result of a rapidly mounting highland population, increasing numbers are being forced to earn their livelihood elsewhere. Some of these people reluctantly enter the coastal lowland area. The temporary residents are likely to restrict their interests to the production of maize or the earning of money with which to purchase maize. The more permanent occupants of the lowland area seem more likely to produce a diverse number of crops which are generally sold as cash crops in the market at Retalhuleu.

For the most part, it seems that those becoming permanent residents on the coastal plain have previously
resided in the piedmont area. The centripetal nature of the social organization of the highland Indian society is less influential among the natives on the lower-lying piedmont. Hence, the inhabitants of the piedmont have a more worldly outlook and are not so closely bound by their environment. As a result of this there is less resistance to movement to the adjacent low-lying region. They are not only more receptive of the idea of living on the coastal plain, but are probably more aware of the benefits to be derived by residence there.

**Government Policy and Land Use**

Until recently, governmental policy has had little encouraging effect upon the manner of land utilization in the coastal plain area contiguous to the lower Río Samalá. Until the present decade, the government had neither contributed appreciably to the development of this area, nor had it followed policies which might have stimulated development by the private holders of land.

Prior to the expulsion of the clergy and confiscation of Church property in 1875, it is probable that large areas of the coastal plain were held by the church. The coastal plain area from the Río Samalá eastward to the Río Sis had reportedly been the property of the San Franciscans. Apparently little use was made of the
coastal plain portion of the property held by this Catholic Order although some sugar cane may have been grown along its inner margin. Confiscation of this property by the government did not alter the manner of land utilization but merely consisted of a transfer of ownership. Devoid of people, the large units of land that prevailed prior to 1875 continued to characterize this lowland region. This is true notwithstanding the fact that the Church was no longer an interested party.

Within the past 20 years, many changes have been wrought which have had and will continue to have a significant bearing on the manner of land utilization in the lower region of the Río Samalá. In all of this the role of government has been exceedingly important and it manifests itself in many aspects of the cultural environment of the lowlands. The basis for the more rapid evolution of lowland development and the increasing effectiveness of the role of government in this area are incipient in the overthrow of the dictatorship of General Ubico in 1944 and the establishment of a more liberal government.

Improved accessibility and greater use of land are exposing the area to increased domination by governmental policy. On the other hand, the lack of expropriations of land in this area during the regime of President
Arbënz (1951–1954) implies a degree of underdevelopment. Nevertheless, the events which transpired under the presidency of Arbënz had many repercussions in this sector of the coastal plain.

The Agrarian Reform Law was enacted on June 17, 1952. Its general aim was to bring about "a substantial change in the nature of ownership and in the form of exploitation of land as a method of overcoming the economic backwardness of Guatemala and improving the level of living of the great masses of the population". In effect, the law was to bring about a more equitable distribution of land. This was supposedly to be accomplished by breaking up the large idle landholdings said to be concentrated in the hands of a few, and distributing them among the landless. This law was basically not favorable to the owners of large holdings of idle land.

For various reasons the law was subverted to further disadvantage of the large landholders. In many cases the illiterate native, spurred on by insidious elements, seized land for his own use with utter disregard for the letter of the law. During this troublesome period of land reform many large landholders, fearing the

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expropriation of their properties, divested themselves of large herds of cattle. On the other hand numerous producers of citronella and lemon grass produced their crops at a loss during the period of low prices which then prevailed in order to avoid the classification of their properties as idle land subject to expropriation under the agrarian reform. In one specific instance, cotton, which had been produced in a large field under the supervision of the administrator of the hacienda, came to be produced individually on plots of land which each worker had requisitioned for himself. The period culminated in intimidations and threats of death. Terror swept the area and many of the landowners or managers who resided on the land were forced to flee for their lives.

The fall of the Arbenz regime in June of 1954 brought an end to this form of terrorism but it resulted in a counterreaction which was termed equally vicious by many. It is reported that many landowners deprived the cultivators of their planted, but not yet harvested, crops, and in other instances the owners were reported to have driven cattle into the patches of growing maize.

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The natives who had been most closely identified with the actions of the past government frequently fled the land or suffered arrest.

Reaction to this period of turmoil has been two-fold. Although it is denied by many, there can be no doubt that the flurry of sales and diminution of size of some landholdings is related to these recent difficulties. Secondly, the turmoil of this period made articulate the latent dissatisfaction that apparently has existed within the natives for many generations.

This turmoil has brought into closer perspective the social and economic conflicts within the region and has promoted a more serious consideration of the problems involved. As a result of this experience, the large landowner is likely to be more responsible to his obligations as a holder of land. An awareness of social and economic injustices has probably served to increase the ambitions of the landless and the holders of small properties. The government of Castillo Armas which came into power in 1954 is aware of the necessity of engaging more actively in the rational development of idle lands. Although the recent era has been politically stormy, it has brought the problems of the Río Samalá sector as well as those of the Pacific coastal plain area into the open and has probably accelerated the evolution of events necessary to provide for a rational approach to land use.
The Present System of Land Utilization

The Nature of Land Tenure

The concentration of land in the hands of a few has elicited considerable attention in Guatemala in recent times. The agricultural census of 1950 reveals that two percent of the fincas in Guatemala embody 72 percent of all land held privately; 11 percent of the fincas have 85 percent.12 The department of Retalhuleu, within which lies the lower region of the Río Samalá, is no exception for 91 percent of the land is contained within the limits of three percent of the fincas.13

12 Departamento de Estudios y Análisis, Dirección General de Estadística, Censo Agropecuario, 1950, Agriculture, Tomo I, Guatemala, C.A., 1954, p. 19. The census of 1950 defines a finca as constituting any unit of land one quarda (slightly more than one-tenth of an acre) or more in size which is dedicated to the production of agricultural crops, livestock, fowl, or bees. The finca may consist of two or more individual plots and still be classified as one farm unit if the separate plots are under the direction of the same operator. Although the word "finca" is officially defined in this manner the term is not popularly conceived to have this precise meaning. A small holding thought of as a labor would hardly be classified as a finca by the ordinary layman. Similarly a large cattle ranch in the lowlands would be referred to as a hacienda although it is classified as a finca in the census. Finca normally refers to a sizeable landholding and along the Guatemalan Pacific pinedmont it usually denotes a large landholding engaged in the production of coffee, sugar cane, or cacao.

13 Ibid., p. 22.
The concentration of land in the hands of a few is even more outstanding in the coastal plain sector of the department.

**Size of Landholding**

At least eight or nine fincas located within the lower Río Samalá region contain in excess of 2200 acres of land. To the east of the Río Oc and Río Samalá is a large holding, the major portion of which lies within the region of the lower Samalá. Until a few years ago this finca contained over 122,000 acres of land. One portion of this property has been expropriated by the government. Another segment lying between the Río Samalá and the Río Sis has been divided up into 20 sections and these are being sold in units averaging about 1300 acres in size.

Although most of the lower Río Samalá coastal plain area is held in large fincas there are numerous holdings involving small acreages of land. A number of individuals were encountered who had recently purchased from 20 to 80 or 100 acres of land. The purchase of smaller sized plots seemed to be uncommon. It may be assumed that the average finca in the lower Samalá region encompasses more than 100 acres of land.  

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14 Dirección General de Estadística, Oficina Permanente del Censo, Colección del Censo Agropacuario de 1950 (preliminary), Guatemala, C.A. Cuadro Núm. 25.
Nature of Land Ownership

In the vicinity of the lower Samalá, virtually all land is held privately. An exception to this is an area of 7000 acres located along the lower right bank of the Río Samalá and fronting upon the Pacific Ocean. The government retains ownership of this land and has reserved similar areas at the mouths of major streams flowing into the Pacific. This has supposedly been done for the purpose of controlling, for national interests, ocean ports which might be developed at the mouths of these streams. Along the left bank of the Río Sis is an area of about 1250 acres which has been expropriated from the Hacienda Trapiche Grande. A large portion of this hacienda lies within the region of the Río Samalá; however, the expropriated area lies just beyond the limits of the region which is under consideration.

Due to the virtual absence of inhabitants prior to the arrival of the Spaniards, there are no communal landholdings on the coastal plain area south of Retalhuleu.

Tenure Status

Many of the problems involved in the utilization of land in the region of the lower Samalá are revealed by

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15 Oficina de Tierras, Dirección General de Asuntos Agrarios, op. cit.
the manner of land tenure. Unfortunately, the agricultural census of 1950 is of little aid in providing precise information concerning the nature of tenure status in the Samalá sector of the Pacific coastal plain. As previously indicated, the data are collected by municipio and these political units are often elongated, extending from the mountains to the sea. Consequently there is an accumulation of data which applies, without discrimination, to both the piedmont and the coastal plain regions of the municipios.

Of the 4106 farm units in the three municipios within which the region of the lower Samalá is located, 50 are under the control of the administrators. In spite

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16 The lower Río Samalá coastal plain region lies within the municipios of San Andrés Villa Seca, Santa Cruz Muluá, and Retalhuleu. Approximately 86 percent of the first named municipio and 72 percent of the second lie within the Río Samalá coastal plain area. The remaining 14 and 28 percent respectively lie in the Pacific piedmont area to the north. Only the eastern third of the municipio of Retalhuleu lies within the lower Río Samalá area. The remaining two-thirds lies within the Pacific coastal plain but to the west of the area under consideration. Data with respect to the entire area in these three municipios are presented in spite of the fact that only 52 percent of the land area in these three municipios lies within the limits of the lower Río Samalá region. There are two basic reasons for the presentation of this material. First of all, no further breakdown of census material applicable to only the lower Río Samalá region is available. Secondly, the data provide at least some measure of information with respect to the lower Río Samalá region and when qualified is better than no information at all.
of the fact that these make up no more than 1.2 percent
of all farm units, they contain 50 percent of the land
area in these three municipios. The great majority
of these administered farm units are probably coffee
fincas on the piedmont; however, most of the area involved
is represented by holdings on the coastal plain. Basic-
ally, this again illustrates the degree to which land
is concentrated in the hands of few. Although some of
these fincas may be well administered, there is usually
a degree of detachment between ownership and operation.
As a consequence, the efficiency of operation usually
suffers.

It is difficult to gauge the average size of the
rented farm unit in the Samalá sector of the coastal
plain; however, they are known to range up to more than
600 acres in size. The census reports that of 4106 farm
units, 52 percent are occupied by arrendatarios, and that
this category of farm operator occupies less than five
percent of the total land area. This provides the
average renter in these three municipios with less than
five acres of land. From observations in the coastal
plain area it is obvious that rented units are few in

17 Departamento de Estudios y Análisis, op. cit.,
p. 74.

18 Ibid., pp. 42, 50, 74. The arrendatario cultivates
the lands of others and pays rent for the use of the land.
number and that most are large in size. Consequently the census data on rented land are largely applicable to the piedmont area of the municipios of San Andrés Villa Seca and Santa Cruz Muluá, and reveal little information with respect to the lower Río Samalá region.

In addition to the 52 percent of farm units which are rented, there are an additional 15 percent on which live operators classified as colonos. In the three municipios, the colono, like the arrendatario is more commonly a feature of the piedmont area. The number of colono farm units is certainly smaller on the coastal plain than on the piedmont. However, unlike the arrendatario, the colono is of considerable importance in providing the basic year around supply of labor needed on the large lowland holdings.

In the three municipios 42 percent of the remaining land area and 20 percent of the fincas are classified as owner-operated (proprietarios). It is difficult to make an estimate which accurately represents the number of such farms on the coastal plain and the area involved. However, as was the case in administered farm units,

19 *Ibid.*, p. 42. The colono lives and works on a finca of which he is not the owner. He receives a salary for his work and generally a ration of maize, beans, salt, and lime, and land which he may cultivate.
there is a tendency for the coastal plain units to be smaller in number and larger in size than those located on the piedmont.

Of the various types of tenure status which occur in the three municipios, four have been specifically noted. These are the administered, the rented, the colono, and the operator-owned farm unit. Other forms of tenure are unspecified and are relatively unimportant. Whatever the status of land tenure it is apparent that it involves small numbers of people in control of relatively large blocks of land.

Agricultural Production

In the region of the lower Río Samalá, the more important crops in terms of acreage are maize, sugar, the essential oils, coffee, cotton, rice, plantain, sesame, and bananas. An attempt has been made to arrange these crops in order of importance; however, the list, at best, represents only a gross approximation of the proper order. The census data are not arranged to make the information readily available. In addition, between 1950 and the present date, there have been significant changes in the number of acres devoted to the various crops. For example, during 1955 the large-scale production of bananas was being abandoned by one large finca.
In the case of cotton, the output of which is now important, production was so insignificant in 1950 that it was not even listed in the census of agriculture. As a consequence of these as well as other factors, it is necessary to resort to an inductive or deductive approach in gauging the relative importance of the various crops.

In the region of the lower Río Samalá, the commodities of agriculture are produced under a wide range of circumstances. There are the small farm units operated by the renter, colono or owner. In many instances, earnings from this type of land tenure are complemented by various forms of off-farm employment. At the other extreme are the large commercial farms which are comparatively highly mechanized. These larger landholdings may be operator owned, rented, or administered.

Although a preponderant share of the land area is held in the larger holdings, most of the region's inhabitants are occupants of smaller plots of land. This phenomenon dictates that agricultural production shall fall into two major categories. The first of these entails a small-scale farm operation in which a majority of agricultural output is consumed on the farm. This also entails the subsistence form of agriculture in which income is supplemented by other types of endeavor. The second category entails a larger scale of activity in
which essentially all output is destined for market. As a result of the great variation in the nature of farm tenure and operation, it is apparent that there must be a degree of overlapping, for some farms may not fall specifically into one category or the other. Unfortunately, this is unavoidable and would occur no matter what the nature of categorization. To be considered first is the nature of agricultural production on the smaller farm units.

Subsistance Agriculture

The colonos, the seasonal renter of land, and other small landholders normally till between one-half and five acres of land. These, of course, are not absolute limits. Most of the plots will probably range between two and three acres in size. In a sense these figures belie the amount of land utilized, for two and occasionally three crops may be grown on a single field in the course of a year. However, these plots of land are not used continuously but are permitted to lie fallow for intervals of time. Among the colonos on two of the larger fincas, land was permitted to lie fallow two years out of four. Although this was reported on several occasions as being common practice, it is known not to be universally true. In numerous instances land was reported to be in fallow at less frequent intervals. The period during
which land lies fallow varies with the nature of land tenure, type of crop, and size of farm unit.

The size of the plot will depend upon many factors. Among these, the size of the family, the amount of obtainable off-farm work, the availability of capital, or imposed restrictions in size of plots loom important.

A large variety of crops is grown on the small farms in the lower Samalá region but none is grown more consistently or in greater quantity than maize. Almost without exception, the area planted to maize exceeds the area devoted to all other crops. The area to be planted is normally burned over. Although draft animals are available, they were never observed used in the preparation of the land. As in ages past, the seed of maize is planted "con palo," that is, with the aid of a sharp pointed stick. The task of weeding is performed with the aid of a long broad-bladed knife called a machete.

Maize planted about the last week of April or first week in May is normally harvested before the middle of August. If a second planting is to take place it occurs during September and harvest follows in late December or January. In moister sites a third crop may be planted in December or January. This latter planting is called the cuarenteño. Due to dry and warmer weather, it supposedly matures in 40 days. Although this third crop
Fig. 13.- In July the stalks of maize are bent down or doubled to hasten the drying of the ear and to protect it from the ravages of birds.

Fig. 14.- In the lowland area as elsewhere, maize is planted "con palo," that is with the aid of a sharp pointed stick.
is frequently referred to in speech, it is relatively unimportant in terms of total production.

Since no fertilizer is used, the yields of maize are relatively small. The first yield was normally reported to be in excess of 15 bushels per acre, however, due to a variety of natural calamities, smaller yields are certainly not unknown. Of the three plantings, the first was always reported as being the largest. The veracity of this general information is borne out by the agricultural census of 1950. Some of the maize produced on these small holdings is undoubtedly sold, but a greater proportion is apparently retained by the producer.

A variety of other crops are grown in close association with maize. This coarse grain is frequently inter-planted with ayote and pepatoria, two varieties of squash. Throughout Guatemala various beans are inter-planted with maize. This was reported to be the case in the lower Río Samalá region, but production of beans is apparently much less important than in the piedmont and highlands to the north. The harvest of maize in August is a forerunner not only to the replanting of maize but also other crops. Since the World War II period, the farmers have been more-or-less experimenting with the production of first, sesame, and now cotton as a follow-up
crop after the August harvest of the first planting of
maize. Sesame is normally planted in August and har-
vested in December. If cotton is to follow maize then it
is interplanted in early July. It is harvested in Decem-
ber and the month following. A second crop of maize is
frequently interplanted with the cotton, and, if so, the
rows are more widely spaced than was the case with the
first planting.

The census reveals that the average yield of sesame
in the department of Retalhuleu is about 16 bushels per
acre. It is doubtful whether or not the yield of the
interplanted cotton ever approaches 300 pounds per
acre. In many instances the cotton crop was reported
to have been a complete failure. Low yield and complete
crop failure are probably attributable to the lack of
disease and insect control. On these small holdings, it
is probable that the acreage in sesame and cotton approxi-
mates the acreage devoted to the second planting of maize.

20 Ibid., p. 285.
21 The farmers expressed their yields in terms of
unginned cotton at so many quintals per manzana. A
quintal is equivalent to 100 pounds. A manzana is
equivalent to 1.74 acres. It may be assumed that 63.4
percent of the unginned cotton is seed by weight. These
data have been used in converting the yield of cotton
into the more familiar pounds or bales per acre which
are expressed above and in later material.
Sesame and cotton appear to be planted less frequently nearer the ocean. Since they are strictly cash crops, poorer transport facilities in the outer coastal plain region discourages their production.

In the rainy tropics, plantain is an important starch food. As in the case of maize, the production is widespread in the lower Samalé region. Unlike its near relative, the banana, the production of plantain is concentrated in the hands of the small farmer. In the department of Retalhuleu, the 2.1 percent of fincas with 88 percent of the land produce 95 percent of the department's banana crop, but only 13 percent of the plantain. This arises from the fact that the plantain is an important subsistence crop whereas the banana is a product of commerce produced in large quantities not only for the domestic, but also for a foreign market. Plantain is probably second only to maize as a supply of food in the lower Río Samalé region. Although it is widespread in production, acreage is relatively small in comparison with other crops. Many farmers have less than one-fifth of an acre devoted to this crop. In most instances the plantings are scattered at random about the

lowland dwellings. Provided with adequate moisture, the plant may yield throughout the year, otherwise growth is retarded by the occurrence of the dry season.

In addition to sesame and cotton, income is also derived from the sale of rice; however, rice varies from the first two commodities in at least two respects. It apparently is not interplanted with maize as tends to be the case with sesame and cotton. Secondly, rice may be consumed in the event of an extreme shortage of food. Unlike maize, rice is not planted with the first rain, but is planted after the rains are well underway. This delays seeding until the third or fourth week in May. In several instances, it was implied that rice was planted in sites which would be too wet for maize. Since the crop is not irrigated, it is necessary to plant it when and where adequate supplies of water assure reasonable chances of success. Among the smaller farmers, rice is reported as giving greater yields than maize. Whereas the average yield for maize is something in excess of 15 bushels per acre, the average for rice is about 30 bushels per acre for the three municipios within which the lower Samalá region is located. Like sesame and cotton, rice is grown on very little acreage nearer the coast. This may be due to transport difficulties as well as the longer dry season which prevails nearer the
Pacific Ocean.

Innumerable additional commodities may be obtained from the small plots. A few of these find their way to the markets in the piedmont and highlands, but most are consumed locally by the producer. Small plantings of yuca are frequently found on the smaller farms. Scattered about the plot may be a few plants of sugar cane. Chili peppers and tomatoes are not widely grown but they were seen on several occasions. Small clumps of pineapple plants were frequently noticed on the small farms. Sorghum, peanuts, and melons were reported to be grown at scattered sites but were not actually seen.

The dwellings are often half-hidden by numerous trees and shrubs. From the trees are obtained a variety of fruits such as mangos, jocote maranon, avacado, zapote, papaya, and citrus fruits, especially limes. Along the piedmont margin of the coastal plain where rainfall is heavier and the drought of shorter duration, a few cacao and coffee trees may be found growing under the shade of the larger trees. The coffee tree was not seen at elevations below 495 feet. Cacao was occasionally seen at lower elevations but generally only at moister sites.

Animal husbandry is also a part of agriculture in the lower Río Samalá region. Compared to our standards, their animals are usually smaller, of poorer breed, and
surely less productive. The chicken is ubiquitous and is as much at home within the dwellings as it is in the area surrounding them. In a study of the nearby Pacific coastal community of Santa Ana Mixtán, the Foreign Operations Administration reports that the average hen lays 22 eggs annually.\(^{23}\) This average would certainly not be exceeded in the area with which we are concerned. Such an average is less than one-eighth of what would be expected in the United States. Ducks and turkeys are raised in the area but were seen much less frequently.

An occasional farmer may possess one or two head of cattle. Pigs were few in number and tended to be concentrated along the northern margin of the coastal plain. Horses are also common to the region but appear in greater numbers at increasing distance from the piedmont where the small farmer apparently has a greater amount of available grazing area. Weeds, corn stalks, plantain, and a small amount of maize serve as feed for cattle and swine. If the reported low productivity of cows and swine at other coastal sites is repeated here, as it most likely is, then it reflects a tendency which is common throughout the Pacific coastal plain of Guatemala.

\(^{23}\) Foreign Operations Administration, *op. cit.*, p. 41.
The cultivated plants and domesticated animals which have been noted serve as the basis of existence for the small farmer. Additional income or maintenance may be earned by a variety of methods. It may be earned by labor on large fincas or at other tasks such as lumbering. Furthermore, the region abounds in wild plant and animal life which has varying degrees of economic value. The leaves of various plants such as platanillo, cuarca, maxon, and corozo palm; the latex from the pavo de hule; the skin of the lagarto; fish from the ocean and various lakes; and the meat of the iguana are some of the stores provided by nature to those who seek them out. The exploitation of these by the inhabitants of the area further supplements their livelihood in the region of the lower Samalá.

**Commercial Agriculture**

The discussion of the nature of commercial agriculture in the region of the lower Samalá involves a consideration of those farm units in which the major share of production is slated for market. These farms range up to over two thousand acres in size. On the other hand, it is exceedingly difficult to establish their lower areal limits. However, it should be noted that in the previous section on small-scale farm operations, five acres was arbitrarily established as the approximate
upper limit for farms in that category.

Basically, commercial agriculture differs from the small-scale subsistence farming in several respects. On these units more use is made of machinery, fertilizers, and insecticides. Emphasis is placed upon the production of a somewhat different selection of agricultural commodities, and interplanting of crops is obviously not practiced.

A variety of crops is produced commercially on the larger farms. Unlike maize among the smaller producers, no crop is so definitely outstanding in production that it can be called the most important. Unfortunately, the census does not reveal specifically the area devoted to crops and so no comparison can be made in this respect. Two relatively important crops in the area, citronella and cotton, are not even listed in the census.

Of first order in importance are such crops as citronella, cotton, lemon grass, maize, sugar, and coffee. Probable crops of secondary importance are bananas, rice and sesame. Cacao, castor beans, and tobacco are of questionable importance.

On the smaller commercial farms there is a tendency to produce maize for sale in highland markets. The first crop of maize is particularly important in this respect. Since it is harvested more than a month before
the date of maturity of the highland varieties, it frequently provides a welcome addition to the diminishing larder of the highlanders. On the smaller commercial farm the land is prepared and maize is planted by hand. Labor is frequently hired for the task. Two crops are normally harvested and the planting dates are the same as those previously listed.

On the larger fincas maize is frequently grown to pay laborers. The planting dates do not differ from those previously noted. Two crops are normally obtained from the same field annually. The larger fincas prepare and cultivate the fields with machinery, but the harvest is accomplished by manual labor. On these larger fincas the yield was reported to be about 20 bushels per acre for the first crop and 15 for the second crop. This is about 25 percent greater than the yield of the non-commercial farmer and is probably attributable to the use of fertilizer. Here again, the yield of the first crop was reported to be greater than that of the second. According to all reports this is normally to be expected.

Citronella and lemon grass which are the source of two of the essential oils, also are grown on a number of fincas. As of the fall of 1955 there was less area in these grasses than in preceding years. This is true in spite of reports of increased planting in Guatemala.
during 1955. The grasses are hand planted and harvested. Satisfactory yields can be maintained only by replanting every three or four years, for the mat of this bunch grass becomes continually higher thus reducing the quantity of grass that can be harvested. Various attempts have been made to overcome this problem but none has succeeded as yet. These grasses are processed at a mill about a mile southeast of Retalhuleu. The necessity of maintaining the movement of these products to the mill for processing accounts, in part, for the fact that production is limited to the margin of the coastal plain which is adjacent to the piedmont. This locational factor is of significance to all products intended primarily for market.

Before 1950 cotton was essentially nonexistent in the lower Samalá region. Today there are at least three fincas with more than 500 acres of cotton and many more with smaller acreages. Preparation of the soil and subsequent cultivation are performed mechanically. The cotton is picked by hand.

The planting dates range between mid-June and mid-July. It was indicated that those nearer the coast plant earlier because the rainy season ends there sooner. The harvest begins about the middle of December and extends into January. Since insecticides and fertilizer
are used the yields are much larger than the interplanted cotton produced on the small farms. At one finca in 1954 the yield was 1.5 bales per acre. At another finca it was anticipated that a first crop would amount to slightly more than one bale per acre and it was the expressed hope that it might even reach 1.25 bales per acre. These yields seem to be unusually high and, unfortunately cannot be checked against census data. \(^\text{24}\)

Sugar is another important commercial crop in the lower Samalá region. The major producers are concentrated along the inner margin of the coastal plain. As with other commercial crops, relatively greater accessibility in this portion of the coastal plain, is partly accountable for the location of the crop. Heavier precipitation and the shorter period of drought that prevails here as opposed to the oceanward margin of the coastal plain may have some bearing on the distribution of cane, but if so, it was not an expressed opinion of the commercial producers. In the same manner as maize, where the field in cane is large it follows that mechanization is important. On a number of commercial farms which

\(^{24}\) The Banco de Guatemala in Memorandum No. 21 of the Departamento de Estudios Económicos, entitled "Estudio sobre la Situación Actual del Algodón Nacional" (ditto), and dated March 24, 1953, reports on p. 8 that the Instituto de Fomento de la Producción (INFOP) estimates such yields to be entirely feasible.
had smaller acreages in cane, the task of growing was essentially carried out by hand. The main harvest is conducted between November and June. There was general agreement on the subject of replanting of cane which was stated to be necessary about every five years.

There are two sugar mills at which the cane is converted into blocks of brown sugar (papala) and much of the product is sold in the highlands.

Contrary to popular conception, coffee can be grown in the tropics at relatively low elevations. In the region of the lower Río Samalá, coffee is grown below the 500 foot contour. One large and several smaller plantings were below that mark. In contrast with highland coffee, the trees normally appeared less sturdy and they tended to be much more deeply shaded. The yield of coffee was reported to be about 450 pounds per acre, or equal to that of the highlands but it was readily admitted that the quality was inferior. Here, and in adjoining lowland regions, robusta was most likely to be the variety planted. The berries do not fall off when ripe. Consequently, this outlying coffee district is less exacting in terms of the timing of labor requirements which is important in this labor-deficient area.

During 1954 several fincas experimented with the production of "cafe de sol," which is literally, coffee
Fig. 45.- On large fincas sugar cane is normally planted with the aid of machinery but there are a number of smaller producers who utilize hand labor in the production of this crop. This native is turning the soil with a large hoe (agadon), a tool which is more commonly associated with highland agriculture.
of the sun. Under this method of production the coffee
tree is grown under irrigation and without the benefit
of shade. The tree begins to bear in two years, reaches
peak production in the third year, and is destroyed af-
ter the fifth year. This is followed by replanting.
The merits of the plan are yet to be proved; however, if
successful, it might be of considerable advent to the
coastal plain region. The production of coffee is con-
centrated on the higher portion of the coastal plain.
Accessibility and elevation are of import, and the avail-
ability of moisture is probably not without significance
in influencing the location of this tree in the lower
Río Samalá region.

In the fall of 1955 no other crop than those men-
tioned was produced on a large-scale basis in the coastal
plain region crossed by the Río Samalá. A major plant-
ing of bananas was reportedly being abandoned because of
low prices being offered by a banana company (and pro-
bably also because of adverse climatic conditions). A
very large planting of castor beans was in the process
of being destroyed because of depressed prices. On one
finca a large planting of tobacco was being tried for
the first time. The success of this venture is unknown.
Cacao plantings in two areas at an elevation of about
250 feet have proved unsuccessful, although production
has been termed successful at the same elevation in an adjoining region.

Sesame and rice are produced on what we have called commercial farms, but only on smaller units in this category. In the region of the lower Samalk, neither crop is produced mechanically, all work being performed by hand. Several of the larger fincas have experimented with rice in the past but have abandoned the effort for one reason or another. Under favorable conditions the yields were stated to have averaged about 43 bushels per acre, which would be considerably less than average yield in the United States. The large-scale production of irrigated rice requires the type of operational ability which apparently is not available in this area of Guatemala. Experiences at other sites on the Pacific coastal plain verify this point with respect to rice.

In addition to the above crops several small stands of trees have been planted for lumber. The species normally planted, caoba (Swietenia Humilis), palo blanco (Cyebistax Donnell-Smithii), and cedro (Cedrela) are sources of valuable cabinet wood.

All of the afore-mentioned commodities present some idea of the nature of crops which can be produced in this region. In addition to these there are others which can be grown and now are produced experimentally
in adjacent regions. Most of these are tree crops such as rubber, the African palm, citrus fruits, balsa, and teakwood.

Livestock is another important product of agriculture in the region of the lower Samalá. Most of the so-called commercial fincas have cattle. In 1950 there were reported to be approximately 31,000 head of cattle in the three municipios within which the lower Samalá region is located. The number of cattle by 1955 is unknown but probably did not exceed the 1950 figure. In the summer of 1955 there was a minimum of 10,000 cattle in the Samalá sector of the coastal plain.

Many of these cattle browse in the low scrub forests. Planted pastures of improved grasses are also very important as a source of feed. The grasses are collectively referred to as zacatón but include various species the most important of which is \((\text{Panicum maximum})\). In the region under consideration it is probable that there are nearly as many acres in planted grasses as there are in maize, which, area-wise, is probably the most important agricultural crop in the lower Río Samalá region.

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25 Dirección General de Estadística, Oficina Permanente del Censo, \(\text{op. cit.}\), Cuadro Núm. 81.
26 C. D. Cline, "La Ganadería en Guatemala" (mimeographed), Guatemala, C.A., n.d. p. 3.
Many of the cattle are *criollo*, or of old stock originally introduced by the Spanish. In recent years improved stock has been introduced into the region of which the Zebu appears to be dominant. Other than cattle and possibly horses, commercial production of livestock in the lower Samalá region is essentially nil.

The nature of agricultural endeavor in the lowland is essentially carried on as has been outlined. Although certain essential and possibly significant detail may be missing, paucity of the proper data makes a more thorough check of field data impossible. Nevertheless it is the best information available and will serve as a basis for comparison with agriculture in the highlands to the north where the same river, the Río Samalá, gathers in tributaries in the vicinity of the Basin of Quezalte-mango.
CHAPTER IV

LAND UTILIZATION IN THE BASIN OF QUEZALTENANGO

Background of the Present System of Land Use

The agricultural economy of the upper Samalá Basin exhibits relative stability. Unlike its lowland counterpart, the economy is not presently in a state of major flux. Among these upland people the manner of agricultural pursuit was markedly altered by events which transpired at the time of the arrival of the Europeans. However, since the era of conquest, little has occurred to basically alter the nature of the land use in the Basin of Quezaltenango.

Influence of Physical Factors

The Basin of Quezaltenango lies within the realms of the tropics; yet, because of elevation, it experiences a temperate zone climate. Since the region is located in the low latitudes, the range of temperature is characteristically small, and it is significantly cooler than in the adjoining lowland. In this tierra fría, frosts are common. As a consequence of increased elevation, reduced temperatures, and limited growing season, tropical plant life is excluded and that which is characteristic
of the temperate zone predominates. At this high altitude the vegetation is not only altered but it appears to be less varied. This seems to be true of both natural and cultivated plant life.

An elevation of over 7500 feet within the low latitudes provides escape from the interminable oppression of heat, but it may also pose a problem in terms of accessibility. This is especially true in the case of the Basin of Quezaltenango which is located at this elevation and, in addition, is surrounded by rugged terrain penetrating to still higher altitudes. The Basin is not as isolated as it once was, nevertheless ground communication with adjoining regions is inadequate. Moreover, the surrounding terrain is such that improved routes would be exceedingly costly to construct and maintain, especially in terms of the resources of the regions.

In contrast with the surrounding area, the terrain within the Basin is relatively flat. In the Basin and the surrounding highland region of southwestern Guatemala, areas of low relief are greatly coveted because they are decidedly in the minority. Under propitious political circumstances, the right to such areas have frequently been usurped by unscrupulous individuals. This is reflected by the increased size of landholdings in the more favorable sites within the Basin of
Quezaltenango. Where cultivation takes place on the slopes flanking the Basin and in less favorable sites within the Basin, the farm units tend to be considerably smaller. Insofar as terrain affects the size of farm units it may also have a bearing upon the nature of crops produced. For example, in more recent times, the larger farm units have resorted increasingly to the production of wheat.

Where the steepness of slope has aided in precluding the establishment of agriculture, the slopes remain forested, or at least partly so. Since these slopes have not been continuously occupied they are frequently held by municipalities as communal land.

Since pre-Colombian times, the region about Quezaltenango has been continuously occupied by considerable numbers of people. The existence and maintenance of this population has, in part, been in response to favorable climatic conditions. The increased density of population has naturally led to the eminence of small-sized landholdings, which, for the most part, are owner-operated. The density of the agrarian population and the concomitant scarcity of land precludes the costly conversion of primary into secondary foods. Consequently the livestock industry is less important within the Basin of Quezaltenango than in the surrounding region.
Influence of Cultural Factors

The Pre-Colombian System of Land Utilization

With the exception of Peru and Bolivia, Guatemala has a larger Indian population than any other nation in Latin America. At the present time these Indians are largely concentrated in the southwestern highlands of Guatemala where they have resided in great numbers since pre-Colombian times. It is from Pedro de Alvarado, one of the first Europeans to enter the Basin of Quetzaltenango, that we learn of these large numbers of Mayan people.

At the time of the arrival of Europeans the great majority of people apparently did not reside in urban centers but lived in dwellings which were dispersed over the landscape. Small urban centers were occupied by the ruling class and ecclesiastics. These centers were occasioned by the rural peoples for festive and religious events, and for the purpose of conducting markets. They were probably also resorted to in times of conflict. ¹

It is probable that the best land was held privately by the ruling class, but, for the most part, land was held as community property and under certain circumstances

it was farmed communally with the harvest being at the disposal of the selfsame community.

Compared with the wide choice of cultivable crops available today the pre-Colombian agriculturalist had a smaller range of plant life from which to choose. As today, maize and beans were among the more important crops. All farming operations were carried on manually, for there were no domesticated animals to aid in this task. For lack of beasts of burden, agricultural as well as all other items of commerce were carried by human bearers. This practice has persisted during the four centuries since conquest and present day travelers in southwestern Guatemala can attest to its continuing importance.

**Alterations Effect by Spanish Conquest**

The first group of Europeans entering Guatemala from the west probably skirted along the lower Pacific piedmont thereby avoiding the coastal plain. Upon reaching the vicinity of the Río Samalá and the community of Zapotitlán they headed upstream and after several days arrived in the populous highland Basin of Quezaltenango. In the four centuries following this initial penetration into Guatemala, the Samalá region of the Pacific coastal plain continued to be avoided and settlement continued to be directed toward the highland regions. As a consequence of this pattern of regional occupancy, the impact of
European cultural innovations was of much greater immediate significance to the uplands than the sparsely populated lowlands.

Upon their arrival in Guatemala, one of the first tasks undertaken by the Spaniards was the concentration of the Indian into settlements. It was tacitly stated that this was for the purpose of facilitating the Christianization of the Indian, but it also improved authority over the populace and provided a ready supply of labor. The significance of this effort in the redistribution of the populace in the Basin of Quetzaltenango is unknown, but it is assumed that it was affected here as it was throughout the Americas. It is apparent that several communities in the Basin of Quetzaltenango antedated the arrival of Pedro de Alvarado; however, most of the settlements were probably established by the Spaniards. The creation of numerous villages was probably one of the first major innovations to reflect the arrival of the European.

In the conquest of Latin America the military, the Church, and others were rewarded for their effort with grants of land. A tract of land, no matter how large, was worthless unless labor was available to work the land, and so, in spite of initial reluctance on the part of the Crown, not only the land but also its inhabitants
became the property of those to whom the land had been granted. In most instances this basically altered neither the nature of land tenure nor the position of the servile populace, for the system installed by the Spaniards was merely a perpetuation of an existing social and economic order in which the Spaniards came to supplant the pre-Colombian tribal nobility.

By virtue of the terrain and the abundance of people in the Basin of Quetzaltenango, it is almost a certainty that grants of land and people in this Basin were made by the Crown to select Spanish citizenry. Unfortunately, there are no specific records of such grants having been made and various circumstances, including a complexity of events, make it difficult to trace back the ownership of land.

Although evidence points to the fact that the pre-conquest tribal nobility had possession of considerable quantities of land, much of it was held communally. The Spaniards acquired large landholdings, but the communal system of landholding continued as a major feature in land tenure in the Basin and surrounding highlands of southwestern Guatemala. The amount of land held privately in the Basin of Quetzaltenango after 1524 is also unknown, but it is most likely that large holdings came to be retained by a small number of Spaniards.
Since independence in 1821, most of the communally held land in Guatemala has come to be held privately. This trend was fully initiated by various decrees pronounced between 1871 and 1876, during the rule of Justo Rufino Barrios. It was also during this time that the Catholic Church was deprived of its extensive holdings, the significance of which has previously been indicated with respect to the lower Samalá region. The conversion from communal to private property is not yet complete. For example, possession of many of the forested and partly forested slopes flanking the Basin of Quezaltenango resides with the various communities scattered about the floor of the Basin.

The larger landholdings reflect post-conquest grants of land that have carried through to the present. In a few instances these estates indicate the consolidation of smaller properties. Some of this occurred as late as the last quarter of the nineteenth century. In the course of four centuries since conquest it is probable that large farms were recurrently created and subsequently divided into many parts only to be reassembled at later dates. This is noted to have been especially true of the Llano de Barsova which is the section of the Basin lying to the east and southeast of Salcajá.

In conquest, the Spaniards altered the landscape not
only by their redistribution of the inhabitants, seizure of land, and construction of alien cultural embellishments, but also by the introduction of diverse species of animal and plant life. The introduction of domesticated animals provided a welcome additional store of food, fiber, and energy. For all intents and purposes, useful domesticated animals did not exist in the pre-colombian Isthmian society. In the highlands of southwestern Guatemala the introduction of grazing animals, especially the sheep, had a profound influence in altering the system of land use. While the introduction of plants was perhaps of less immediate significance than that of animals, there are species of plant life which eventually became relatively important in the Basin of Quetzaltenango. Two of the more important of these are wheat and the broadbean (*Vicia faba*) (Figs. 48 and 49). While it is true that the Spaniards made use of numerous plants which existed in Guatemala and other regions of the New World, their contributions of animal and plant life were an important factor in promoting a broader base for the creation of agricultural wealth in the Basin.

The Effect of Accessibility on Land Use

The implication of accessibility is significantly different in the Basin of Quetzaltenango from what it is in the lower coastal plain region of the Río Samalá.
The Basin of Quezaltenango has been fully occupied for many years and so greater accessibility does not involve the opening up of hitherto unoccupied areas. Rather it involves the improvement of existing communication with adjacent regions.

Since the Basin of Quezaltenango has been occupied for many years, a fixed pattern of land tenure has been established that is not likely to be altered by improvement in the existing system of transportation. However, better land communication with adjoining regions evidently has had considerable bearing upon the types of commodities produced in the Basin. The Basin of Quezaltenango and the surrounding region have sufficient elevation to permit the production of temperate region crops. The major markets for these commodities lie to the east where the market is centered in Guatemala City, and to the south along the lower Pacific piedmont where there are numerous sizeable communities. Specialty highland commodities can reach these markets only if they are readily accessible.

From the older chronicles up to the more recent reports, mention is made of the importance of wheat, but the relative importance of wheat in comparison with maize is not stated. In 1955 approximately 50 percent of the Basin's cultivated area was devoted to the production
of wheat. Various responsible individuals report that wheat has become more important within the past ten to 20 years. They attribute this in part to improved transportation which has made it easier to ship wheat out, and also to the fact that maize can be more easily supplied from the lowlands. For years, other commodities such as potatoes, apples, and peaches have been carried to distant markets. The quality of these products has normally been quite poor. Within the past few years interest has been exhibited in providing the markets with better quality products which no doubt will not be carried to market by human bearers.

As the ability to transport agricultural commodities to market improves, it may tend to lead to less reliance on such subsistence crops as maize and more dependence upon those commodities which can be produced only under the climatic conditions which prevail in the Basin of Quetzaltenango. There is evidence that this is beginning to take place.

The Influence of Agricultural Endeavor upon Land Use

In the Basin of Quetzaltenango farmers are primarily engaged in the production of maize and wheat. This is in striking contrast to the lowlands where a much wider variety of crops is produced. Specialization in these two crops is carried on to the extent that others are
hardly worth noting as affecting the nature of land use.

One of the more striking features with respect to maize and wheat is the system of crop rotation in which they are involved. There are definite explainable exceptions, but, for the most part, these two crops are rotated annually by a great majority of the smaller producers. Although the alternate planting of wheat and maize hardly merits classification as a worthy system of rotation and in spite of the fact that this system may well pass into oblivion in the not too distant future, it prevails at mid-century and is largely due to circumstances involved in the growing of wheat. The fields are not manured prior to the planting of wheat and yet there is apparently some need for fertilization. The application of manure evidently leads to taller wheat and an increased danger of lodging. Whether or not lodging is encouraged by heavier heads of wheat as a result of fertilization was not determined. Consequently, after manuring, fields are planted to maize, the growth of which is thereby enhanced. Wheat follows in the ensuing year and is grown without the aid of fertilization after which the fields are again manured and planted in maize. Large-scale operators apply chemical fertilizers without adverse affect to wheat.

Efforts have been made to introduce other crops,
especially legumes, into the system of crop rotation but the attempt has met with no success. Since irrigation is virtually unknown, the extended period of drought offers a major obstacle in the selection of a suitable legume. Furthermore, any legume would find a small market in this area where a cheaper feed is imperative for the relatively small number of livestock.

Land Tenure and Land Use

Many of the farm units exceeding one and one-half acres are planted to both maize and wheat. If a farmer has less than this amount of land he will normally plant only maize since it is basic for his livelihood. Any land over and above that needed to supply his family with maize is usually planted in wheat which is produced as a cash crop.

Renters of land, colonos, and ocupantos normally occupy very small plots of land and so are not likely to produce wheat or any other commercial crop on a large scale. 2 These three latter types of land tenure, while existent, are relatively unimportant in the Basin of Quezaltenango. Wheat is of primary importance on the administered fincas and on the owner-operated fincas which are not small enough to preclude its production. The more

2 The ocupante cultivates federal, municipal, or privately held land without the permission of the proper authority.
extensive fields of wheat are usually found on the larger properties, in fact, they are devoted to little else than the production of wheat (Fig. 46).

On some of the administered and a few of the larger owner-operated landholdings, wheat is produced with the aid of machinery. This is obviously impossible in the smaller fields of wheat many of which are inaccessible and too small for the efficient use of machinery.

In general the evils of certain types of land tenure which prevail in the lower region of the Rio Samala are not specifically duplicated in the Basin of Quezaltenango. For example, in the lowland region it was cited that under certain types of land tenure, operators frequently use land for single purposes which tend to lead to the rapid deterioration of soil resources.

In the Basin of Quezaltenango the deterioration of soil is not so much associated with a type of land tenure as it is with the nature of areas which individuals are forced to cultivate. Here again we find that unlike the lowlands, it is not necessarily the type of land tenure so much as it is the size or location of a given farm unit which affects the manner of land utilization. In the Basin the administered and the very large owner-operated fincas undoubtedly occupy the best agricultural sites but they are relatively few in number and occupy a relatively
small percent of the total area.

Land Utilization as Affected by Market

The agricultural products of the Basin of Quezaltenango are totally destined for consumption within the country. This factor releases the region from subjection to the uncertainties of foreign markets.

Because maize is a mainstay of livelihood, virtually every farmer produces it. He produces enough for his family and after harvest has a momentary surplus which may in part be sold. Although maize is seasonally exported from the Basin of Quezaltenango, the area is probably deficient in terms of annual production and consumption. This deficit is made up by the seasonal purchase of maize, primarily from the lowlands. The sale of wheat and seasonal sale of maize provides most of the funds needed for this purpose.

Urban centers and especially Guatemala City with its large population provide the major market for domestically produced wheat. Imported wheat is preferred to domestically grown wheat but as long as the government protects the domestic producers, wheat will be an important crop in the Basin area. Consequently, the production of wheat is not supported by what we would call an absolutely unfettered market. This aspect will be discussed more fully under a later topic.
In spite of the production of wheat there are many subtle reminders of the fact that this region is not far removed from the status of agricultural subsistence, and unlike the lower Río Samalá region, the nature of agriculture is relatively unaffected by the giration of market.\(^3\)

**Changing State of the Arts and Land Use**

In recent years many technological advancements have enhanced the possibility of providing aid to underdeveloped regions. Unfortunately, not all such regions are capable of being receptive of this aid. The region within and surrounding the Basin of Quezaltenango is a good illustration of this. A rapidly increasing population of culturally backward people, the limited land area, and restricted resources create a vicious cycle which is neither provocative to the creation of nor readily receptive of capital. It has previously been noted that improved transport facilities may eventually lead to increased commercialization of agriculture and increasing production of specialty crops such as wheat, and various fruits and vegetables which can be most successfully grown at this altitude. However, the evolution of the

\(^3\) The fact that the region is still largely one of subsistence farming is partly revealed by the fact that wheat is produced on only one-half of the fincas located in the Basin area.
Fig. 46. - The mechanization of wheat has been
effected on larger holdings but most properties are so
small that their size precludes the use of machinery.
agricultural economy from one of largely subsistence maize culture to purely commercial agriculture, if it is to come, will be a long time in the making. Although obstacles such as poor roads may be quickly overcome, there are many cultural traits in the nature of production and consumption that defy rapid transformation.

The system of landholdings and devotion to antiquated methods of agricultural production are great barriers to progress. The mechanization of wheat has been effected on larger landholdings but most properties are so small that they preclude the efficient use of machinery. Land consolidation or cooperative efforts at land use are remotely feasible but are hardly likely to be immediately successful. Use of better and disease resistant strains of plants and animals would increase agricultural output, but in this highly illiterate agrarian society there are many forms of cultural resistance and an understandable tendency to oppose innovation.

All of this is in striking contrast with the lower Río Samalá region which is unhampered by deep-seated tradition, and where the cultural and physical circumstances are such as to be more receptive of modern agricultural techniques. This does not mean that highland utilization of land is not capable of responding to the changing of the arts, but merely that the system of land
use employed is more rigid in form and less responsive to external influence.

Social Institutions with Regard to Land Use

An appreciation of the cultural environment is basic to an understanding of the manner of land use in the Basin of Quesaltenango. For that reason it is necessary to review briefly the nature of the people who occupy this rural landscape.

Nearly two-thirds of the Basin's population is classified as Indian. The culture of these people is by no means Latin nor, in a sense is it purely Indian. They are neither Catholic nor are they totally heathenistic. They certainly do not carry on agriculture in the modern tradition but yet they definitely have advanced beyond the stages which circumscribed them at the time of the arrival of the Spaniards. Their culture is neither Latin nor Indian but rather an amalgamation of the two. As Charles Wagley implies of an Indian community to the north of the Basin of Quesaltenango, "Their entire culture is a fusion of Maya and European cultures."

While there is a tendency to describe the society as being static, this can only be said to occur in

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relative terms. In evolution, the economy cannot be called ecstatically dynamic but neither is it in the throes of stagnancy.

For the most part these people are shy and submissive. Within their society they are ruled by group activity. This does not encourage the expression of individualism. For want of aspirations, they seek no goals beyond their immediate community. They are highly superstitious people to whom nearly every prominent physiographic feature abounds with supernatural beings. As Tumin has indicated, they are insulated from the modern world by fear and ignorance.\(^5\)

A linguistic boundary passes through the Basin of Quezaltenango. To the west, the Basin villages of San Juan Ostuncalco, San Miguel Sigüilá, and Concepción Chiquirichapa are classified as Mam speaking communities.\(^6\) The remaining eastern section of the Basin is occupied by Quiché speaking Indians. Many of these natives speak very little Spanish. An attempt to question many individuals was thwarted by their ignorance or halting use of Spanish. In other instances the husband knew Spanish

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whereas the rest of the family did not. Women less frequently than men possessed some facility in the use of Spanish. It was also noted that children who attended school could speak some Spanish whereas in many cases their younger brothers or sisters could or did not. In the course of interviewing people it soon became apparent that the natives in the more remote sections of the Basin as well as those residing on the rugged terrain surrounding it were less likely to be fluent in Spanish than the residents of the Basin proper.

Contrary to popular opinion, these people are not less virtuous than others. Unlike the Ladino they do not shy away from hard work but rather they have a "high positive evaluation... of the dignity of manual labor." Because of seasonal adjustments in the highland, the Indian cannot be fully occupied there in agriculture at all times. Although he may work hard he is not necessarily productive. For most of the people, living conditions are at the subsistence level. The mortality rate is exceedingly high. This primitive society is further characterized by a meager diet in which maize is of overriding importance.

The importance of maize to the societies of southwestern Guatemala has been noted previously. Out of this

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7 Tumin, op. cit., p. 13.
importance has arisen the milpa system of agriculture which is the basis of economic, social, and political life. Needless to say, the milpa system and its concomitant emphasis on the production of maize cannot exist without the presence of land suitable for cultivation. Since the individual's hold on the future is best maintained by possession of land, the native regards this as the basis of security. As a consequence the native has "an intense attachment to the land which supports him." In the Basin of Quezaltenango a cuerda of suitable land may cost between 40 and 60 dollars. This would be the equivalence of approximately 370 to 550 dollars per acre. In view of the poverty of these people it is surprising that they make such efforts to purchase additional land. The natives are well aware of the limited earning power of agricultural land and they are cognizant of the fact that it is more profitable to grow wheat than maize; yet, they continue to purchase

8 Wagley, "Economics of a Guatemalan Village," p. 56.
9 The basic land measurements in Guatemala are the cuerda, manzana, and caballeria. Unfortunately neither scholars nor the natives are agreed upon the area encompassed within a cuerda. According to the agricultural census of 1950, 9.249 cuerdas equal one acre. The manzana is equivalent to 1.74 acres and there are 64 manzanas in a caballeria, the latter being equivalent to 111.6 acres.
land and to grow maize. The Indians recite a variety of reasons for growing maize but one gains the impression that it is the assurance of a supply of maize that comes with the production of a homegrown supply. The natives simply have not overcome the fear of a seasonal shortage of grain. Up to the present time rapid transport has not demonstrated the capacity to overcome the erratic availability of their most important form of foodstuff.

The high price of land is not merely contingent upon the production of a profitable crop. If it were, it is not likely that such high prices would prevail. For the Indian (and many Ladino) there is no other trustworthy outlet for capital except the purchase of land. There is a certain element of prestige in the ownership of land, although most sociologists identify this as being more characteristic of the Ladino. Such holdings provide security in the case of illness or death and above all they seem to give added strength to the patriarchal system in which the provision for offspring and eventual legacies of land loom important. In light of this background it is easy to understand why their system of landholding is out of place in the modern day world.

In the Basin of Quezaltenango, the position of maize as an agricultural crop is maintained in part out of cultural habit. The agricultural census of 1950 reports
that it was grown on 12,290 of the Basin's 12,675 fincas.¹⁰ First and foremost the farmer plants maize. If his finca encompasses more than one and one-half to two acres of land then the operator is almost certain to plant wheat on the remaining portion of his land holding. Since the average finca has about two and one-half acres of land this means that considerable numbers are able to sow at least a small patch of wheat. On the outskirts of villages and in certain outlying regions the predominance of very small holdings is frequently illustrated by the virtual absence of wheat.

Due to the high density of population there is little fallow land. The absence of fallow land is also enhanced by the nature of the Basin floor which for the most part precludes extensive erosion.

With a rapidly increasing population it is necessary for farmers to depend to an increasing degree upon other forms of activity. Many find employment in public works and other projects within the Basin but increasing numbers of younger men are resorting to part-time employment on the Pacific piedmont and coastal plain. The nature of the society is such that the Indian does not willingly

leave his native environment for a period of time longer than necessary, consequently a relatively small number of inhabitants depart from the highland area on a permanent basis. The increasing pressure of population has aggravated the problem of minute division of land. In view of these circumstances it would seem that the trend toward smaller holdings is not likely to be halted in the foreseeable future. This would encourage the production of maize and make more remote than ever the conversion of the area into anything other than a region of subsistence agriculture.

**Government Policy and Land Use**

Aside from the influence which it has brought to bear upon the production of wheat, the Guatemalan government has had little direct effect upon the use of land in the Basin of Quezaltenango in recent times. The turmoil which accompanied the agrarian reform movements in the early years of this decade was much more violent in the lower Samala region than it was in the upper reaches of the river.

Were it not for the various measures adopted by the Guatemalan government it is doubtful whether or not wheat would continue to be an important crop in the highlands of southwestern Guatemala. The bakeries prefer varieties of wheat and flour produced and processed in
the United States. The imported flour is whiter, more uniform in quality and texture, and generally cheaper, and since it is made from a harder wheat with higher gluten content, nearly a third less than soft Guatemalan wheat is required to produce an equivalent sized leaf of bread.\textsuperscript{11} The native wheat yields rather poorly and the grains are small and lack uniformity in size. Milling facilities are antiquated, turning out a poorer quality of flour than that offered by foreign suppliers.

The government has imposed various restrictions on the import of wheat but with only a limited degree of success. In 1955 it was necessary for the Instituto de Fomento de la Producción (INFOP) to purchase considerable quantities of domestically produced wheat in order to maintain a minimum price which it had established earlier. In conjunction with this the importation of wheat and flour were restricted. The government is actively encouraging the improvement of domestic production and in 1955 announced plans to improve milling facilities believing that this would overcome some of the criticisms which merchants and bakeries have found with the domestic product.

\textsuperscript{11} Sección de Análisis de Mercados, Departamento de Estudios Económicos, Banco de Guatemala, "Condiciones de Mercado del Trigo," Informe Núm. 1 (ditto), Enero, 1953, p. 3.
For the past few years it is estimated that between one-quarter and one-third of all wheat and flour consumed were produced domestically. It is highly unlikely that the Guatemalan government aspires to become self-sufficient in the production of wheat in the near future. With a rapidly increasing demand for wheat and flour it is even doubtful whether or not the nation's farmers can maintain their relative share of the domestic market. More efficient production and better processing may place the domestic producers of wheat in a better competitive position in the future but at the present, the production of wheat in the Basin of Quezaltenango is, in part, dependent upon the policies of the government.

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The Present System of Land Utilization in the Basin of Quezaltenango

The Nature of Land Tenure

In the Basin of Quezaltenango as in much of the highland region of southwestern Guatemala, the agricultural economy is plagued by fragmentación or the chronic division of land into smaller plots. Innumerable persons contacted owned two or more separate plots of land. Various individuals estimated that probably 50 percent of those owning land in the Basin held it in two or more parcels. This feature in landholding will vary from place to place within the Basin.

Size of Landholdings

In the Basin there are at least three farms which approach 700 acres and there are more than ten others which exceed 100 acres in size but in this region large farms are relatively few in number. The agricultural census of 1950 reveals that only 51 of the 12,675 fincas in the municipios within which the Basin is located exceed 55 acres in size. However, this small number of fincas encompass 16 percent of the Basin's area. ¹³ The average size farm in these municipios contains approxi-

¹³ Dirección General de Estadística, Oficina Permanente del Censo, op. cit., Cuadro Num. 25.
mately 3.9 acres of land. The non-cultivable and forested land held privately and by the various communities is included in this figure by the census and if such areas are excluded then the average farm approaches a size of about 1.4 acres.14 Forty-three percent of all fincas contain less than 1.74 acres of land.15 This is in sharp contrast with the Pacific coastal plain area flanking the lower Río Samalá where the average farm is presumably over 100 acres in size, and where numerous farms contain over 2000 acres.

It is of significance that the average size of farms is larger in those highland municipios which are most favorably endowed with good agricultural land. To a degree, this probably represents earlier acquisition of the most favorable sites for agriculture by a limited number of favored persons.

Nature of Land Ownership

The agricultural census of 1950 makes no differentiation as to whether land is held privately, communally, or by the federal government. Most of the land in the Basin is held privately. Except for a few minor except-

15 Dirección General de Estadística, Oficina Permanente del Censo, loc. cit.
tions there is no evidence of land being held by the federal government.

It has previously been noted that various communities throughout the Basin have retained possession of certain lands which evidently were not capable of being cropped or at least not continuously so. The wooded slopes of Cerro Quemada are largely under the control of the adjoining city of Quesaltenango and a portion of the south facing slopes of the Cumbre de Olintepeque are under the control of the nearby village of Olintepeque. Permission to cut wood on these slopes must be obtained from the controlling community and fees for this privilege must also be paid. Whether or not these holdings are still classified as communal is unknown. In the past, various administrations have discouraged the communal system of landholding and, have forced the Indian occupants to obtain title to the land.

**Tenure Status**

In the municipios within which the Basin of Quesaltenango is located approximately 90 percent of the area is farmed by the owners of the land. These farms range from as little as 0.3 of an acre to over 700 acres in size. The majority of farmers possess less than two acres of land. Not only is 90 percent of the Basin's area farmed by owner-operators, but 95 percent of all
farm units are classified as belonging to this category. The preponderance of the Basin's area and farm units in the owner-operated category makes the other forms of land tenure relatively unimportant.

Second of importance are the administered units which tend to occupy the best land available. These fincas make up only 0.5 of all farm units but they occupy four percent of the land in these municipios. This reflects the larger size of administered units which average nearly 29 acres in size as opposed to the 11,985 privately owned and operated farms which average about three acres in size.

The arrendatarios, colonos, and occupantes who are important elements in the system of land tenure in the lower piedmont and coastal plain region of the Rio Samala are also to be found in the Basin of Quezaltenango; however, they are relatively unimportant, for they comprise less than 2.5 percent of all farm units and retail possession of about one percent of the land area.

Agricultural Production

The agricultural economy of the Basin of Quezaltenango relies primarily upon the production of the two

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16 Departamento de Estudios y Análisis, op. cit., pp. 49-50, 73.
17 Ibid.
grains, maize and wheat. The maize is grown mainly for consumption by the producer. Wheat is produced for domestic consumption although it is not normally consumed in great quantity by the producer. The production of livestock for food and fiber is of secondary importance and third ranking in importance are a miscellany of agricultural commodities, several of which are closely associated with the production of wheat and especially maize.

In the Basin maize is generally planted between the tenth and twentieth of March. On slightly higher slopes it is apparently planted a little earlier. Where germination has been poor or where frosts have destroyed the first planting the maize is replanted. Preparation of the soil and planting are accomplished manually. Neither machinery nor draft animal were reported to have been used extensively for this purpose. There are limited quantities of animal manure and other organic matter which are used in the preparation of the soil. Compost is made from a mixture of manure, garbage, dried leaves gathered from the forest, and an assortment of green vegetation. A large number of small plots of maize are located about home sites where they are fertilized of large quantities of human wastes.

During the course of the growing season the maize
is normally weeded on three occasions. When it is about a foot and one-half high a small mound is formed about the base of each hill. After the stalk has reached from five to five and one-half feet, the height of the mound is increased (Figs. 47 and 48). These mounds of earth around each hill prevent the stalks from falling down. The hills are frequently formed so as to create a continuous ridge which acts as a deterrent to erosion. This is especially important on the steeper slopes.

At maturity the purplish hued stalks of maize normally exceed ten feet and under favorable growing conditions they reach between 12 and 13 feet in height. The maize is not doubled as it is in the lowlands but is left standing upright until the harvest, which begins about the first of November and is normally completed by the end of December.

According to the census, the average field of maize is about one acre in size and the average yield is about 14 bushels per acre. A crop of 66 bushels per acre was reported by using a quantity of sheep manure. Several reliable informants reported that they received about 33 bushels per acre which is certainly well above the average reported by the census. On the slopes about the Basin the yield was reportedly less than eight bushels per acre.
Fig. 47. — During the growing season mounds of earth are formed about the hills of maize to prevent the stalks from falling down.

Fig. 48. — The mounds of earth formed about the hills of maize often form a continuous ridge which is an important factor in reducing erosion on steeper slopes. Interplanted is the broadbean.
After the harvest, the white, yellow, purplish and mottled grained ears are stored until consumed or sold. The ears are never shelled for the purpose of storing, for this apparently promotes the rapid deterioration of the grain. Under existing conditions of storage it is doubtful whether or not maize can be kept for more than six months.

A number of important crops are interplanted with maize. The most important of these is the broadbean which is also interplanted to a lesser extent with wheat. This bean is normally planted after the maize has germinated, although in several instances, it was reported to have been planted at the same time as maize. It is normally planted between the hills of maize but was also seen where it appeared to be in the same hill with the maize. Harvest normally takes place in October and the yield averages about four bushels per acre. A yield in excess of six bushels per acre was considered to be very good. Although the bean is eaten by the natives, it also appeared to be important as a cash crop.

Other varieties of beans of lesser importance are also grown with maize. They are the frijol del suelo and frijol del varo which are respectively what we would call the bush and the pole bean. The former is normally planted between the hills of maize whereas the latter is
Fig. 49.- The broadbean (haba) is the most important interplanted crop in the Basin of Quezaltenango. Although it is more frequently interplanted with maize it is also found in fields of wheat.
planted in the same hill. The yields are smaller than in the case of the broadbean. There is another bean called the píloy or butter bean, which apparently is not planted but comes up at random. In some fields, makeshift racks are erected to support the vine. Peas were also observed interplanted with maize and this is the only cultivated leguminous crop seen planted in a plot by itself. This latter vegetable is apparently intended only for sale.

Ayote and chilacayotes, two varieties of squash are also grown with maize. They provide an additional store of food but, for the most part, find their way to local markets.

The production of wheat occurs under a much greater range of circumstances than is the case with maize. This is based primarily on the scale of production. As in the case of maize, there is the small producer of wheat who prepares the soil, plants, weeds, and harvests his crop manually (Fig. 51). At the other extreme is the mechanized producer of wheat who mechanically prepares and plants his crop although it may, in part, be harvested manually. In between these two extremes is a very small minority of producers who prepare their fields with the aid of draft animals, and then broadcast the
Fig. 50. - In the Basin and on the adjoining slopes wheat is produced by the small producer who prepares the soil, plants, weeds, and harvests his crop manually.

Fig. 51. - Hand weeding a field of wheat.
seed. The harvest in this latter case is normally accomplished manually.

The small producer, using no fertilizers, plants his wheat in paralleling elongated ridges (Fig. 49, 51 and 52). As a rule, these mounds follow the contour. The furrows between them are about 15 inches wide. Ridges of soil are frequently placed across these furrows to minimize runoff and erosion. Broadbeans are frequently planted on these ridges. The empty furrows provide entry into the fields for the purpose of weeding. Hand weeding is usually performed twice during the growing season. The yield of wheat by these producers is not likely to exceed 12 bushels per acre and more than likely averages between eight and ten bushels per acre.

The large-scale mechanized producer of wheat differs from the smaller producers in many respects. He uses chemical fertilizers which provide him with greater yields. Since the wheat covers the entire field, entry for weeding is not possible without damage to the stalks. The interplanting of broadbeans is likewise impossible. Also the mechanized farmer is more likely to sow tested and proven varieties of seed whereas many small producers

18 The preliminary data supplied by the agricultural census of 1950 report in Chart No. 179 that only 120 fincas out of 12,675 in the Basin area utilized draft animals in the preparation of the soil in that year.
continue to plant old unimproved varieties. The mechanized producers reported yields averaging about 18 bushels per acre. The Gregor Mendel wheat experiment station northeast of the city of Quezaltenango has obtained more than 26 bushels per acre in the testing of 20 improved varieties of wheat.19

The agricultural census of 1950 reports that 35 percent of the cultivable area in the municipios within which the Basin of Quezaltenango is located was devoted to the production of wheat. Since 1950 there has been an increase in production due to various measures passed by the government to encourage output. One of the most important of these has been a base price of six dollars per hundredweight which the government has established for the domestically produced commodity. There has been no agricultural census by municipio since 1950 but in the department of Quezaltenango the production of wheat, which is centered in the Basin of Quezaltenango, increased by nearly one-third between 1950 and 1955. Inspection about the Basin indicates that the area in wheat now approaches that in maize.

Within the Basin there are nearly 600 acres of

potatoes most of which are grown in the extreme south-western portion of the Basin to the west and south of San Juan Ostuncalco and Concepción Chiquirichapa. The agricultural census of 1950 also reports the production of vetch, oats, and barley, but in all instances these involve less than 30 acres and were not observed growing within the Basin of Quesaltenango.

Varieties of fruits are produced among which apples, plums, and peaches are the most important. The Basin produces approximately one-third of the nation's supply of the two former. For the most part the fruit is produced from unimproved stock and the quality of fruit is exceedingly poor. A variety of wild cherry is also an important fruit but it is not listed in the census. A small variety of additional commodities are produced but they are unimportant in terms of the aforementioned crops.

The livestock industry provides another important source of income for many farmers in the Basin of Quesaltenango. For the most part, however, the production of livestock is a more important source of income in the surrounding regions than in the Basin proper. Within

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20 Dirección General de Estadísticas, Oficina Permanente del Censo, op. cit., Cuadro Núm. 43.
21 Ibid., Cuadro Núms. 69, 72.
the Basin draft animals are few in number. Pasturage is limited. During the growing season animals, tethered or tended by young children or women, feed among roads or pathways, on slopes of deeply incised streams, and on level sites along the larger streams where waterlogged soil makes the planting of crops impossible (Figs. 52 and 53). After harvest the animals feed on what vegetative matter remains in the cleared fields.

Sheep number about 27,000 and they exceed by a considerable extent the sum total of all other forms of livestock in the Basin of Quezaltenango. In numbers swine are next in importance. They are rather evenly distributed over the entire department of Quezaltenango; however, they vary in terms of marketability. Suckling pigs and breeding swine tend to be concentrated in the Basin and surrounding highland while sows and barrows are likely to be more characteristic of lower-lying areas to the south where the tattening process is facilitated by the availability of cheaper feed.

Beef and dairy cattle and horses are far more important in the lower piedmont area of the department of Quezaltenango than in the Basin to the north. The requirement of grazing areas for these livestock prohibits the

22 Ibid., Cuadro Num. 81.
23 Ibid., Cuadro Num. 91.
Fig. 52. - In the Basin of Quezaltenango pasturage is limited. During the growing season animals, tethered or tended by young children or older women, feed along roads or pathways. After the harvest the animals feed on what vegetative matter remains in the cleared fields.

Fig. 53. - Grazing sheep tended by a lad.
concentration of large numbers in the Basin of Quezaltenango.

The census completes its data on livestock with listings on burros and mules, the latter being over three times as numerous in the Basin of Quezaltenango than the former. Unlike the horse, which is found in greater numbers in the lower portion of the valley of the Río Samalá, the smaller numbers of burros and mules tend to be concentrated in the Basin of Quezaltenango and the highlands immediately to the north.24

With the exception of maize, the agricultural crops of importance in the Basin of Quezaltenango are totally different from those produced in the lower Río Samalá region. Unlike the lowlands, the variety of important agricultural crops is distinctly limited, and the recent introduction of new crops is virtually unknown. Insofar as livestock in the Basin are concerned, sheep are a measure of importance that can be compared only with cattle in the coastal plain area of the lower Río Samalá. According to the agricultural census of 1950 there are a greater number of livestock and a greater variety of domesticated animals in the Basin of Quezaltenango than in the Río Samalá sector of the Pacific coastal plain.

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24 Ibid., Cuadro Núms. 33, 85.
It is possible that greater numbers of livestock may come into existence in the lowland region in the near future; however, the nature of the physical environment provides the highlands with a greater array of domesticated animals and this will probably continue into the foreseeable future.
SUMMARY AND CONCLUSION

An attempt has been made to portray the manner of land utilization in the upper and lower region of the Río Samala. The presentation of historical antecedents to the present system of land utilization and of factors currently involved in the mid-twentieth century pattern of land use indicates the background and character of the environment within which economic and cultural activity presently takes place. The major obstacles, inducements, and dangers involved in any consideration of improved use of land have also been implied.

In the vicinity of the lower Río Samalá there are a number of obstacles which act as deterrents to improved methods of land use. For the most part, the land is held in large holdings by absentee owners many of whom make little effort to develop potential land resources. The region is plagued also by a paucity of labor and total inadequacy of transportation. The continuing shortage of labor is inherent in the nature of land tenure although there is an admitted reluctance on the part of many individuals to enter this region, especially on the part of highland Indians. The prospect of immediate improvement in the manner of land use is further limited by the small size of the domestic market and dependence upon
the uncertainty of sales abroad. Less explicit but most outstanding is the shortage of capital for developmental purposes. This problem is common in all aspects of the Guatemalan economy and looms especially important in the unoccupied lowlands where it becomes necessary to supply even the most basic needs of the populace in order to establish any number of individuals in the region. The lack of political stability is of lesser significance but it too has nation-wide implications and tends to destroy the continuity of any program involving improvement in land-use policies.

In the lower Río Samalé region the major inducements to improved methods in land utilization are primarily inherent in the physical elements of the coastal landscape. There are extensive stretches of level land which provide the permissive element for mechanization. In the lowlands the extensive area of land under uniform climatic conditions lessens the requirement for a large number of varieties of a particular crop. This is in contrast with the highlands where slight changes in position may radically alter the conditions under which crops are grown. By far most of this area has not been farmed for many centuries and a cursory investigation reveals that the soil throughout the region tends to be relatively fertile. There is an abundance of moisture during one-half of the
year and streams flowing throughout the year provide a potential dry season supply of water. The continual warmth makes possible the annual production of more than one crop in the same field, although control of disease and insects is made more difficult thereby.

If improvement in land use presupposes increased mechanization in agriculture, then the nature of land tenure which involves large landholdings and the low density of population contribute to that end.

The greatest danger in the development of an advanced form of land utilization in the lower Río Samalá region involves the establishment of an inadequately financed and poorly directed type of settlement in which the inhabitants are able to maintain but not improve their level of living.

In the Basin of Quetzaltenango the most impressive features affecting land use appear to be the nature of the terrain and the large number of people who occupy the Basin and surrounding region. The Basin of Quetzaltenango encompasses an area suitable for agriculture, but such surfaces are limited in the surrounding highlands. The shortage of good land obliges many inhabitants to earn an inadequate living tilling land which is unsuited for that purpose. The exceedingly rugged nature of the surrounding terrain also compounds the problem of communica-
tion and maintains a degree of isolation for the Basin area.

The Indian inhabitants of the Basin are sorely in need of long-term aid in the fields of health, sanitation, and education. The exceedingly high rate of mortality in Guatemala is attributable to the living conditions among the highland Indians. In addition to widespread illiteracy, there is a language barrier caused by the large numbers who speak only one of the various Indian dialects. While these cultural problems may be resolved, no short-cut solution is possible. Consequently, considerable amounts of time and effort will be required to overcome these obstacles.

In the Basin of Quezaltenango as well as in the lower Río Samalá region, the shortage of capital and the political instability create stumbling blocks in any attempt to improve methods of land use. Of these two deficiencies, the shortage of capital is paramount.

Programs involving the improved use of land in the Basin of Quezaltenango might well be enhanced by a number of factors. The climate afforded by the degree of elevation makes it possible to produce agricultural commodities on a scale that cannot be matched in any other part of Central America. Even though these commodities may be purchased more cheaply from foreign nations, production in Guatemala has the virtue of conserving foreign
exchange. Much remains to be done in the way of improving the productivity of crops already successfully grown in the Basin and eliminating those agricultural endeavors which can be accomplished more profitably in other regions of the nation.

The high density of population in this region is not necessarily a handicap in that it affords a ready supply of labor which might be used to great advantage under proper circumstances.

In dealing with the matter of improved use of land in the Basin of Quezaltenango, the primary dangers are inherent in the attitudes which prevail among responsible individuals. There are several extreme expressions of this attitude. Many display a resigned feeling of hopelessness. The feeling is that nothing can be done about the highland situation at this time, so why try. It is assumed that the future of the nation lies in other sectors not blighted by an intransigent Indian society; furthermore, it is felt that if the lowlands are made productive then the highland society will eventually come to benefit. On the other hand there are those who, underestimating capital requirements and overestimating the mobility of these people, advocate a wholesale voluntary movement of highland people to unoccupied regions of the nation. Within the framework of reference there exists a variety of approaches which are usually arrived at
emotionally and unrealistically.

When speaking of the future there is a tendency to think in terms of unoccupied areas. In Guatemala there is a prevalent belief that factors favor land-use development in the lowlands rather than in the highlands. This may be true; however, there should be a suppression of the over-optimistic views which frequently prevail with respect to land-use development in lowland zones.

Any form of development in land use requires capital and technical aid. In an underdeveloped economy such as that of Guatemala, these requirements are great. The nation's capacity to accumulate capital is limited and even with the capital assistance of advanced countries the funds supplied fall short of needed requirements. Consequently the government is not capable of carrying on more than a small number of major developmental projects simultaneously. In view of limitations in funds it seems logical that economic development should proceed from relatively simple and inexpensive undertakings to more complex and capital-demanding projects and from sound knowledge of resources to resource development. Past schemes in the development of land use indicate that there is a temptation to yield to those projects in which material advance is readily and quickly perceptible. It is much more spectacular to establish a virgin community
in a newly cleared jungle than it is to introduce a new type of wheat which increases yield by 15 percent, or to construct a modernistic school than to staff it with teachers. It is the insufferable necessity to show immediate material progress as a signal of success that dooms many projects before they are begun.

It is assumed that the benefits derived from the improvement of land use in the lowlands will gradually filter out to the impoverished segments of the upland society. First of all, the shortage of capital restricts the development to limited areas. Consequently, this provides a very small base for the dissemination of benefits. Secondly, there is actually no advantage in developing a new area to aid the old if the old remains unreceptive of benefits offered by another segment of the economy. For example, the increased production of maize in the lowland is not contingent upon an ability to produce more maize, but rather upon the ability of the impecunious highland populace to afford the commodity. Any alteration in their purchasing power involves a relatively long-term economic transformation.

Great hope is placed in an agricultural revolution through mechanization. In this respect the lowland regions appear most favorably situated. There is a need for increased mechanization to reduce the cost of production;
however, there is some question as to whether or not this supplies an answer to the estimated future needs of the populace. Will an innovation such as mechanization increase the consumptive capacity of the majority of people? The answer to this is probably no. Unfortunately, we give undue attention to labor-saving devices and fail to realize the importance of labor-absorbing tasks which would certainly be to the advantage of the large numbers of poverty-stricken highlanders of southwestern Guatemala. The feat of mechanization is comprehensible and from a purely scientific point of view can be easily accomplished; however, to initiate the formation of labor-absorbing tasks involves a time-consuming movement necessitating, among other things, the creation of a receptive attitude among the Indians. It also involves work in education as preliminary to training programs. Progress in this direction can only be slow and the effort is unrewarding but yet exceedingly necessary. It is the attempt to sidestep or delay these pains-taking preliminaries that creates irrationality in the programs for improved methods of land use in Guatemala.

There can be no doubt that cultural institutions often resist sudden change and thus create a barrier to economic development; however, these resistances reside not only within the Indian society but are implicit in the feudal attitude maintained towards agriculture and
held by many of the educated. Fortunately, we know that rapid transformation is possible. Consequently the future holds some hope in this respect.

The unqualified attitude that development in one region is favored over another is dangerous. The desire to develop the lowlands at the expense of continued progress in the Basin of Quetzaltenango and the surrounding highlands in southwestern Guatemala cannot be justified morally, let alone economically. There is need for equal consideration of both the highland and the lowland problems in land use and of the long-term as well as the short-term benefits to be derived from improved use of land. Political stability and the creation of a favorable atmosphere for domestic and foreign capital will contribute greatly in creating reality out of well-conceived aspirations.
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AUTOBIOGRAPHY

I, Oscar Heinz Horst, was born in Newark, Ohio, March 4, 1924. I received my secondary school education in the public schools of Newark, Ohio. Most of my undergraduate and graduate training has been obtained from The Ohio State University, from which I received the degree Bachelor of Science in 1949 and the degree Master of Arts in 1952. Undergraduate credit was obtained also from Mexico City College and The University of Texas where I attended school in the summers of 1947 and 1949, respectively. Work towards the degree Doctor of Philosophy was continued at The Ohio State University during the 1951-52 academic year after summer attendance at the University of Tulane field school in Guatemala. Graduate studies were pursued at The University of Texas during the following year, after which I returned to The Ohio State University to complete the requirements for the degree Doctor of Philosophy. While working towards this degree I have served as Graduate Assistant, Assistant, and Instructor in the Department of Geography at The Ohio State University.