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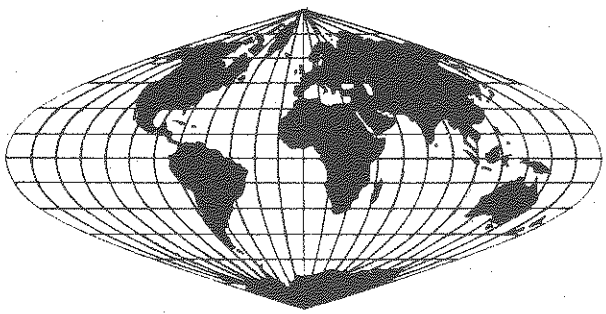
CORNELL/INTERNATIONAL AGRICULTURAL ECONOMICS STUDY

AGRICULTURE AMONG THE LOPIT LATUKA IN EASTERN EQUATORIA, SUDAN

by Dwight A. Jurey



DEPARTMENT OF AGRICULTURAL ECONOMICS
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DEPARTMENT OF
AGRICULTURAL ECONOMICS
WARREN HALL

December 1981

It is a pleasure to introduce Dwight Jurey's monograph on agriculture among the Lopit Latuka of southern Sudan. The study could not have been done at a better time. The Latuka have been little affected by development. In the nineteenth century they were exploited by Arab slave traders, then ruled--and largely ignored--by the British well into the twentieth. Only since the end of the 17-year post-independence civil war in 1972 has positive change been possible.

Mr. Jurey was thus able to record the traditional cultural and agricultural practices of this people, and he has done so in great detail. Local history, tribal ceremonies and dances, the structure of Latuka society, soils, climate, cropping systems, and wealth distribution all come under his scrutiny. His analysis also enables him to recommend a strategy for change and development. The strategy he suggests is based on resources available to the Latuka. Its components are designed to modify their systems of agriculture, culture, and the household while leaving these systems basically intact. He attempts to put forth both a feasible strategy and one which will be equitable in its impact.

The study is based on extensive field work. From June through November 1980, Mr. Jurey lived among the Latuka and closely observed their practices. His research and travel were made possible by a Hudson-Lyon Scholarship; Cornell University and The Honor Society of Phi Kappa Phi also supported him with fellowships. While in the field he was associated with the program of the Africa Inland Mission.

The contribution of others to Mr. Jurey's work is gratefully acknowledged.

- At Logotok a number of villagers deserve special thanks; unfortunately the second names of some are not available:

Chief Daniel Imeri	Otia
Tobia Oliha	Elija
Michael Otongo	Martin
Josiah Odwa	David
Lomiang Romeo	

- Among the staff of the Africa Inland Mission, the following were especially helpful:

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David and Johan Gladstone	Susan Massena
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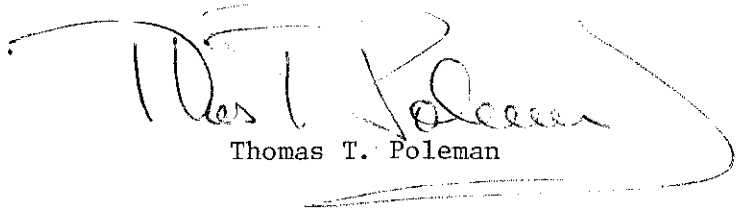
Raymond and Betty Pontier	Rob Van Os

Lillian Thomas deserves special thanks for helping with innumerable details attendant to preparing the manuscript; Joseph Baldwin for drawing the figures and maps; and Lewis Relyea for helping prepare the plates and printing the final copies. It is also appropriate to note our indebtedness to Professor David Norman of Kansas State University, whose concept of the farming system greatly influenced the content of the study.

It is most satisfying for Professor Randolph Barker, the other member of Mr. Jurey's Special Committee, and me in this way to recognize the work of a superior student.



Thomas T. Poleman

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GLOSSARY OF LATUKA TERMS

Abaloni - The highest traditional authority below the rainmaker. The abaloni is closely associated with war and hunting.

Aburio tulo - The funeral dance.

Aduri holwang - Older boys not yet initiated into manhood.

Alam - Either of two dances done for the rainmaker.

Amalong - A type of monkey serving as totem for the clan Hachohi.

Amuroni - A traditional healer.

Angotemana - One who is said to magically ward off crop pests and diseases.

Awoyo - Patrilineal clan.

Ayomana - A dance to keep pests away from the crops and to kick off the main sorghum and millet harvest.

Eboni - A seer.

Efira - The celebration that occurs when the final age class making up a generation is initiated.

Ekanga - A dance celebrating the completion of harvest.

Epifoho - A dance.

Etobok - A war dance.

Habi - Husband.

Hahanyi - Grandmother.

Hahotani - Wife's sister, husband's brother, brother's wife, sister's husband.

Hani - Co-wife.

Hanie - Full sister.

Hatar - A dance.

Hobu - Rainmaker or chief.

Hohonyi - Grandfather.

Homani - Father-in-law, mother-in-law, son-in-law, daughter-in-law, sister's son's wife, husband's mother's brother.

Honye - Mother.

Hotu - Father's sister's husband or mother's sister's husband.

Ibele - A type of bird serving as the totem for the Owangi clan.

Ilesi - Wife's brother or sister's husband.

Illa - Full brother.

Iyanyi - Father's sister or mother's sister.

Jok - Evil or god.

Lonyi - Son.

Makungu - Local government official in charge of a village group.

Mamanyi - Father's brother or mother's brother.

Monye - Father or sometimes father's brother.

Monyemana - Father (or owner) of the garden.

Monyemiji - Men of warrior age. Literally, "fathers of the village".

Nadupa - Hut where the village drums are kept.

Nametere - The bundle of grass and sticks representing the deceased at a funeral.

Ngari - Daughter.

Ngarihonye - Husband's sister, brother's wife.

Ngorwoi - Wife.

Nyipara - Local government official in charge of a village.

Obele - A multi-tiered lounging platform for the men of the village.

Soni - Father's sister's child, mother's sister's child, or mother's brother's child.

Wehe - Child of same father but different mother or child of father's brother.

CHAPTER I

INTRODUCTION

The plane was cutting across Ugandan air space on its way to Logotok, a village midway between Torit and Kapoeta in the south of Sudan. (See map 1) It was the beginning of the rainy season, but the sky was clear. There were four of us. The pilot was an expert at landing small planes on crude airstrips carved from the African bush. He worked for Africa Inland Mission (AIM) which had recently begun work at Logotok. AIM was under contract with the government to set up a series of Sudanese staffed health care centers in Logotok and other villages along the Lopit Mountains. An Irishman and his English wife were the other two passengers. The Irishman would supervise the building of the clinics and staff houses for the project.

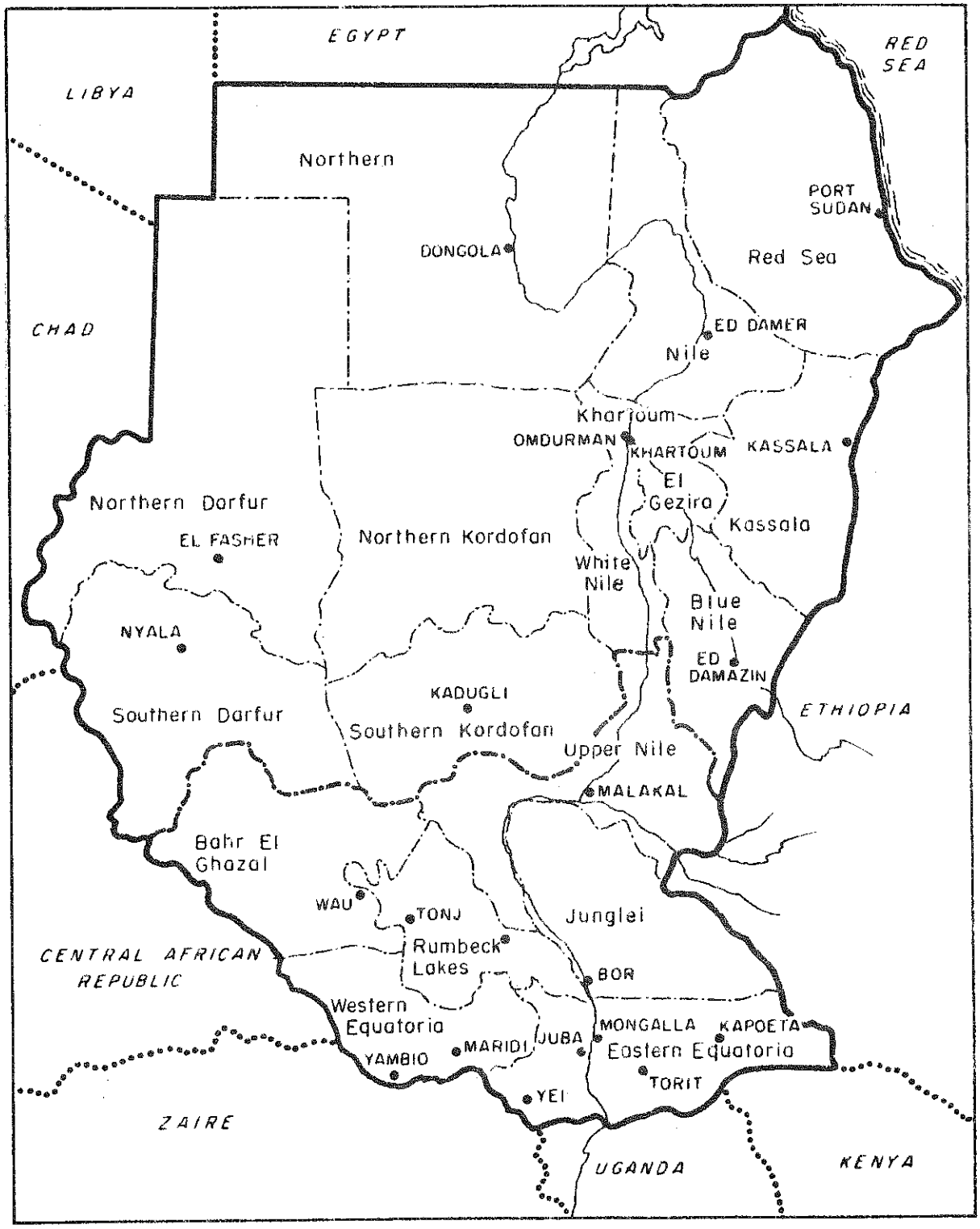
I had contacted AIM several months before, asking if they had an opening for a student of agricultural economics. They were interested in adding an agricultural development component to their work at Logotok. They invited me to spend five or six months doing background study for this. My M.S. thesis would be based on this research.

We went through customs at Juba. Then we headed toward Logotok. From our vantage point the Lopit Mountains appeared almost lonely. They projected from a vast plain of flat to gently undulating and mostly uninhabited land. The scattered villages on the mountain flanks blended with the mottled green and brown landscape of trees, fields and rock outcrops.

The plane bounced a couple of times, settled down on the grass runway and rolled to a stop. We were met by an American woman with many years of experience in Uganda and Sudan, a Dutch family recently arrived and a multi-aged group of smiling Latuka tribespeople. The Dutch man and the American woman were nurses working with the project. The expatriate staff was rounded out by an administrator and his family who were absent on a short vacation. After greeting us the expatriates began unloading from the plane their monthly supply of fresh food and mail.

The Latuka were very friendly and outgoing. The men set aside spears and hoes and approached the plane. Handshakes were accompanied by rapidfire repetition of the Latuka greetings "mong" and "ogolo". Women on their way to the fields with babies strapped onto their backs, stopped to welcome us. Children shook our hands or, if they were shy, watched us and smiled before returning to school or the fields which they guarded from monkeys. Eventually all the appropriate greetings were exchanged and we were left to settle into our new home.

MAP 1. THE SUDAN: POLITICAL DIVISIONS, 1980



-·—·- Boundary of Southern Region

Research Objectives

I wanted my research at Logotok to result in a description of the local farming system. I wanted to identify major factors that brought about the current farming system and those that would shape its future. I hoped also to predict the effect of current government development programs and policies and to suggest a development strategy that would bring to the Latuka equitably distributed economic growth. Achieving this would require gathering information about many subjects.

To understand both the uniqueness of Latuka agriculture and the features it shares with other southern Sudanese agricultural systems, a general description of the south was needed. This description is contained in Chapter II, which devotes special attention to Eastern Equatoria and Western Equatoria provinces. The physical environment of various parts of the Equatoria provinces is discussed. Crops and livestock grown in the different areas are outlined and compared. Tribal differences within the provinces are described. The uniqueness of the south vis a vis the north is also discussed. The contribution of geography, external political forces over the past two centuries and the recent civil war to the current impoverished state of the south is examined. Finally a survey of development projects underway or planned in the Equatoria provinces is included.

As in any tribal society, agriculture and culture are closely related among the Latuka. Latuka culture is therefore extensively examined in Chapter III. Previous studies of the Latuka (there are few) are briefly reviewed. The history of Logotok, taken from oral accounts, is discussed. The structure of Latuka society is seen through studying family relationships, age classes, the clan system and traditional systems of government. Finally the ceremonies and dances of the Latuka are described. Most of these center around agricultural events.

Chapter IV describes the crop and livestock system along with its technical determinants. This includes an investigation of topography, climate, soils, natural vegetation, crops and cultivars. Cultivation techniques, crop rotations and fallowing receive special attention. The importance of livestock and of wild plants and animals in the tribal economy is briefly examined. Labor use over the year in the farming system is outlined. Sex and age roles for agricultural tasks are recounted. Attention is given to techniques the Latuka use in adjusting to and reducing seasonal variations in labor requirements. Finally an attempt is made to analyze the distribution of wealth at Logotok. To do this, distributions of land area cultivated per household and value of livestock owned per household are used.

Chapter V reviews the needs to be met by a development program. A program based on the existing farming system and other available resources is outlined. Its major components are discussed in detail. Recommendations about the timing of the implementation of these components are made. Changes the recommended strategy would require in current government programs are discussed. In the end, a more prosperous future is cautiously predicted for the people of Logotok.

Information Sources

The types of information needed for this study were many. Several methods of collecting information had to be used. Broadly, these techniques were informal conversations and interviews with farmers, direct personal observations in the fields and villages, a formal survey, visits to rural development centers and reading published materials.

Informal Conversations and Interviews

To give direction to informal conversations and interviews with farmers, I found it crucial to maintain an outline of all information collected. Constant reviewing and updating of this outline revealed areas where more detailed information was needed or where knowledge about relationships between various parts of the farming system was lacking. Conversations and questions were directed so as to fill these gaps. The new information thus gathered was incorporated into the outline. Further gaps in knowledge of the farming system were thereby revealed and the information gathering began anew.

In interviewing villagers, it was very important to direct certain questions toward particular individuals. The older the individual, the greater was his knowledge of the culture and the intricacies of the farming system. Questions requiring thorough understanding of culture, farming or the past were thus directed at older men. The elders of the tribe were the only ones able to discuss the totem animals associated with the patrilineal clans. Younger people who had spent much of their lives as refugees in Uganda during the disturbances often knew much less about tribal culture and agriculture than their elders. Language also limited whom I asked questions of. A handful of individuals who were especially fluent in English answered the most complex questions. Less complicated questions were addressed to villagers who spoke English but haltingly. Only with difficulty were those who spoke no English queried, and then usually with the help of interpreters. (My information gathering was likely biased because no Latuka women spoke English.) To learn about livestock herding, men with stables were interviewed. While investigating traditional medicines, a tribesman who had received some medical training was interviewed. He was familiar with both technical terminology describing diseases and traditional remedies for treating them.

In informal interviews it was useful to solicit classification systems employed by the farmers. For example, all sorghum varieties were classified into one of two planting groups. Groundnut varieties were classed into two plant types with one variety sometimes considered a third type. Probing for more detail was almost always successful. In this way, a list of sorghum varieties expanded from five to more than twenty.

Searching for exceptions to general statements was especially important in eliciting unanticipated knowledge. I questioned one man about exceptions to the tradition that harvest may only begin after a

certain dance is performed. He revealed that mountain fields may be harvested before this dance as they mature early. In addition, a special ceremony may be performed in famine years so that harvest may begin early in all the fields.

Searching for the rationale behind a practice was another useful interviewing technique. One of my informants, in talking of crop rotation stated, "Millet grows faster after sorghum." An owner of a cattle stable commenting on the division of milk between himself and the man herding cattle said that the man with the most people to feed would receive the most milk.

Direct Observation

In addition to conversations and interviews with farmers, direct personal observations were made in the fields and villages. Crop diseases and weeds were best identified in this way. Soil types and their association with topography were also found in this way. Personal observation supported by further questioning led to much information about ceremonies and dances. It was particularly helpful to be continually in contact with the Latuka so that unexpected events could be observed. Personal observations most importantly provided a valuable check on information from the interviews.

Sample Survey

Some types of information could not effectively be gathered through personal observation or informal interviews. A survey was conducted to collect some such information. It covered a sample of 61 households chosen randomly from the 238 households in the village. The survey was simple and brief because it was targeted only at information that could not be collected in easier ways. It was administered in less than a week by four school children. The survey was used to find out the areas planted to various crops by each household. Locations of fields were recorded. The number of livestock owned and data about them such as sex, mortality, number sold, number slaughtered and number stolen were collected. The composition of the household was recorded as were such facts about the head of household as clan and age class.

A census had been done of the Logotok villages shortly before I arrived. It was supervised by the headmaster of the local school. This provided population information broken down by village, age and sex. It was very helpful in defining the population from which my random sample was drawn.

Rural Development Centers

I visited three of the government's new rural development centers. These were in the Latuka, Didinga and Taposa tribal areas. These visits provided important knowledge about the government's development plans. For example, the crops being emphasized were evident through observing the variety trials. The types of technology being promoted were outlined by those in charge of the centers. How close programs were to being introduced to farmers was also easily observed. Other traveling, though limited, in most of the mountain ranges of Eastern Equatoria, the plains between them and the semi-desert area in the east contributed to my understanding of the region and the tribes inhabiting it.

Published Information

For historical and other background information I had to rely heavily on published material. This was generally adequate, though more complete information about the north - south civil war which ended in 1972 would have been interesting. Much information about development policies at the national level was gleaned from Sudanow, an English language magazine published in Khartoum. There is little published information about Latuka culture. The only significant study was done in the third decade of this century (22 p.305-339). Published information about Latuka agriculture is, for all practical purposes, non-existent. This work is intended to remedy that situation.

CHAPTER II

THE EQUATORIA PROVINCES

The Khedive Ismail of Egypt appointed Sir Samuel Baker in 1869 to annex Equatoria to Sudan, govern it and suppress the slave trade. Baker was replaced in 1874 by General Charles Gordon who immediately and successfully demanded of Ismail that Equatoria be treated as an independent state (15, pp. 184-185). This was to facilitate administration and the ending of the slave trade. In 1936, under British rule, Equatoria was established as a province. Originally it also included present day Bahr el Ghazal and Lakes provinces. Recently it was further divided into two provinces as part of the government's effort to decentralize political power. These two provinces are Western Equatoria and Eastern Equatoria which I will refer to collectively as the Equatoria provinces. These provinces together with Bahr el Ghazal, Lakes, Junglei and Upper Nile provinces constitute the Southern Region which has its administrative center in Juba (Map 1). In general, I will center my attention on the Equatoria Provinces, the area of my study. In discussing politics, however, it is more useful to examine the south as a whole and its differences with the north. The focus of this chapter will hence occasionally shift from the Equatoria provinces to the south.

The Equatoria provinces span the width of Sudan's southern flank. They border on the Central African Republic in the west; Zaire, Uganda and Kenya in the south and Ethiopia in the east. Within their limits are variations in natural conditions perhaps greater than in the rest of Sudan taken together. This situation presents the agricultural policymaker with a unique challenge. The challenge is that not one but a multitude of strategies must be implemented to develop traditional agriculture in the internally diverse Equatoria provinces.

There are already large differences among tribes in accessibility and in degree of exposure to new technologies. The timing of the implementation of development projects relative to one another will profoundly affect income differences among tribes. Those sedentary tribes near the Nile will likely be the first to benefit from development. The remote, semi-nomadic peoples along the Ethiopian and Kenyan frontiers will be the last reached by agricultural development. Policymakers ought then to strive against this bias imposed by location, climate and culture. Special efforts should be made to extend programs to remote and difficult areas. This will result in greater equity, albeit at the expense of lower rates of return on development expenditures.

Information about the Equatoria provinces and the south is difficult to find. The following information is included so that the reader may evaluate the applicability of the research I conducted among the Latuka to other parts of the Equatoria provinces. The special position of the south within the nation and development programs in Eastern Equatoria will also be discussed.

Geology, Soils and Climate

The Nile (which in this region is called the Bahr el Jebel) enters Eastern Equatoria from Uganda. It is from Lake Victoria in Uganda that it receives most of its water. From Nimule near the Uganda border the Nile travels through a well-defined gorge to Juba. Because of occasional rapids this stretch of the river is not navigable. At Juba the Nile begins to spread into flood plains and swamps. Juba marks the upper limit of navigation on the Nile. Traffic up the Nile provides Juba with an important link to the north (26, pp. 882-883).

The border of the Equatoria provinces west of the Zaire-Uganda interface follows the Nile-Congo divide as shown in Map 2. This area is gently hilly and ranges between 700 and 1100 meters above sea level. Between this area and the lower land to the north and east is the ironstone plateau. Rainfall here is around 1200 to 1400 millimeters per year, making it among the wettest areas in the country. Alternate water-logging and drying under conditions of severe weathering have formed a layer of hard, red concretionary ironstone a short distance below the surface throughout this plateau (3, pp. 54-56). The soils of the ironstone area are typically "red and non-plastic on the hills, and pale, mottled with iron stain and slightly plastic in the valleys" (3, p. 251). Most of the ironstone region is infested with the tsetse fly, making animal husbandry very difficult.

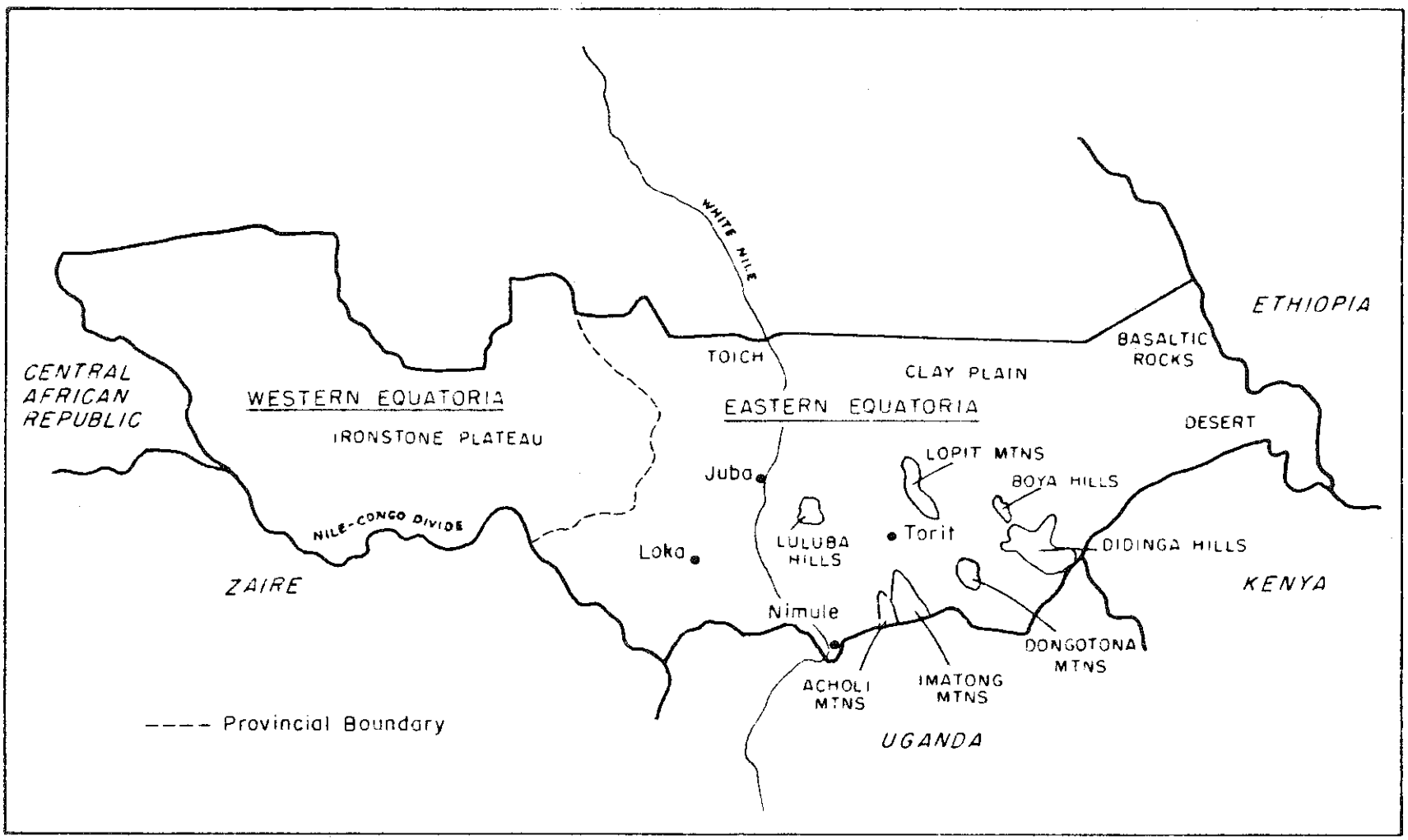
Between the ironstone area and the clay plains to the north and east are found soils of the toich catena. These are located on land that is only gently rolling. In the highest areas are red soils that are fairly fertile. On slopes below these is a pale, bleached soil with an ironstained subsoil. In the flood plain, the soil is leached and ironstained near the surface but alkaline in the deeper layers (26, pp. 147-150).

The land east of the Nile (except for some areas in the mountains) is in general drier than that to the west. For example the average annual rainfall in Loka (west of the Nile) is over 1300 millimeters whereas in Torit (east of the Nile) it is under 1000 millimeters (26, p. 82). Rainfall in the west is also more regular and evenly distributed than in the east.

The northern part of Eastern Equatoria is a plain which is swampy during the wet season and parched during the dry season. This plain receives the runoff from the mountain and hill masses which dominate the landscape along the Ugandan border. These massifs include the Luluba, Didinga and Boya Hills and the Acholi, Imatong, Lopit and Dongotona Mountains which appear as chains of peaks rising abruptly from vast level plains.

The highest point in Sudan is Mount Kinyeti in the Imatong Mountains which rises to over 3200 meters. The cool, wet climate of the Imatongs supports wild bananas, teak forests and wild bamboo. That the British stocked streams with trout and their mountain cabins with wool blankets and fireplaces testifies that the climate in these mountains differs greatly from most of Equatoria. The Imatongs are the wettest

MAP 2. GEOGRAPHIC FEATURES OF THE EQUATORIA PROVINCES



area in Sudan, with rainfall likely exceeding 1500 millimeters per annum in some spots.

The soils of the Imatongs tend to be of the red loam catena. This means they are deeply weathered, leached and acid. On the upper slopes of the mountains, the soil is dark with humus. In lower areas, "the soil is yellow, heavier and more plastic, and the humus level may be darker and deeper" (3, p. 251).

The other mountain and hill masses are drier than the Imatongs, with those to the west being the driest. The driest chains are the Lopit and Dongotona Mountains and the Didinga and Boya Hills. All are composed of schists and gneisses (types of metamorphic rocks with parallel layers of crystals). Those in the drier areas tend to have soils in the alkaline catena. This soil group consists of thin, red skeletal soils on the mountainsides which grade into brown loam soils near the base of the mountains then heavy, alkaline, expanding-type clay soils on the plains (3, p. 251).

The part of Eastern Equatoria east of the Didinga Hills is inhabited by the transhumant Taposa and Turkana tribes. The central and northwest part of this area is a clay plain. In the northeastern area of basaltic rocks near Ethiopia there are many plateaux bisected by deep gorges. In the southeast, low hills and undulating clay loam soils stretch into northern Kenya. This area is very desert-like (3, pp. 260-261). Annual rainfall is only a few inches in some places (26, p. 884).

Vegetation Zones

Many types of vegetation are found in the Equatoria provinces ranging from near desert to near rain forest. The broad leaved woodland (or high rainfall savannah woodland) is found in most areas unless modified by local conditions. This vegetation type varies greatly in height and density. It is tallest in the south were rainfall is greatest. The canopies of the trees may touch and there is much undergrowth. Farther north the trees are more scattered with some *Acacia* species among them.

There are some areas of high forest. A few of these are depression forests such as those in the foothills of the Imatong Mountains. Gallery forests of high trees line streams, especially west of the Nile. Cloud or high mountain forests are found in the Imatong, Dongotona and Didinga massifs above approximately 1800 meters. Mountain meadows are also found in these ranges.

There are areas of treeless grassland, particularly in the swampy flood plains of the streams. In the permanent swamps, papyrus may be found.

Those areas which are drier by virtue of climate or topography often support acacia grass woodland. The driest areas east of Kapoeta, near Ethiopia and northern Kenya, only support a sparse acacia desert scrub (3, pp. 251-252; 26, pp. 884-886).

Crops and Livestock

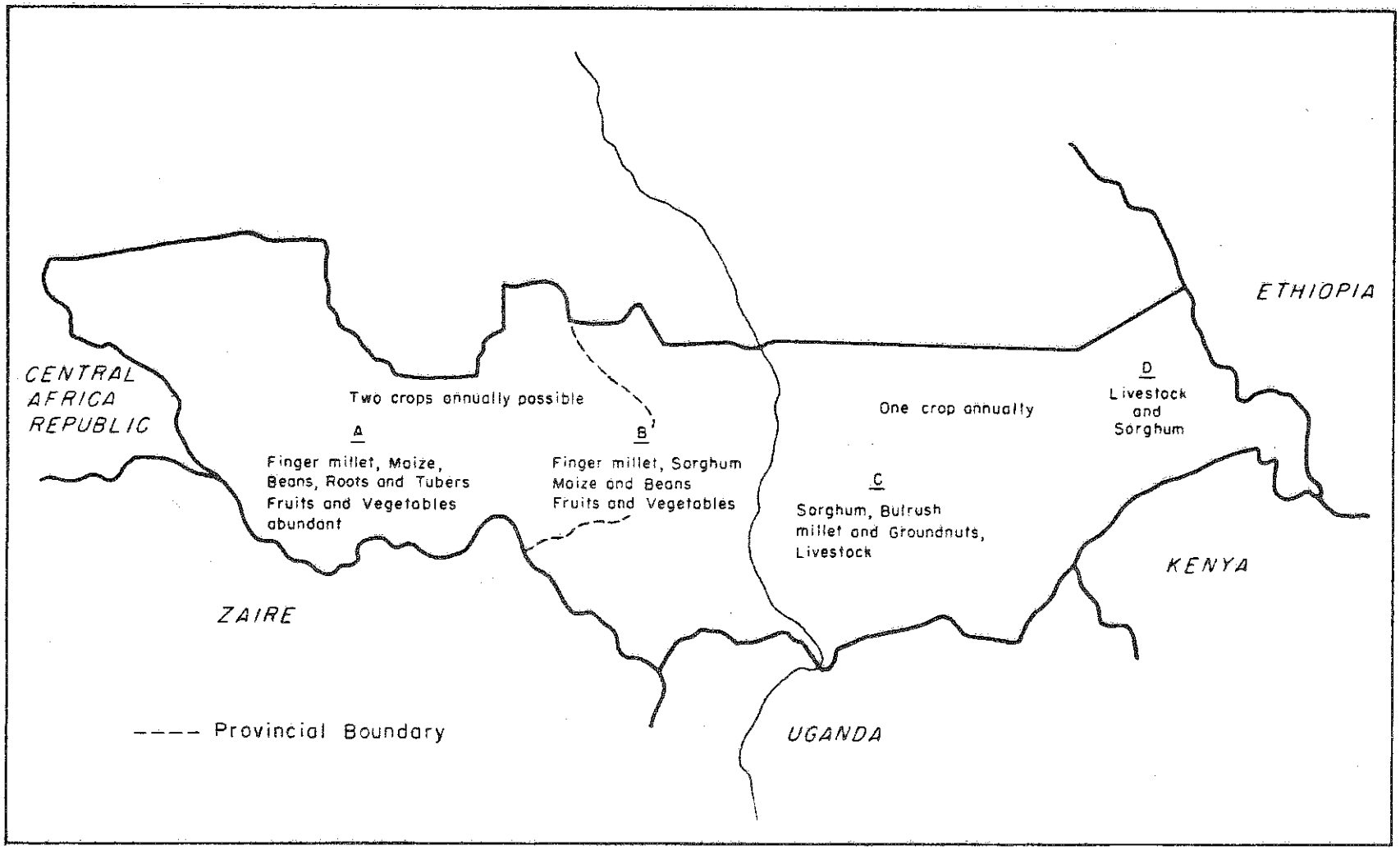
Just as climate, soils and natural vegetation vary within the Equatoria provinces, so do crops grown. In the southwest (area A on Map 3) the agriculture of the Zande people is characterized by a great variety of crops. It is not uncommon to grow two crops annually of finger millet, maize, cowpeas and sesame. Finger millet is the primary grain crop. Other starchy staples grown are upland rice, yams, cocoyams, sweet potatoes and cassava. Groundnuts are of importance. Both lima beans and green gram beans are grown. Much fruit is grown including mangoes, pineapple, papaya, guava, banana and citrus. Vegetables include chillies, okra and tomatoes. Pumpkins, gourds and other cucurbits are found. Such commercially oriented crops as oil palm, coffee and cotton were grown under the encouragement or compulsion of the British. Other minor crops are sugar cane (for chewing), tobacco and hemp. Honey is collected from hives placed in trees as it is in most areas of the Equatoria provinces. Livestock products are absent from the diet because of the heavy tsetse fly infestation.

Just east of the above area and extending to the Nile is an area of less regular rainfall inhabited by Bari speaking tribes (area B on Map 3). The tsetse fly is less common here. A few cattle, goats, sheep and chickens are kept but the diet is primarly vegetarian. Two crops may be harvested annually. The main sowing is during the last half of the rains, apparently to avoid waterlogged soils. The main crops are finger millet, sorghum and maize. Cassava, sweet potatoes and perhaps other root crops are grown. Pulses and oilseeds grown are sesame, cowpeas, pigeon peas, lima beans and a few groundnuts. Most of the fruits and vegetables grown in the Zande area are also grown here. Oil palm, cotton and coffee have been grown.

As one moves east of the Nile toward area C on Map 3, the tsetse fly becomes less common and livestock become correspondingly more important. Because of the higher rainfall in the Imatong and Acholi Mountains the crops grown there resemble those grown west of the Nile. For example coffee, tea and many bananas are grown. But in the drier massifs, such as the Lopit, Boya and Didigna, this is changed. Sorghum, bulrush millet and groundnuts replace finger millet, maize and beans as the important crops. The variety of fruits available decreases as does the importance of root crops. Two crops can no longer be grown annually. Minor starchy staple crops are cassava, sweet potatoes, maize and finger millet. The latter two are limited to upper mountain slopes of high rainfall or valleys where runoff is concentrated. Only rarely are beans or seasame grown. Vegetables include okra, tomatoes and the cucurbits: pumpkins, squash, gourds and cucumbers. Papayas and mangoes are normally the only cultivated fruits.

In the dry southeastern corner of the country, (area D on Map 3) crops are replaced by livestock as the focal point of the agricultural system. The Taposa, who live there, have large herds of cattle and goats, making over-grazing a problem. Sheep and donkeys are also raised. It was only in the 1920's or 1930's that they began growing crops at the encouragement of a British official. Before that time they were wholly pastoral. They now cultivate fields of sorghum near

MAP 3. GENERAL TYPES OF AGRICULTURE IN THE EQUATORIA PROVINCES



their permanent villages. They grow no crops other than sorghum (3, pp. 254-264, 26, pp. 888-918).

The great differences in agricultural systems reveal much potential for trade within the region. In the southwest, starchy staples, pulses, fruits and vegetables abound in great variety but livestock are rare. In the southeast, livestock are overabundant but the only crop grown is sorghum. Were a good east to west road system available with adequate feeder roads and vehicles, trade could be expected to expand quickly among traditional farmers.

The Tribes

There are many tribes in the Equatoria provinces. These tribes (shown in Map 4) vary greatly in physical appearance, culture, language, religion, type of agriculture practiced and place of origin before migration into Sudan. There have been many disagreements in the literature over the years about whether certain groups are separate tribes or parts of larger tribes. I will follow the more recent opinions in my discussion. By origin, the tribes of the Equatoria provinces fall into three broad classes: the Nilotes, the Nilo-Hamites, and the Sudanic tribes.

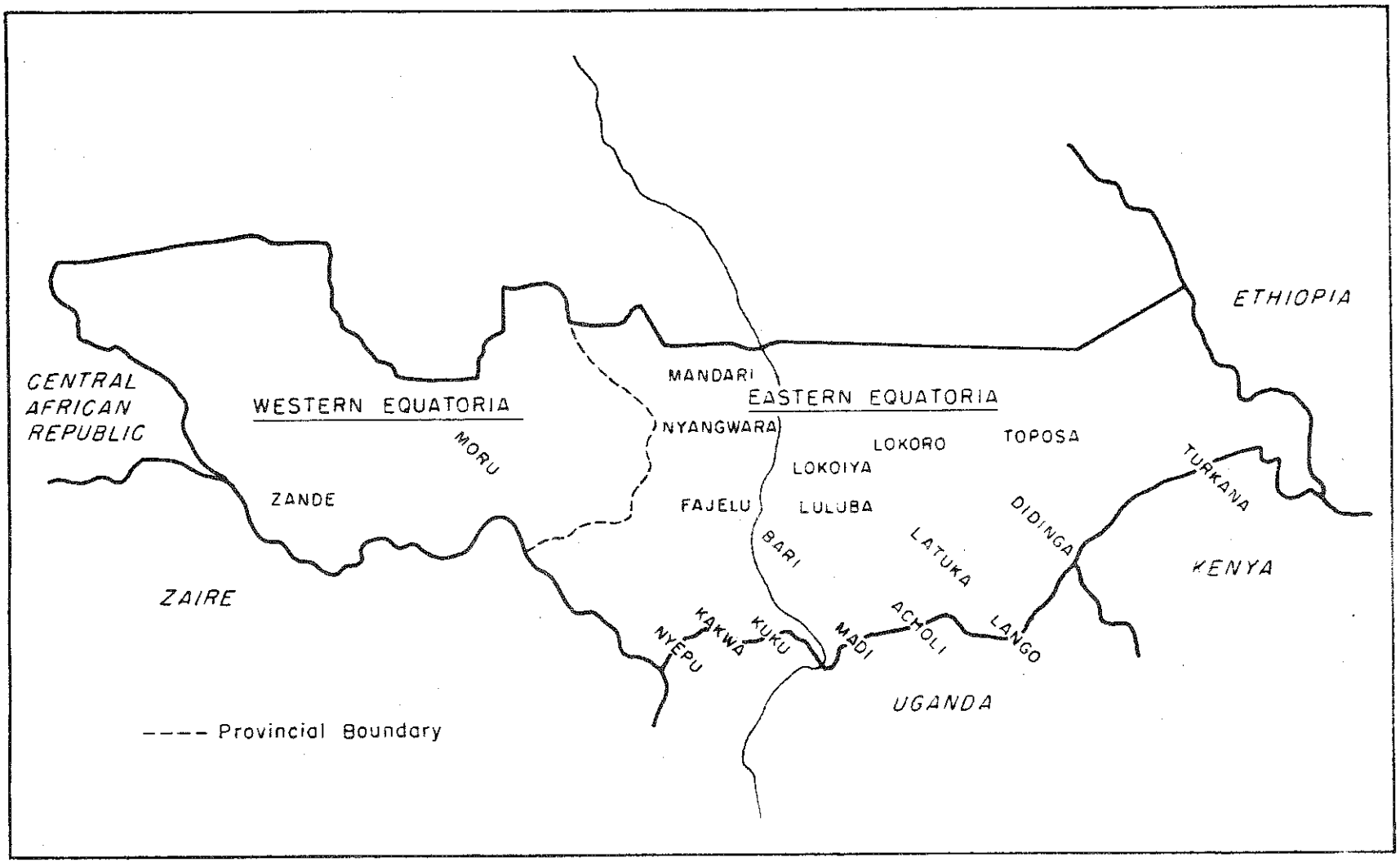
Only a few Nilotic tribes lie within the Equatoria provinces. The major Nilotic tribes (the Dinka, Nuer and Shilluk) lie further north. The principal Nilotic tribes in the Equatoria provinces are the Acholi and the Lango. These tribes overlap the Uganda border just east of the Nile. The Lokoro, living north of the Lopit Mountains near Lafon, may also be considered Nilotic as they speak a dialect akin to Shilluk.

Nilo-Hamitic tribes are found from Sudan all the way through Kenya to Tanzania. The Masai of Kenya and Tanzania are one of the best known Nilo-Hamitic tribes. The Nilo-Hamites of Sudan are concentrated in Eastern Equatoria. The Turkana (who overlap into Sudan from Kenya) and the Taposa are predominantly pastoral Nilo-Hamites. The other Nilo-Hamitic tribes in Sudan are the Didinga, Boya, Latuka, Lokoiya, Bari and the Bari speaking tribes (Mandari, Nyangwara, Fajelu, Kakwa, Kuku, Nyepu and Luluba). These tribes likely moved northwest to their present locations from Uganda or Kenya.

The Sudanic tribes inhabit the southwestern corner of Sudan along the Nile-Congo divide. They moved northeast into this area from Zaire. The principal Sudanic tribes in the Equatoria provinces are the Zande, Moru and Madi.

At some time the Sudanic tribes coming from the southwest and the Nilo-Hamites migrating from the southeast met near the Nile. In this vicinity there has been a mixing of cultures. For example, the use of magical stones by a rain king to cause precipitation was formerly limited to the Sudanic tribes. It has since been adopted by the westernmost Nilo-Hamitic tribes such as the Bari and Latuka. Some Latuka villages did not adopt the use of these magical rainstones until

MAP 4. TRIBES OF THE EQUATORIA PROVINCES



the mid-nineteenth century. Tribes caught between the Bari and the powerful, incoming Zande (who entered Sudan in the early nineteenth century) appear to have been partially disintegrated and scattered. Such Bari-speaking tribes as the Mandari, Nyangwara, Fajelu, Kakwa, Kuku, Nyepu and Luluba may well be assimilated remnants of such groups (22, pp. 11-24, 239-241, 296-298, 3, pp. 84-87).

The tribes are concentrated in favorable areas, leaving vast areas of the Equatoria provinces uninhabited. In the west, the population is concentrated in the wetter regions near the borders with Uganda and Zaire and along the Nile. To the east the tribes favor sites along the mountain and hill masses. There are many Latuka on the plain surrounding Torit. The Taposa have large permanent settlements along the rivers near and to the east of Kapoeta.

The Special Problem of the South

Southerners make up an important minority within the nation. According to the 1973 census there were about 3 million southerners out of a total population of 15 million. Almost 800,000 people lived in the Equatoria provinces (11, p. 303). The national total was estimated at 17 million by 1979 and the southern figure likely rose in rough proportion (25, p. 70).

General Nature of North/South Differences

There are vast differences between the north and south. In the north 20% of the population is urban (according to the 1973 census). In the south the figure is only 10% (11, p. 304). The north is generally very dry. This characteristic reaches its extreme in the Libyan desert which receives no significant rainfall. The south includes such wet regions as the Imatong Mountains where annual rainfall exceeds 1500 millimeters. Culturally the north is predominantly Arabic. Southern tribes in contrast, follow black African cultural systems. Almost everywhere in the north Islam is practiced. The south is characterized by a host of tribal religions and a fair sprinkling of marginal Christianity. Arabic is the lingua franca in the north. In the south tribal languages dominate everyday life. English is the language of education while Arabic is limited to dealing with northern merchants. Swahili may be heard occasionally in areas near Uganda and Kenya.

Source of the Differences

Most of these differences between north and south find their roots in the Sudd. The Sudd is a ten million hectare swamp along the White Nile south of Malakal. Its maze of channels, papyrus and floating masses of vegetation for centuries eliminated the Nile as the only possibility for communication between the north and south. As early as

A.D. 60 a survey expedition sent by Emporer Nero of Rome was turned back by the impenetrable Sudd (9, p. 18). It was not until 1839 that a flotilla pierced the swamps and opened the south to northerners and other outside influences. As can be seen in Map 5, transportation links between the north and south are still tenuous.

Movement Toward Conflict

The first major exposure of the southerner to the outside world was in the form of the oppressive trade in ivory and slaves. While Egypt controlled Sudan in the nineteenth century, Egyptian, Turkish and northern Sudanese slavers greatly depopulated many southern areas. The Latuka, Bari and Mandari tribes were especially affected (3, p. 86). Under British pressure, the Khedive Ismail of Egypt made token efforts to stop the slave trade. These efforts pushed the trade inland from the easily policed Nile. The British efforts gradually reduced the slave trade. However it was continuing on a lesser scale at least until 1929 when a brisk trade was uncovered in one area of the country.

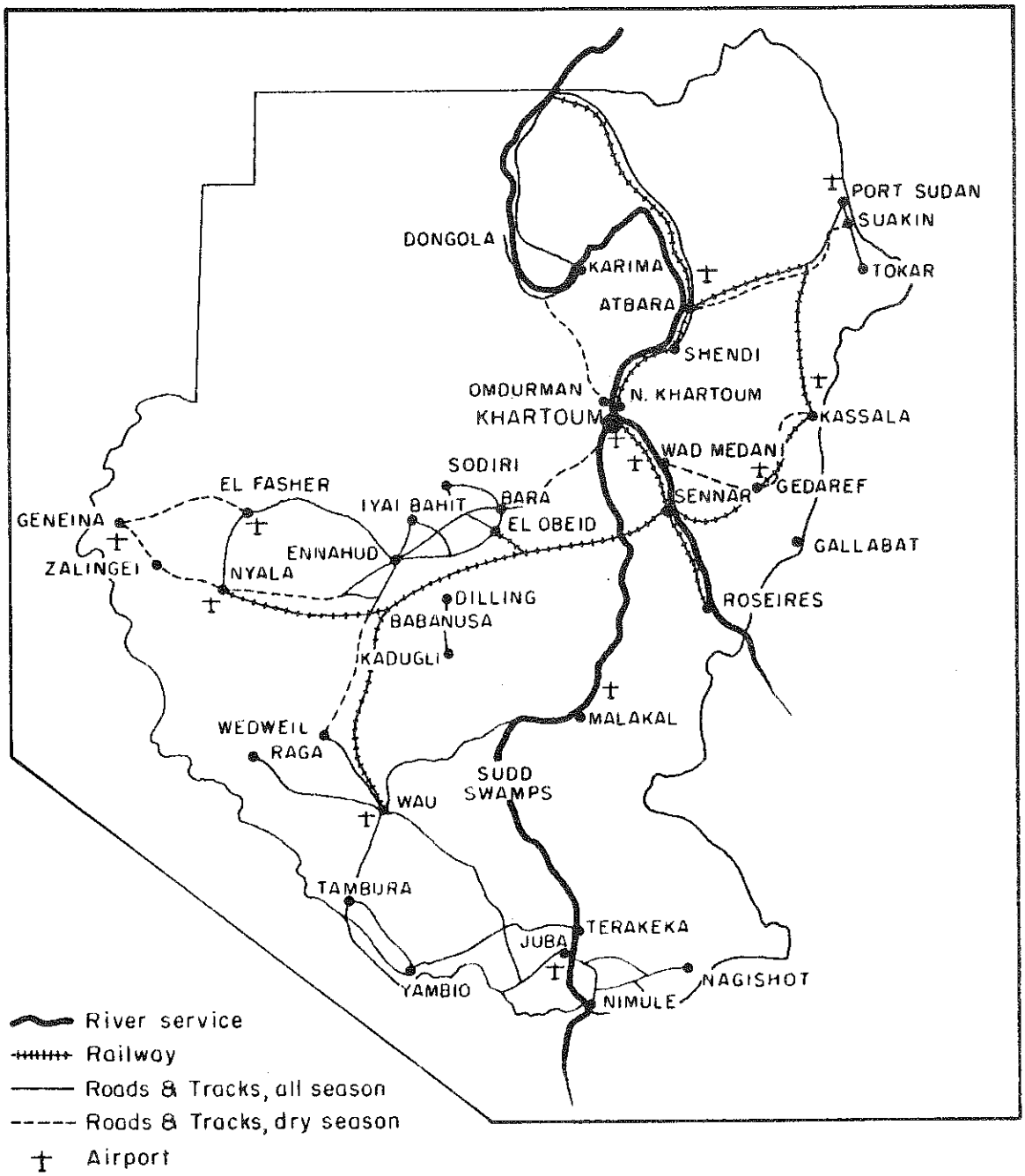
After this discovery of continuing slaving, the British began enforcing a southern policy that essentially closed the south to northern traders, administrators and travelers. This fueled the northerners' belief that the British and the missionaries were conspiring to convert the south to Christianity and separate it from the country.

As the nation moved toward independence, various parties made rash promises and circulated misinformation to win southern votes. Misunderstandings occurred and lines between groups hardened. After independence a constitution was proposed which would have denied southerners the federal form of government they wanted. The southerners finally walked out of the constituent assembly. Before a way was found around the impasse, Lt. General Ibrahim Abboud took over the government in a coup in November of 1958.

To create a pro-northern Arabicized intelligentsia in the south, the new government took over the mission schools. It sought to substitute Arabic for English and to impose Islamic education and holidays. However, in the south this was considered cultural imperialism by a people no less colonialists than were the British. It is hardly surprising that the south soon erupted in rebellion against the northern government.

Indeed, the rebellion was underway before independence. On August 18, 1955 the Equatoria Corps mutinied in Torit. Seventy-eight northern officers and civilians were massacred. The policies that followed the 1958 coup caused the rural masses to join the rebellion (9, pp. 152-202). The conflict resulted in the fleeing of 200,000 villagers to Ethiopia, Kenya, Zaire and especially Uganda. Many more who remained moved villages to remote mountaintops or lived in the bush (11, p. 200). Bridges and roads were destroyed. Northern soldiers, southern rebels (the Anya Nya) and tribes not involved in the conflict

MAP 5. THE SUDAN: MAIN LINES OF COMMUNICATION



Source: International Labour Organization, Growth Employment and Equity: A Comprehensive Strategy for the Sudan, (Geneva, 1976) p. 526.

plundered villages for livestock. It was an unsettled time. The social losses incurred may never be known.

Resolution of the Conflict

Northerners grew ever more disenchanted as the conflict wore on. Southerners became willing to accept a compromise. When the coup of 1969 installed Jaafer al-Nimeiry as president, the stage was set for a negotiated settlement. A peace treaty was finally signed in Addis Ababa, Ethiopia in 1972. The agreement retained the south as part of Sudan but gave it the regional government it desired. This ended a long era of turmoil.

Difficulties Facing Development of the South

The reconstruction of the south is now slowly getting underway. The task will require many resources and constant, prolonged attention. The south lags far behind the north economically. Per capita income is about half the national average and one-quarter that of Khartoum and Kassala provinces. In 1975 the south had more than 20 percent of Sudan's population but only 10 percent of dispensaries and dressing stations. The proportion of children in school was less than half the national averge (11, p. 199). The road network was greatly disrupted during the disturbances. There are no paved roads in the region and some important river crossings have neither bridges nor concrete low water crossings. This impedes internal and external trade, administration and development. Shortages of vehicles, fuel and mechanics compound the problem.

An even greater proportion of southeners depend on traditional agriculture for their livelihood than do northerners. Government development expenditures are heavily weighted toward irrigated and mechanized rainfed projects in the north. The Gezira scheme and its extensions alone cover about 850,000 irrigated hectares. In 1975 an equal amount was under pump irrigation. Since then, several large irrigated sugar schemes have been initiated. The recent government emphasis on mechanized rainfed farming contributed to the nearly three million hectares under mechanization by 1979 (27, p. 33). Most of the irrigated schemes are near Khartoum on the Blue and White Niles and benefit middle income tenants. The mechanized schemes are concentrated in the eastern provinces of Kassala and Blue Nile with much of the area operated by small capitalists.

The emphasis on irrigated and mechanized agriculture is a major bias against traditional agriculture. In some regions of the country the effect of this is mitigated in that irrigated and mechanized schemes provide seasonal employment for migrants from the traditional sector. For example in 1973/74 the Gezira scheme employed 542,000 people to harvest the cotton crop, 336,000 of whom were seasonal workers from outside the province (11, p. 90). However, most schemes are too remote

from the south, especially the Equatoria provinces, to provide sesonal employment for southerners. (This can be seen as an advantage if it delays the alientation of the southern laborer from the land, his means of production.)

The development of traditional agriculture in the south will not be easy. The ILO/UNDP Employment Mission 1975 stated (11, p. 210):

> ... a rapid development of traditional agriculture which could benefit large numbers of the rural population is made extremely difficult today by the almost complete absence of agriculture infrastructure: there are few proven technologies, no extension staff to spread knowledge of them, no supply system for inputs, no credit system to enable the purchase of inputs, no storage facilities, and only rudimentary feeder roads and markets to cope with the output.

The development of southern agriculture will certainly be difficult. However, if southerners are to become the economic equals of their northern countrymen, it is essential.

Development Projects Underway

Since the Addis Ababa peace accord, the government of the south has been planning and is beginning to implement development projects. In Eastern Equatoria, nearly all projects are either just being planned or are in the earliest stages of implementation.

Primary Health Care

The primary health care program is one notable exception to this. It is already fairly well established. Under this program, health care facilities are being established throughout Eastern Equatoria. The primary health care units are the backbone of the program. It is intended that a primary health care unit be within walking distance of every person. This is to ensure that everyone receives at least minimal health care. A primary health care unit serves approximately 4000 people. Each community with a primary health care unit chooses someone to receive six months of training as a community health worker. He is then given a small salary by the government to serve in his community. He is capable of treating twelve common disorders: malaria, diahrrea, respiratory diseases, measles, wounds, abcesses, skin disease (eg. yaws and scabies), malnutrition and anemia, veneral diseases, eye infections, poisonous bites and stings and guinea worm. The primary health care worker also is to encourage community public health projects and disease prevention. These latter tasks are rarely carried out.

For every five primary health care units a dispensary is established. It is run by a medical assistant with five years of training. He supervises five community health workers and handles cases

referred to him by them. He may refer complicated cases to rural, district or province hospitals (13, pp. 133-145).

Curative, preventive and social health services are part of the program. The curative aspect runs into bottlenecks of supply. The poor transport system causes shortages of necessary medicines. Inadequate transport also causes difficulties in supervising the community health workers. In spite of these problems, the curative part of the program is making important widespread contributions to rural welfare. The preventive and social health aspects of the program, however, are almost non-existent at the local level.

Domestic Water Supply

In some areas contaminated pools were the only sources of water. Elsewhere, during the dry season, water could only be obtained by digging in dry river beds. Wells are now being drilled in villages throughout Eastern Equatoria to ensure sanitary drinking water. This task is almost complete. However, the hand pumps placed over these wells frequently break down. This leaves villages depending on unsanitary water sources until repair crews can be dispatched. Delays in repairs may be extensive because of poor communication and transport facilities.

Village Schools

Village schools are being emphasized, at least for the first six grades. Formerly boarding schools were more common. The emphasis on the village school should bring basic literacy to a greater part of the population.

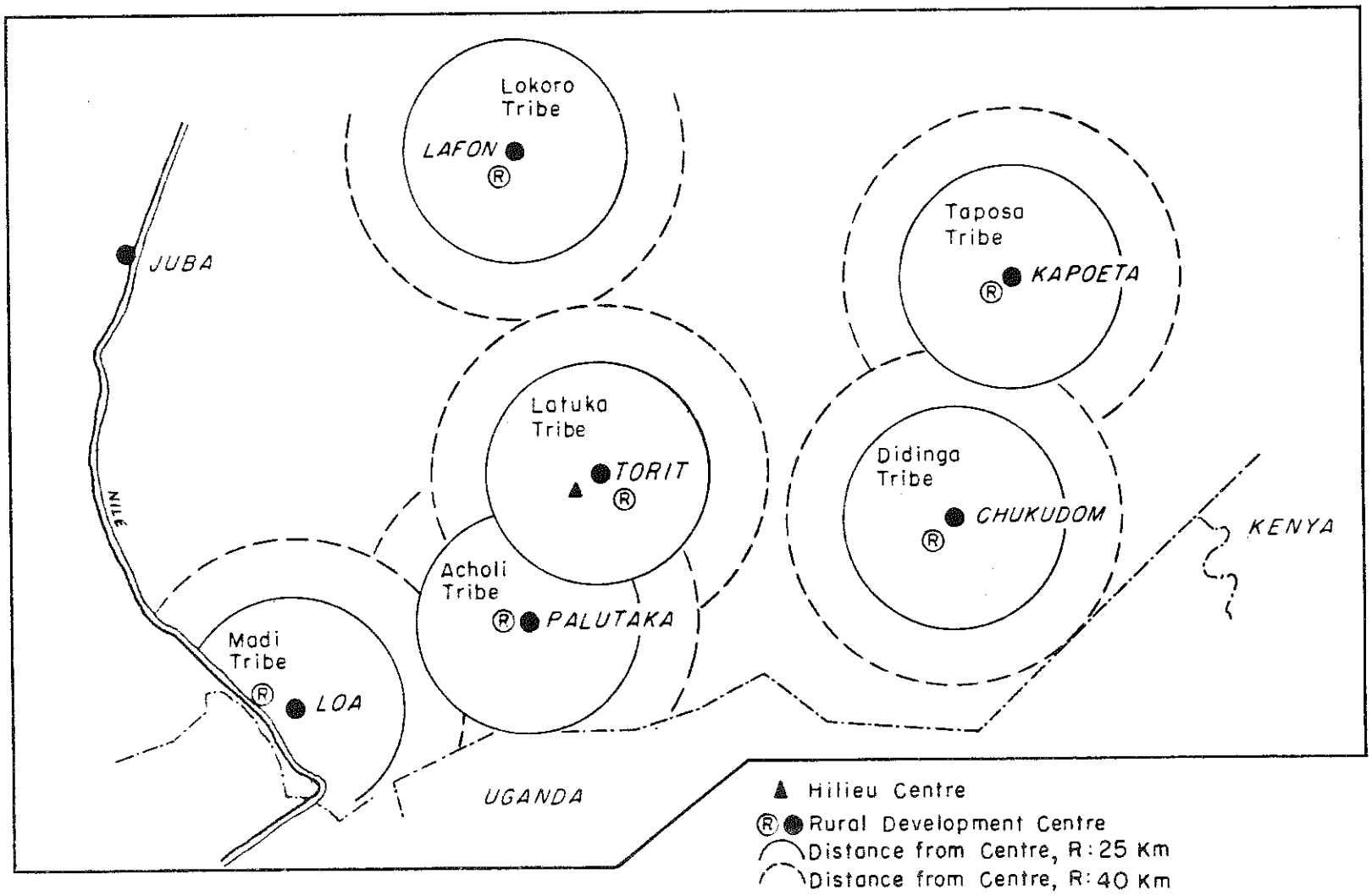
Rural Development Centers

The long range purpose of the Regional Ministry of Agriculture was summarized in 1981 by its Director General (since then elevated to Minister of Agriculture), Dr. David Bassiouni (12, p. 26):

> . . .the aim of the regional government was to make the region self sufficient in food, and later on to produce enough for the whole Sudan. This policy was to be achieved first by encouraging food production by small holder farmers and eventually by large mechanized farms. This policy is still being pursued.

The agricultural research and extension service is being developed with the small farmer in mind. In the east bank of Eastern Equatoria, Norwegian Church Aid is shouldering a substantial part of this burden. Six rural development centers (shown in Map 6) have been established.

MAP 6. RURAL DEVELOPMENT CENTERS IN THE EAST BANK REGION OF EASTERN EQUATORIA



SOURCE : NORWEGIAN CHURCH AID, SUDAN PROGRAM, PROGRESS REPORT NO. 10 (TORIT, SUDAN. MARCH 1979) p. 11

These are to concentrate on crop experiments (observations and trials), seed multiplication, introduction of animal power, extension activities and production of appropriate tools and equipment. Each center is located to serve one or two tribal areas. The two centers in the Acholi and Madi tribal areas seem nearest full implementation. The two serving the Lokoro and Toposa areas seem furthest from full establishment.

Currently, extension activities are barely existent at the centers except for occasional "farmers' days." Initially, most of the effort at the rural development centers seems directed toward variety trials and seed multiplication. The stock of information and genetic material thus built up is to serve as the basis of future extension work. Sorghum, maize, groundnuts and sesame were the subject of most trials in 1979. Bulrush millet, rice, soybeans and sunflowers were also tested. Seed multiplication focused on improved and some local varieties of sorghum, bulrush millet, maize, finger millet, groundnuts, sesame, soybeans, sunflower, green grams, green beans, kidney beans, yellow beans and pigeon peas.

Other activities undertaken at the centers include training of oxen for plowing and encouraging cassava, fruit and shade tree planting. In addition to work at the rural development centers, a few other projects are underway. Two tea projects are being developed by the government. Coffee is being produced (12, pp. 27-28). Forests of teak and other species are being rehabilitated in the Imatong mountains. A veterinary laboratory was recently established in Juba.

Cooperatives

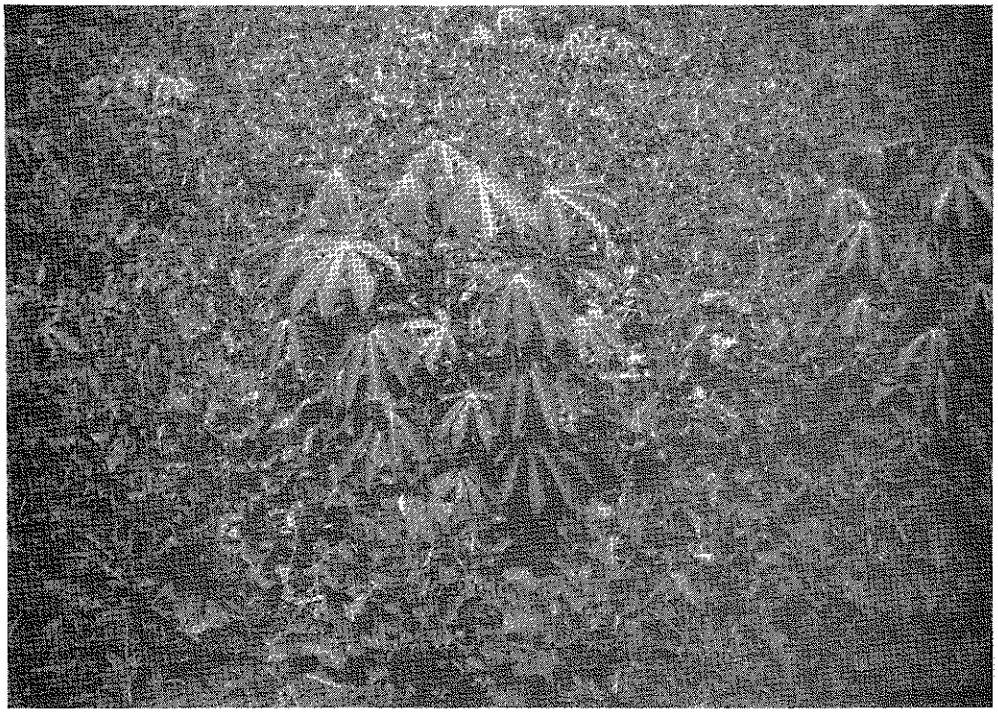
The formation of local cooperative societies is also an important part of the development strategy. Norwegian Church Aid began spearheading the establishment of such societies in the east bank of Eastern Equatoria in 1976. The cooperative movement is intended to supply agricultural equipment and seeds, market commodities produced, assist in extension, and aid such local craftsmen as carpenters, tailors and blacksmiths (18, pp. 23-31). One accomplishment of the cooperatives has been the marketing of large quantities of Irish potatoes grown in the Didinga Hills and Imatong Mountains. Such tools as hoes and sickles are being sold successfully. During a time of famine, the cooperative societies sent several truckloads of bamboo to Renk, a town about 250 kilometers north of Malakal along the Nile. This was sold and sorghum was purchased. The sorghum was sold in Torit at subsidized prices to force down the merchants' high prices.

Road Improvements

The Sudanese section of the road connecting Juba with the Kenyan port of Mombassa via Kenya's Northern Frontier District is being improved. It will soon be a two-lane tarmac highway. This will give the south easy, all-weather access to international markets and greatly

improve internal communications and transport. The completion of this project should substantially accelerate development in the south by making imports cheaper and by opening up internal markets to small farmers.

PLATE II-1



A mixture of cassava and groundnuts growing in an experimental plot at Torit Rural Development Center (above). After the groundnuts are harvested, the cassava will be left to grow an additional year.

The primary health care worker at the right weighs a baby at his weekly well-children's clinic. In 1980 malnutrition and measles caused high infant mortality, especially among unvaccinated children.

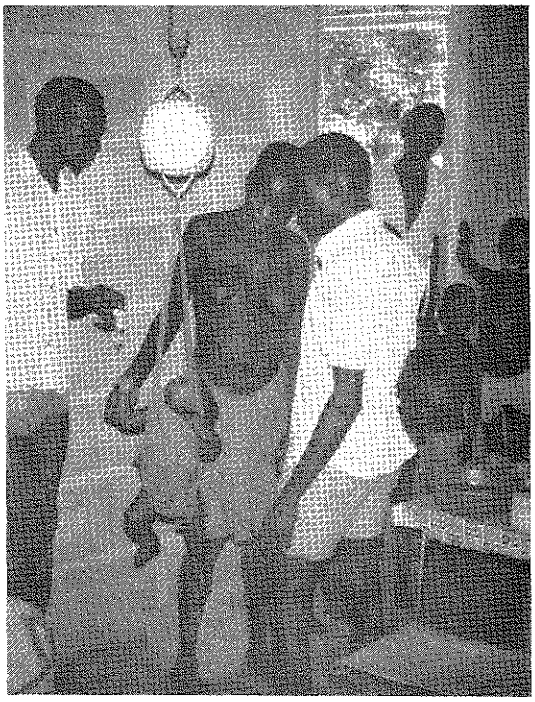
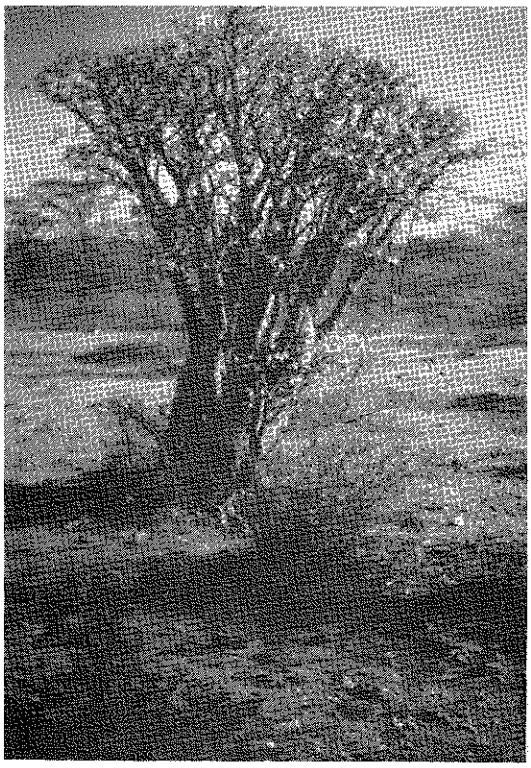
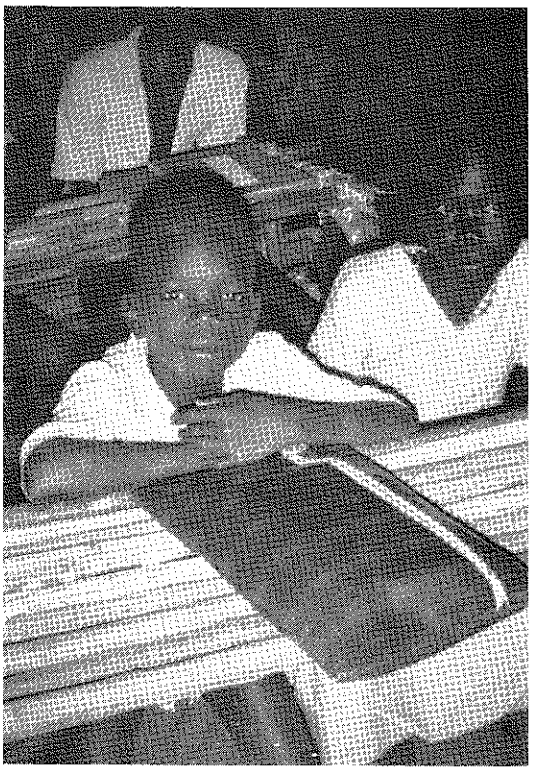
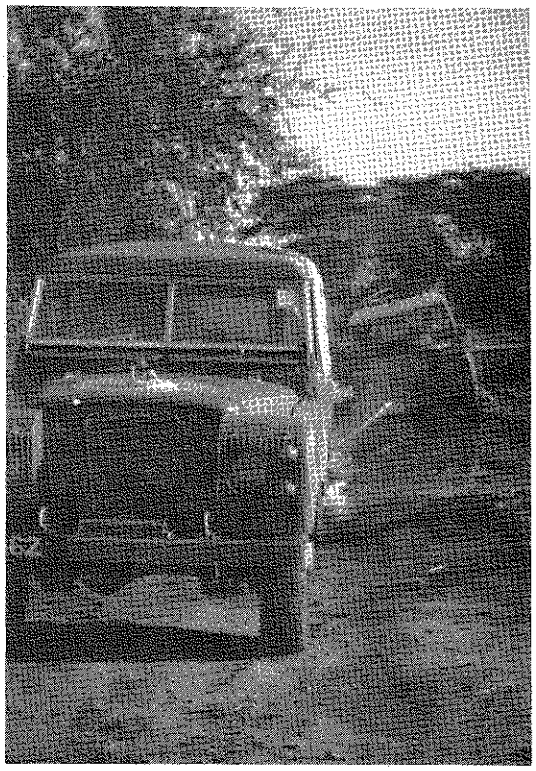


PLATE II-2





The desert rose (above) growing east of Kapoeta is typical of the vegetation of the drier areas of the Equatoria provinces. The boys (upper right) are ready for their next class at a village school. At right, two Land Rovers struggle through a mud hole north of Kapoeta. Poor roads are a major bottleneck to development.



CHAPTER III

LATUKA CULTURE AT LOGOTOK

The focus of this study is on the agriculture of a particular section of the Latuka tribe. The Latuka have been only marginally affected by the urban and commercial sectors. Capitalist production has not begun to develop. Tribal institutions and social obligations affect how agricultural production is carried out and how the fruits of that production are distributed. Latuka culture and agriculture are an organic whole. Religious ceremonies are centered around agricultural operations and events. These ceremonies sometimes regulate the timing of the agricultural operations. Agricultural possibilities have heavily influenced choice of diet. Traditional dietary preferences in turn influence current production decisions.

All this is not to say there have been no significant outside influences on the Latuka. Some major outside influences have included early ivory and slave dealers, the government, the recent civil war, Christian missionaries and the availability of commercially produced goods in the markets of Torit.

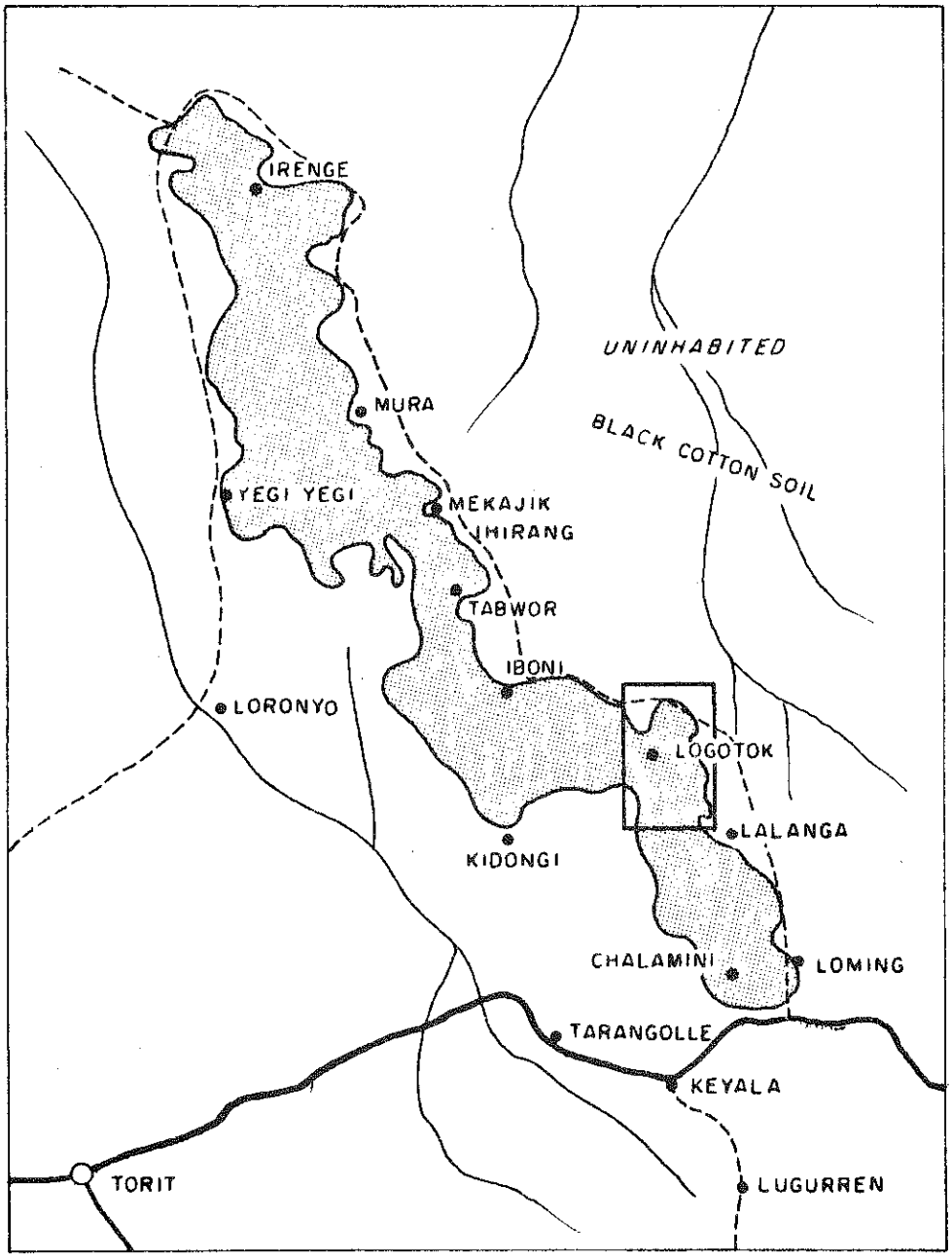
The above influences have not caused fundamental changes in Latuka culture and agriculture, however. Instead the Latuka have responded with adjustments that effectively protect their traditional ways from disintegration. Adjustment to outside influence in the case of the government and Christian missionaries has generally involved setting up parallels to traditional politico-religious institutions. Cattle losses from slaving parties and from the civil war have caused a greater reliance on crops.

In the Latuka, then, we have a culture in which economic, social and religious activities and relationships remain largely an integrated whole. Hence, Latuka agriculture must be described against the broader backdrop of Latuka culture. This chapter will paint that backdrop.

The Villages

The Logotok villages on which this study is based are located 4° 39' north latitude and 32° 51' east longitude or about 40 kilometers north-east of Torit (Map 7). There are six villages in the Logotok group scattered along two miles of the eastern slopes of the Lopit Mountain range. These villages (Logotok, Lobel, Hidere, Sohot, Ifite, and Lofuluho) are shown in Map 8. Their populations, as determined by a 1980 census conducted by the headmaster of the village primary school, appear in Table 1. The group of villages is referred to collectively by the name of the main village, Logotok.

MAP 7. THE LOPIT MOUNTAINS



SOURCE: SUDAN SURVEY DEPT.; 1:250,000 SERIES

MAP 8. THE LOGOTOK VILLAGE AREA

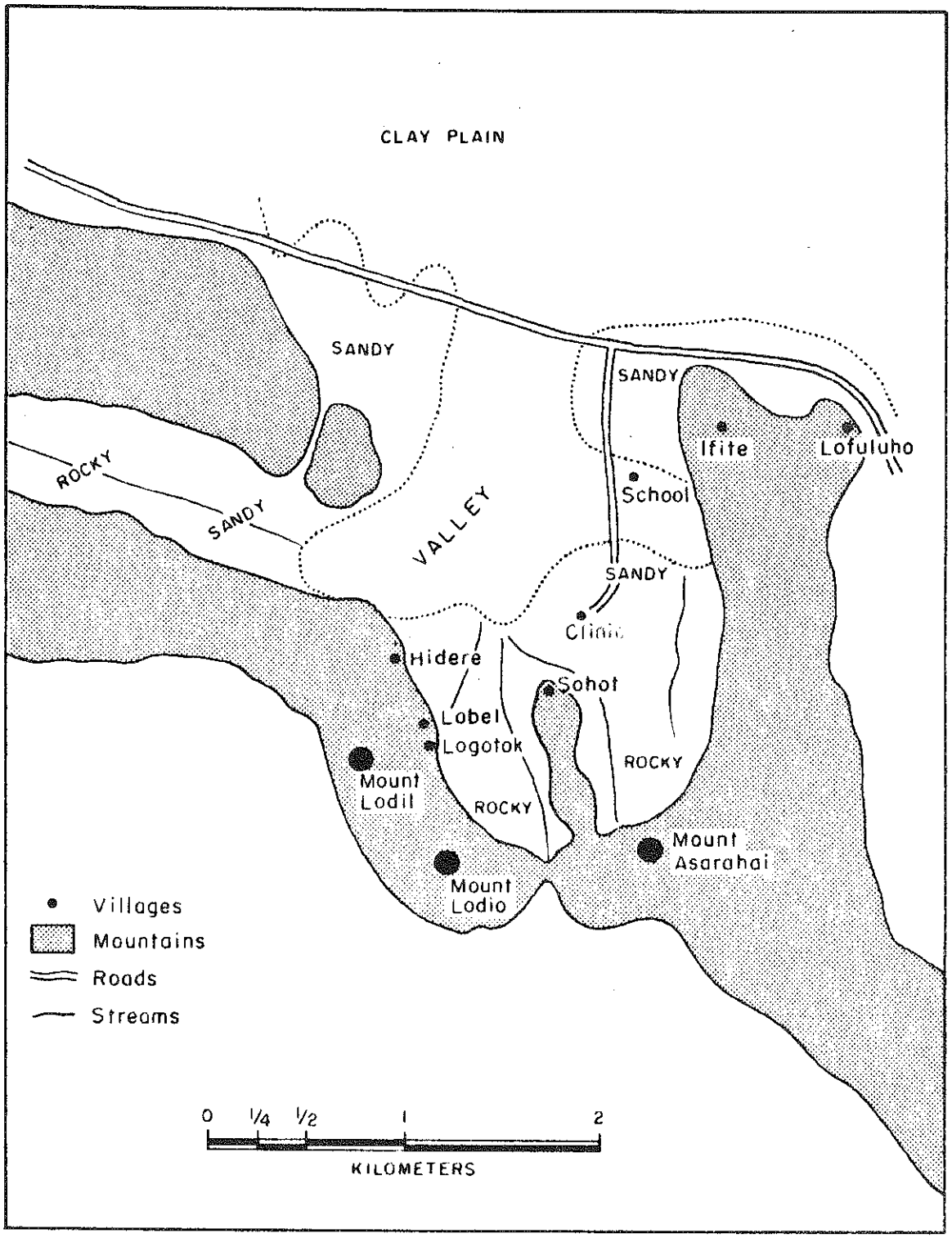


TABLE 1. RESULTS OF SEPTEMBER 1980 CENSUS OF THE LOGOTOK VILLAGE GROUP

Village	Households	Adults		Children		Total People
		Male	Female	Male	Female	
Logotok (or Losira)	113	129	187	189	159	664
Lobel (or Husa)	24	21	25	35	20	101
Hidere (or Longerum)	51	39	50	62	69	220
Sohot	16	14	17	16	6	53
Ifite	7	11	7	9	9	36
Lofuluho	27	34	36	34	32	136
TOTAL	238	248	322	345	295	1,210

Village Groups

The Latuka seem always to have been sub-divided into small, rather close-knit groups of villages. These village groups see themselves as distinct from other village groups. Each village group has its own set of traditions and of political and religious leaders. Each has its feasts and ceremonies on dates it determines and in some cases the date of a particular ceremony can vary by several months from one Latuka village group to another.

Cattle raids and other conflicts have always occurred among village groups. These were particularly evident in the days of the slave and ivory merchants. The slaving parties would typically strike a pact with the head of one village group to make raids on neighboring village groups for cattle, ivory and slaves.

Dialects spoken differ substantially among village groups, though most are largely mutually intelligible. For example, in the southern-most twenty miles along East Lopit there is a slightly different dialect associated with each main village group: Loming, Lalanga, Logotok and Iboni. Furthermore, all of these differ from the main dialect spoken on the plain southwest of the Lopit Mountains.

Extent and Applicability of Previous Cultural Studies

In the context of village group to village group variation it is important to recognize that the few previous studies of Latuka culture have been based on the Tarangolle area. Tarangolle is located beyond the Lopit Mountains and twelve miles to the south of Logotok. According to Emin a trading station was opened at Tarangolle in 1855 by Kartoum merchants, which station formed the center of the region's ivory trade (21, p. 105). In 1863 the Englishman, Sir Samuel Baker, reluctantly traveling with a slave and ivory trader, camped at Tarangolle for nearly three months. His lively account, The Albert N'Yanza: Great Basin of the Nile and Exploration of the Nile Sources, contains much information especially helpful in analyzing cultural changes over time (2, pp. 131-269). He reveals the sorts of technology used by the Latuka, the importance of cattle, burial practices, their manner of dress and the techniques of the slave and ivory merchants. Care must be taken in reading Baker, however. He was prone to exaggeration. His book is the chronicle of an explorer's adventure, not a serious academic study. It is disappointing that he did not illuminate such things as rain-making, the clan system, age classes, or any of the traditional ceremonies, dances or agricultural methods.

In 1921 and 1922 C. G. and B. Z. Seligman, British anthropoligists, did field work in the far South for their encyclopedic study, Pagan Tribes of the Nilotic Sudan (22). Though out of date, this book remains the major source of information about many tribes of the Southern Region, including the Latuka.

The Seligmans collected their information on the Latuka at Tarangolle. They give extended descriptions of the clan system, age classes, family structure, rain-making, and death and funeral ceremonies. Their account, though not complete in many particulars, is in general quite accurate. They had little success, though, in determining the sequence of events within larger ceremonies such as rain-making. This is understandable, given language difficulties. They neglected to investigate the multitude of annual celebrations or the agricultural cycle and thus failed to portray the annual rhythm of life in a Latuka village. The Seligmans did not recognize the people of the Dongotona Mountains as Latuka. Currently they are known to be Latuka. The Seligmans admitted to learning little of the inhabitants of the Lopit Mountains other than that they spoke a Latuka dialect and had a rain-maker at Iboni. This latter fact shows that even as recently as the early 1920's outsiders knew practically nothing of the inhabitants of Logotok.

Beyond these early works little has been published about the Latuka other than occasional reports in Sudan Notes and Records and a February 1953 National Geographic Magazine article (10, p. 248-272). This lack of information makes it difficult to determine what changes have occurred over time or what may have caused those changes.

This basic lack of historical information about Latuka culture is compounded by a second problem. We do not know to what extent the information gathered about the Latuka of Tarangolle area was applicable to those of Logotok. Because I was not able to investigate Tarangolle in addition to Logotok it is not even possible to be certain whether the cultures of these two areas are currently identical. As throughout this chapter I compare the current culture at Logotok with that described for Tarangolle by the Seligmans, I will attempt to identify which differences are locational and which temporal. I may not be always successful in this attempt, but I hope to be always logical.

Oral History of Logotok

Most of the following history of Logotok was told me by Josiah, the headmaster of the village school. He had questioned a very old man in 1975, five years before my venue to Logotok, and had written down what he learned. The old man died a year or two after that interview.

Beginning with Immou, the first generation to live at Logotok, the accompanying table shows the generations of Logotok. Josiah claimed that a generation averages 22 to 24 years. Other informants estimated a generation as 20 years. I used this more conservative figure in estimating the dates given in Table 2. In the telling and re-telling of this history it is more likely that a generation was omitted than that one was added. Hence it is safely assumed that Logotok was settled no later than 1770. It is said the Latuka moved to their present home from a place called Lotuke. This is currently the name of a village in the Didinga Hills near the Uganda border which is roughly 60 miles southeast of Logotok. This is in conflict with Emin who says the Latuka claim to have come from the northeast (21, p. 106).

TABLE 2. THE GENERATIONS OF LOGOTOK ACCORDING TO ORAL ACCOUNTS

1.	Immou	1770-1790	
2.	Obeleng Beleng	1790-1810	
3.	Otulihiria	1810-1830	
4.	Hahuli	1830-1850	Tarangolle opened by Khartoum merchants in 1855 (21, p. 105)
5.	Imeri	1850-1870	Sir Samuel Baker visits Tarangolle in 1863 (2, pp. 131-269)
6.	Hurajak	1870-1890	Emin visits Tarangolle in 1880 (21, p. 105)
7.	Hadi Hifyong	1890-1910	Lomoro becomes chief of Tarangolle in 1892 (16, pp. 107-109)
8.	Aharanya	1910-1930	The Seligmans visit Tarangolle in 1921-22 (22, p. xiii)
9.	Akara	1930-1950	Hoogstraal visits Tarangolle, writes article for National Geographic Magazine in 1952 (10, pp. 248-272)
10.	Miriyang	1950-1970	
11.	Balu	1970-	

At or before the generation of Immou there were political rivalries and divisions within the tribe, disease, famine, conflict with other tribes and man eating animals. These problems prompted some people to move to Logotok. According to Logotok tradition, the Latuka at that time were mainly hunters, living in caves or in the bush rather than houses. The keeping of cattle began during the time of Immou. During the times of Immou, Obeleng Beleng, and Otulihiria they started learning to use metal. By the time of Baker's visit to Tarangolle in 1863, the Latuka were already skilled in working with metal. Baker described a bellows of two pots with a clay pipe projecting from the base of each toward the charcoal. A skin covered the mouth of each pot and a stick was fastened to the center of each skin. These sticks were pumped up and down producing blasts of air across the charcoal (2, p. 189). This method of metal working is still common at Logotok, the equipment being exactly as described by Baker.

Cultivation of crops followed soon after metal working had opened the possibility of using hoes and axes. At the time of Imeri, 1850 to 1870, some people from Iboni moved to Logotok and brought the institution of rain-making with them. Indeed the Seligmans mention Iboni as a center of rain-making (22, p. 310). Rain-making currently is central to tribal tradition and will be discussed at greater length below. It was at the time of Hadi Hifyong, 1890 to 1910, that the Latuka had many cattle. This squares reasonably well with Baker's observations in 1863 that cattle were "the wealth of the country" and that there were "vast herds of cattle" at Tarangolle (2, 149-150). Josiah stated there were slave traders during the time of Hadi Hifyong, further confirming the estimated dates. When dealing with oral accounts, inaccuracies are expected. In this case many of the events said to have occurred in the first few generations of Logotok almost certainly took place much earlier than that. Oral tradition says that in sixty years the Latuka shifted from living in caves as a hunting and gathering society to living in villages as an agricultural/pastoral society with metal working skills. Such a rapid transformation is unreasonable. As regards more recent events, however, oral accounts seem reasonably accurate. They conform quite well with the records of Baker and the Seligmans.

Family Relationships

The Seligman's studied family relationships, giving particular emphasis to terminology and appropriate behavior towards various relatives. Table 3 gives the terminology they uncovered. (Because they lacked familiarity with the Latuka language, they retained the possessive suffix -ong in most cases.) Next to each of Seligman's terms is the corresponding term and definition as used currently.

Further light is shed on Latuka kinship terms by comparing them with those of nearby, similar tribes. Kinship terms used by the Lango are quite similar to those used by the Latuka. For example the Seligmans give the Lango descriptive word for father as moinye as compared to the Latuka monye (or according to Seligman's spelling, moinyong). There are also some differences between the two languages in

TABLE 3. FAMILY RELATIONSHIP TERMS AMONG THE LATUKA[a]

Seligman[b]	My Informants	Description
Moinyong	Monye	Father
Eyang	Honye	Mother
Lorighong	Lonyi	Son
Ngarighong	Ngari	Daughter
Ilang	Illa	Full brother
Ghanighong	Hanie	Full sister
Woke(kong)	Wehe	Child of same father, different mother or Child of father's brother
Soni	Soni	Father's sister's child; Mother's sister's child; Mother's brother's child
Imani	Mamanyi	Father's brother;[c] Mother's brother
Iyani	Iyanyi	Father's sister; Mother's sister
Aghanighong	Honhonyi	Grandfather
	Hanhanyi	Grandmother
Kotu(ghong)	Hotu	Father's sister's husband; Mother's sister's husband
Komani(kong)	Homani	Father-in-law; Mother-in-law; Son-in-law; Daughter-in-law; Sister's son's wife; Husband's mother's brother
Ilesi	Ilesi	Wife's brother; Sister's husband (Used only between men)
---	Ngarihonye	Husband's sister; Brother's wife (Used only between women)
Koatani(kong)	Hahotani	Wife's sister, Husband's brother; Brother's wife; Sister's husband (Used only between opposite sexes)
Kanighong	Hani	Co-wife
---	Ngorwoi	Wife
---	Habi	Husband

[a]This table compares the Latuka word used by Seligman with the currently recognized form. The "Description" column contains several corrections of Seligman's descriptions. Ngarihonye, ngorwoi and habi were not included in Seligman's table.

[b]C. G. and Brenda Z. Seligman, Pagan Tribes of the Nilotic Sudan (George Routledge and Sons, London, 1932), p. 315.

[c]Father's brother may be called Monye or "father," especially if the father dies.

usage of similar words. For example, the Seligmans note that the Latuka iyanighong refers to both father's sister and mother's sister whereas the Lango iyanikong refers only to father's sister (22, pp. 350-353).

Languages similar to Latuka make a distinction between the maternal and paternal uncles. The Bari mananye (22, pp. 258-259) and Lango mamani (22, pp. 350-353) refer to mother's brother but not father's brother. The Latuka use mamanyi for both father's brother and mother's brother. The Seligmans mistakenly concluded that the Latuka monye refers only to the biological father (22, pp. 314-315). It is used to refer to father's brother as well. This hints that the Latuka, like their neighbors, do make a distinction between maternal and paternal uncles even though that distinction has become blurred in their language. This distinction is clearly seen in traditional Latuka family roles as will be shown below.

Economic Security and Family Relationships

Among the Latuka, family relationships form a structure within which the economic security of an individual is protected. The paternal uncle plays an important role within this structure. If a child's father dies, it is the paternal uncle who will take responsibility for its support. Were it not for some such arrangement a fatherless child would likely have no source of sustenance. A child shows a certain formal respect for his mamanyi (uncle). He will obey him as he would his father. Indeed, I can recall several instances where a child was sent by his mamanyi to do some chore or errand. The order was carried out without the slightest hesitation. If a man dies, his brother will take responsibility not only for his children but also for the wife or wives of the deceased.

Reciprocal Obligations

Extended family responsibilities are easily seen in times of famine. If a man procures food during a famine, he is expected to share it with his relatives. I have seen Latuka share food with distant relatives even though doing so meant hunger in their immediate family when the food was gone.

When a boy is to marry, certain of his relatives have an obligation to help him accumulate the cattle and goats for the bride price. Chief among these relatives is, of course, the father followed by the father's brother. Other relatives may also supply one or more animals for the bride price. It is likely that these obligations are reciprocal, though many Latuka deny this. If a relative supplies livestock for the marriage of a man's son, he can also anticipate receiving livestock should that man's daughter marry. A similar sort of reciprocity is seen in everyday gift giving. The recipient of a gift is obligated to the giver in some way unspecified at the time of giving. When someone asks another for a goat to feed those who are cultivating his fields, however, terms of repayment seem to be made fairly explicit.

The giving of gifts in general and bride wealth in particular thus creates a web of economic interdependence within the village group. As long as this web remains intact, a man's "wealth" and security are increased by the number of those obligated to him and decreased by the number of those to whom he is obligated. Such obligations, however, because they need not be met at any specific time, serve to reduce risk of economic disaster. When examining distribution of wealth within a culture such as this, one's conclusions about equity must be tempered by knowledge of such reciprocal obligations.

Inheritance of Land Use Rights

The economic security of an individual is further increased by tribal custom regarding rights to land. Rights to use of land are inherited but not sold. Inheritance is normally, but not exclusively, through the eldest son. If there are several plots, these are likely to be divided among the offspring. The man who owns rights to land is called monyemana or "father of the garden". If a man has moved from his ancestral home to another village area, he will have no inherited rights to land in his new home. In such a case, he will be allowed to use the land of an in-law or a friend. He will not be charged for the use of this land for that would violate tribal tradition. In turn he will let someone in his ancestral home use his land there. Under this type of system, land "ownership" is not a measure of wealth. Nor is land "owned" a good indicator of the amount of land farmed. In seeking measures of wealth one is advised to look at area cultivated.

The traditional form of land tenure has apparently broken down in the area around Torit. Torit is the district town. Many government employees, merchants, and workers from other Latuka village areas and from other tribes in the south and north live there. Around Torit an individual can cultivate where he wishes without asking the permission of a monyemana.

Age Classes

The men of the village area are divided into generations. Each generation is given a name. The monyemiji (literally "fathers of the village") are those who have been initiated into manhood. They have responsibilities in defending the village against attack, deciding disputes, and enforcing tribal mores. The aduri holwang are the youths who have not yet been initiated.

The monyemiji are further subdivided into age classes. Each age class is given a name. Generally four age classes make up each generation. However, a current generation, Miriyang, contains six age classes because it was formed during the turmoil of the war. When a group of boys is initiated into manhood they become an age class and remain members of that class for life.

The Seligmans' account connects the initiation of a new age class with a "new fire" ceremony. In preparation for this there is said to be a ceremonial fight between the aduri holwang and the monyemiji. All fires in the villages are extinguished, then the rainmaker starts a fire by rubbing sticks. Four of the initiates help him in this task. The fire is carried to the nadupa (drum house) of each village and from there to each house (22, pp. 322-325).

My investigations at Logotok uncovered no "new fire" ceremony connected with the initiation. I did learn that the abaloni, a traditional village authority, makes new fire by rubbing sticks in October. This signals the beginning of the season when grass may be burned. This occurs about the same season the Seligmans said their "new fire" ceremony occurred. It is possible that they mistakenly connected the making of new fire with the initiation of a new age class.

My findings about the initiation differ substantially from the Seligmans' account. I found that when the aduri holwang decide to become monyemiji they inform the abaloni. He passes word of this to the monyemiji. They then decide what will be required of the aduri holwang. An example of what they might require the initiates to do is collect fifty or one hundred long poles of firewood, one or two tins of honey (five or ten gallons), and two cows to be given to the old men to eat.

In former times, four of the aduri holwang would have been selected to watch the cattle of a nearby village area. These four were to come from a particular clan (Owangi at Logotok). When they uncovered the pattern of the movements of the cattle, a raid was made. The monyemiji did the fighting. The aduri holwang drove off the cattle. The cattle were then divided among the men of the village. This part of the rite de passage is no longer practiced because of the retaliation it would bring from the government. That the interval between initiations is to this day not fixed can likely be traced in part to this custom. Had the initiations occurred at fixed intervals, neighboring village areas would have been prepared for the inevitable raids.

The four aduri holwang are each required to give a goat to be eaten by the old men of the villages. These four then sleep in the nadupa (house where the drums are kept) for four days. After this the other initiates begin bringing goats for the old men. When one of them brings a goat he begins to sleep in the nadupa. When each has brought a goat and slept in the nadupa a goat is killed outside the nadupa. Its blood or stomach contents are put on the door of the nadupa. After this the aduri holwang are considered to be monyemiji and are free to sit on the obele, the multi-tiered platforms that are the lounging places of the monyemiji.

Aduri holwang are initiated about every fourth year, though this can vary substantially. Every fourth such rite is accompanied by a larger celebration called efira. Each efira establishes the group of four age classes as what I have called a generation. Efira is said to be a great festive occasion, attracting spectators from far away.

The thirteen most recent age classes at Logotok are listed in Table 4. The number and proportion of heads of households are given for each age class as found for the sixty-one households surveyed.

Some of the heads of households did not designate their age class. Individual age classes within the generation Akara were not determined. The generation Miriyang contains six age classes rather than the usual four. This likely results from the civil war delaying the efira.

The Clan System

The clans (awoyo) of the Latuka are exogamous and of patrilineal descent. According to the Seligmans, the clans are totemic. This means clan members are of one blood with the animal that represents their clan. The Seligmans said it was believed that upon death a man becomes his clan animal. They indicate that though men will normally kill their clan animal, a special relationship may be perceived as existing between a man and his clan animal. As an example they cite the belief that "elephants would recognize the millet planted by a Lomini man by its (Lomini) smell and so not trample it" (22, p. 311).

The idea that an animal was associated with each clan was apparently strong sixty years ago. This is certainly no longer the case. Only a few Latuka, generally the older ones, know that there was once such a belief. Fewer still can recall the animal associated with their clan. Of the eight clans found at Logotok, only for the two most well represented was the clan totem known by anyone questioned. Those are a bird named ibele for the clan Owangi and the monkey, amalong, for the clan Hachohi. In addition, the Seligmans reveal that the crocodile is the totem of the Igago clan (22, p. 310).

The clans of Logotok are shown in Table 5. The number and proportion of heads of households in each clan are shown for the 61 households surveyed. A given clan does not live exclusively in certain villages. Each clan is found throughout the tribe, though clans do tend to be more concentrated in some areas than others. Clan membership does not determine who forms work groups for cultivation. Indeed, if the clan was ever an important force in Latuka society it is no longer so. Its sole role currently seems to be in delimiting the set of potential spouses.

Traditional Systems of Government

The Office of Rain-maker

There are a number of traditional authority figures for each village area. Paramount among these is the rain-maker (hobu). As stated previously, tradition says rain-making came to Logotok from the nearby Latuka village area of Iboni. This introduction occurred when people from Iboni migrated to Logotok during the generation of Imeri (estimated to be between 1850 and 1870).

TABLE 4. RECENT AGE CLASSES AT LOGOTOK
(Youngest to Oldest)

Generation	Age Class	Number in Sample of Household Heads	Percentage
Current aduri holwang age class	Tabaho	0	–
	Ongililu	2	3
Balu	Bola	3	5
	Lohilok	4	7
	Imotak	12	20
	Krito	9	15
Miriyang	Ferika	9	15
	Ewoho	3	5
	Yaya	6	10
	Omojok	0	0
	Odinok		
Akara	Holong	5	8
	Okidik		
	Unknown or other	8	13
Total		61	100

TABLE 5. THE CLANS OF LOGOTOK

Name	Totem Where Known	Number of Household Heads	Percentage
Owangi	Ibele (a bird)	16	26%
Hachohi	Amalong (a monkey)	15	25
Igago	Crocodile	12	20
Imura		9	15
Oluluk		3	5
Oribile		3	5
Ohosobai		2	3
Ohiliangai		1	2
Total		61	100

Rain-making is an hereditary office. The rainmaker must be born of a father and mother both of whom are descended from a rain-making line. The male descendents take precedence in filling the office of rain-maker. However, it is common for a woman of rain-making blood and married to a rain-maker to take over the office upon the death of her husband. One of her sons will succeed her in the office. The requirement that the rain-maker be married to another of rain-making descent to produce heirs to the office coupled with the requirement of clan exogamy has necessitated intermarriage with daughters of rain-makers from other tribes (22, p. 328). This has certainly influenced Latuka rain-making ceremonies.

The importance of rain as perceived by the tribes of southern Sudan is great. In nearly every tribe in this region the rain-maker is the highest authority. In some tribes (eg. the Dinka and Shilluk) the health of the rain-maker is believed to embody the tribe's well-being. Formerly, in these tribes, the rain-maker was killed at the first sign of old age and a successor installed lest the rains fail and the crops wither. The Latuka were never quite so harsh with their rain-makers. However, a rain-maker who does not produce rain is still the object of much grumbling and secret accusation.

The office of rain-maker carries with it much authority and privilege. The rain-maker of Logotok is also rain-maker for the village areas of Lalanga, Ihirang, and Tabwor. These village areas give annual presents to the rain-maker in exchange for his services. The monyemiji are responsible for planting the crops of the rain-maker. He receives the second animal killed at all group hunts. At two annual group hunts associated with the rain-making ceremonies he receives all animals killed. These he may give away or sell at his discretion.

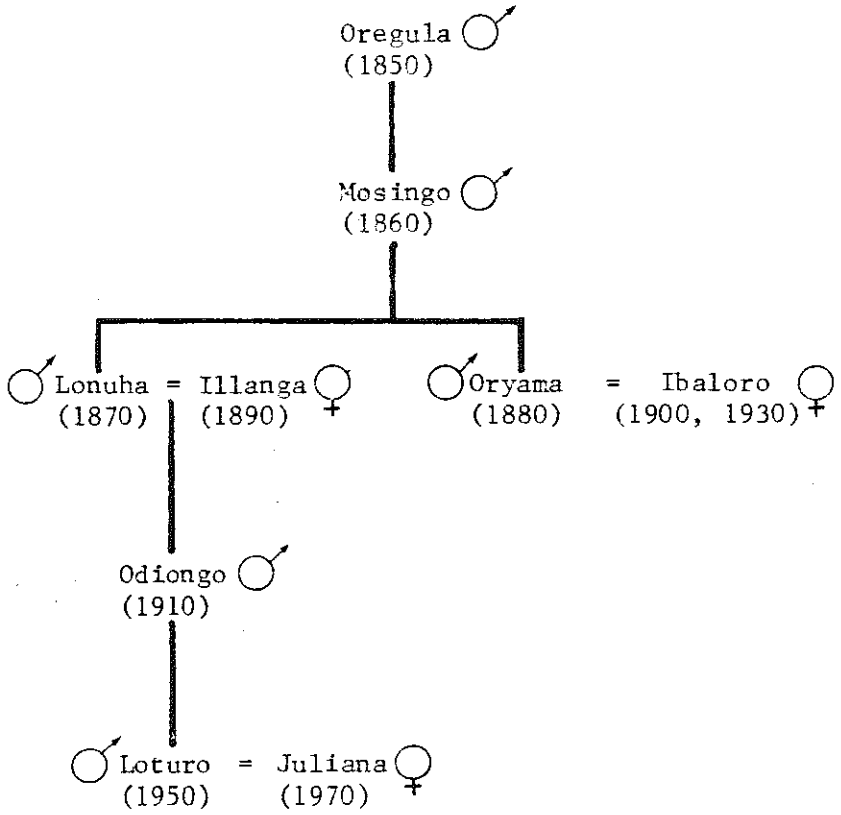
Before the British era, some Latuka rain-makers were able to bring rather large areas under their control. For example, in the 1890's the rain-maker of Tirangolle, Lomoro who was son of Xujang or Moy, conquered and brought under his control most of the Latuka (16, pp.107-109).

Figure 1 shows the line of descent of the Logotok rain-makers according to oral tradition. Note that Ibaloro held the office twice: once when her husband died then again when her nephew died. Juliana, the current rain queen, will be succeeded by her son when she dies.

Other Specialized Offices

The offices of abaloni, eboni, and amuroni seem to have been confused with one another in the Seligmans' study. This was probably because of linguistic difficulties. To add to the confusion, all three of these authorities deal with illness: one with epidemics, one with illness brought by ancestors, and one with ordinary cases. In discussing these offices I will rely principally on my own findings at Logotok. It may be that the titles and functions of these offices vary from one Latuka area to another.

FIGURE 1. A GENEALOGY OF THE LOGOTOK RAINMAKERS*



*Dates in parentheses indicate estimated beginning of reign.

The Abaloni

Below the rain-maker, the abaloni is the highest authority in a village group. The office is inherited. The abaloni's duties resemble those of the Lokoiya akhoboloni as reported by the Seligmans (22, p. 340). His role in preventing epidemics is very similar to that which the Seligmans record for the Lango ibwoni (22, p. 354-355).

The principle role of the Latuka abaloni is associated with war and hunting. Before a battle he performs a ceremony in which he throws some dust into the air. This presumably symbolizes the scattering of the enemy. He prays to his god (ajok) that the warriors will have success. Before a group hunt he sharpens a ceremonial spear to bring good fortune. He has the right to the first animal killed in a group hunt. Each year a dance and hunt are held especially for the abaloni. He receives all animals taken in this hunt.

In case of an epidemic, the abaloni will be called. He will assemble the village in the main dance ground. He will then administer a medicine to everyone to drive away the spirit (ajok) which caused the epidemic.

The bones of both the rain-maker and the abaloni are exhumed about one year after burial. This exhumation is preceded by two months of regular dancing in the compound of the deceased. The bones are then put in a sacred place.

The Eboni and Amuroni

The eboni is a seer who uses pebbles in making predictions. He might be consulted about pending journeys and lost livestock. He can be asked if enemies are coming or if one's children are ill because of an ancestor's curse. If an illness is caused by a curse he may order the bones of the appropriate ancestor to be exhumed to remove the curse. In this function he resembles the iboni that Seligmans describe for the Lokoiya tribe and the ibwoni of the Lango (22, pp. 345, 354-355). He normally charges a small fee for his consultations. An eboni may look through the viscera of a sacrificed goat or cow and "read" the cause of a drought. (More will be said later of this ceremony.) There may be a number of eboni in a village group. One may become an eboni by inheritance or by demonstration of prophetic ability. For diseases where a curse is not suspected, the Latuka consult an amuroni for a cure.

The Angotemana

The Angotemana has responsibility to magically drive off crop pests. It is said that he "cuts" the pests meaning that he kills an

insect representative of those attacking the crops. He is associated with the annual ayomana ("crying for the gardens") dance. This dance will be discussed in more detail below.

The Monyemiji

The monyemiji have much traditional authority in the governance of a village. It is they who guard and defend the village against cattle raids. They may also decide disputes. For example, if a husband catches a man committing adultery with his wife he may try to beat or kill that man. However, if the guilty party can escape to the house of the rain-maker or the obele (sitting place of the monyemiji) he will not be beaten. There the monyemiji will listen to the case and decide the punishment or fine. Another example of monyemiji authority was seen when a youth was caught in fornication. The monyemiji fined him six goats or one cow. These were beaten to death by the monyemiji with great ceremony and given to the old men to eat. Furthermore each of the offender's age-mates was also fined one goat.

Elected Government Officials: A Recent Introduction

The introduction of elected local government officials has slightly usurped the responsibilities of traditional tribal authorities. The local government officials are the nyipara for the individual village, the makungu for the village group, the sub-chief for several village groups, the head chief over several sub-chiefs, and the Executive Administrator for the district. The nyipara and makungu collect poll taxes and are responsible for the upkeep of roads in their areas.

The sub-chief supervises the makungu's and nyipara's under him. He will likely have an informal police force. Much of his time, though, is spent in hearing legal cases in his jurisdiction. Appeals of his decisions may be taken to the head chief, the Executive Administrator, and even on to the province level. There are thus parallel legal systems at the village group level. Adultery or theft may be punished by the monyemiji in accordance with tribal custom or a fine may be imposed by the sub-chief under Sudanese law. A violent quarrel may be resolved by the monyemiji in council or by the sub-chief's court punishing the party judged guilty. The traditional system has remained intact although some of its functions have been taken over by the government.

Ceremonies and Dances

Many of the ceremonies and dances of the Latuka are very closely related to their agriculture. These may coincide with an agricultural operation such as the beginning of planting, the beginning of harvest, or the end of harvest. Others occur during the less busy dry season but

serve as preparation for agricultural events in the coming wet season. This preoccupation with agriculture in Latuka ceremonial life is hardly surprising given their nearly complete dependence on the produce of their land for sustenance.

Ayomana: A Dance To Begin The Harvest

The ayomana (literally "crying for the gardens") dance occurs in August or September at Logotok. This dance and its associated ceremonies serve two purposes. First, it is intended to keep plant pests away from the maturing crops. Second, it marks the start of the main sorghum and millet harvest. The harvesting of some sorghum on the early maturing mountain fields is permitted before ayomana. If, however, harvesting of the main crop in the valley and on the plains is to begin before ayomana, a special sacrifice must be made. This will be done if there is famine during the pre-harvest weeks.

It used to be that to announce the coming of ayomana a particular old woman would ring a bell morning and evening for three days. This was followed by six days of silence then three more days of bell ringing. The woman sent word to the villages that ayomana would be held the day after the last bell ringing.

The ayomana begins in the morning when women assemble at Logotok village carrying spears and dressed in beads and cow or goat skin skirts. The women then run to a place below Ifite near the north-east corner of Logotok village area. They set up two vertical poles in the road there to represent a doorway into the fields. Sorghum and millet plants are laid across the doorway along with weeds, diseased plants, and insects attacking the crops. A short dance is done around this pile of vegetation during which it is repeatedly speared. This is to ceremonially kill the crop pests. This may be seen as blocking the path of pests into the fields. Once this is accomplished the women run as a group to the north-western part of the Logotok village area to repeat the ceremony. They then run back to the main dance ground in Logotok village to perform the killing of the pests a third and final time.

After these ceremonies are completed, the dancing begins in the afternoon. The women dance for several hours. The music of the dance is that used for funerals, appropriate for both the ceremonial killing of plant pests and for the end of the growing season for the crops.

After a time some monyemiji come down from the village to the dance ground. They are in full ceremonial dress at this point: shiny brass helmets with long white ostrich feathers radiating in every direction from their peaks and topped by a puffball of black ostrich feathers, copper necklaces or colorful beadwork around their necks, and elephant tusk armbands. Only after the monyemiji have arrived are the women free to eat, drink, and smoke. These things are forbidden on the day of ayomana before this time. Shortly the monyemiji remove their finery and the dance continues as the drums throb their monotonous rhythms into the night.

Ekanga: Celebrating the Completion of Harvest

The ekanga dance occurs in December or sometimes January at Logotok. Ekanga originated in the Iliu village group, hence, Iliu celebrates ekanga before any other Latuka villages. It is said that Iliu may punish any village area that celebrates ekanga before they do.

Ekanga is a celebration of the completion of harvest. It is a dance done for the abaloni. The morning after ekanga a hunt is held. All the people come to the abaloni with their spears. He then brings out his spear and sharpens it as a representative of their spears. This is said to make the spears accurate so they hit the animals instead of the ground. This hunt covers a relatively small area along the mountains and in the valley. The abaloni receives all the animals taken in this hunt and in turn gives them to the old men and women to eat.

After the hunt, the men of the youngest monyemiji age class visit the compounds of all the unmarried girls and collect beer from them. They then deliver this to the next older age class of monyemiji. The aduri holwang give beer to all the monyemiji except for these two youngest age classes. For the feast following ekanga, there are thus three main eating groups: the old people, the older monyemiji, and the second youngest monyemiji age class. The youngest monyemiji age class and the aduri holwang do not participate in the eating.

Group encirclement type hunts other than this one may not occur until ekanga and the two annual alam dances have been performed. It is permissible, however, for individuals or small groups to hunt at any time.

Alam: Two Dances for the Rain-maker

The two annual alam dances are held for the rain-maker during the dry season. Each alam includes a group hunt. The rain-maker receives then distributes all animals from these hunts. In this both the rain-maker's authority over his villages and his responsibility to provide for their sustenance are expressed. If group hunts were performed before both alams were complete the rain-maker would punish the people.

The first alam normally occurs in February. On the morning of this alam a hunt takes place over a moderately large area on the plains near Logotok. In the afternoon the dance begins. Each camp in the village group is to supply one tin (just over one-half bushel) of beer flour.* Beer for the dance is made from the flour.

The second alam is held in March. Not only the Logotok village group but also the other village groups served by the Logotok rain-maker

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*A camp is a subdivision of a village. Large villages such as Logotok are made up of four camps. Small villages such as Sohot comprise one camp.

take part in this alam. These village groups are Lalanga, Tabwor, and Ihirang. The purpose of this alam is to make formal requests for rain. For the hunt associated with the second alam, a large area from Logotok to the neighboring village area of Lalanga about nine kilometers away is encircled. Each camp in the villages is to supply two tins (about one bushel) of beer flour for this alam. On the day of alam people from all of the village groups meet in the rain-maker's compound to make a collective request for rain. Later during the day each village group except Logotok goes separately to the rain-maker's compound. It is likely that this is the time when the rain-maker exacts promises of gifts and labor in exchange for his rain-making services.

The following evening, after the other village groups have departed, the people of Logotok assemble in the rain-maker's compound. They negotiate their request for rain after which they celebrate by drinking beer.

The Rain-making Ceremony

When it is about time for planting to begin the rain-making ceremony is performed. Central to this event are the rain stones. The rain stones are small, cylindrical pieces of what appears to be white quartz. The rain-maker keeps them in small clay pots in a rain shrine behind his house. The Logotok rain shrine is much smaller than a normal house. It has many holes in the roof and is generally very run-down. Also in the rain shrine are a number of rusty spear heads partially buried in the floor. These spears may once have been used in ceremonies. The bones of sacrificed cattle and goats and the remains of recently deceased rain-makers rest in large pots in the rain shrine. The stones were said to be "rain" in some mystical way that I could not fathom. Most Latuka other than the rain-maker have never seen the rain stones. It is believed that one can see something circling in the air about the stones. Children are warned not to look at the stones lest they become blind.

The rain-making ceremony is quite straight-foward in its symbolism. The rain-maker takes the stones out of the small pots in which he keeps them. He washes them clean, then annoints them with oil. They are then returned to the pot and covered with water. They are kept submerged as long as rain is desired. If it is decided the rain is excessive the water is poured off and the stones are laid out to dry. It may be that there is a sacrifice associated with this ceremony, but I was unable to confirm this.

A Planting Ceremony

When the planting of the main crop is to begin the rain-maker performs a special ceremony to insure good yields. Some of the monyemiji bring seeds of sorghum, finger millet, sesame, cucumber, and pumpkin to the rain-maker. These crops are said to be those planted

traditionally by the Latuka in times past. Of these, finger millet and sesame are of almost no importance currently at Logotok. Notable because of their absence are bulrush millet and groundnuts. These two crops are apparently relatively recent introductions to the area. Along with sorghum they are now the three most important crops. The rain-maker places oil on a few of the seeds brought to him. He then mixes these with the remaining seeds and returns them to the monyemiji. The monyemiji then plant them in their fields.

A Special Sacrifice for Rain

If the eboni decides there has been "too much sun", which is to say not enough rain, he may require a special sacrifice to be made. In most years he will direct that a black or reddish brown goat be given to the rain-maker. If there is exceptional dryness, he may direct that a bull be used instead. If, on the other hand, the rains have been especially good for several years no sacrifice may be required. The rain-maker delivers the sacrificial animal to the eboni. The eboni then slaughters the animal near the fields. By looking through the intestines he ascertains the cause of the drought. The cause will certainly include any killings, robberies, and other crimes committed during the year. He then announces that the sacrifice has made atonement for these misdeeds. In the ceremony that was related to me, the lower stomach was then slit open and carried to the rain-queen. She took some of the contents and threw them into the air and took some more and spit into them. Finally, she placed some of the stomach contents on her toes. The eboni and his assistants went through the same actions with the first stomach. The stomachs were then carried away and thrown into the forest where no one would find them. I believe the blood from this sacrifice is scattered about the gardens. The meat of the sacrifice is thrown into a fire to cook then is eaten by the old men of the village.

Other Dances

Etobok is a war dance. It is performed before making an attack or a cattle raid. It may also be done as a celebration of good rains during planting. Hatar and epifoho are two dances not associated with any particular event. Hatar is often, but not exclusively, done when there is new beer. Epifoho can be performed almost any time except July, August, and September when the grain crops are tall. Epifoho involves much hand clapping. It is believed the clapping of hands brings winds which could cause lodging of the sorghum and millet.

Traditions Associated With Death

Several ceremonies and customs are associated with death. When it becomes obvious that a person will soon die, a piercing death wail is

taken up by the women in attendence. The death wail is begun before death so that the infirmed may know that others care for him. Shortly after death, the deceased is buried in his compound near the house. The exception to this occurs when a man is killed in battle or dies a violent death. In such cases the body will be left in the bush. To bury such a one in the compound is thought to bring violent death to his relatives. The group of men who dig a grave are normally given a goat for their consumption. The dung of this goat will be spread over the grave.

A funeral dance, aburio tulo, will be held and drums beaten for two days for an ordinary person. For a young child there is no funeral and no drums will be beaten. This may be associated in some way with the high infant death rate. The funeral of a rain-maker, on the other hand, will last for one or two weeks. For relatives who come to a funeral from a distance, a cow or a goat may be slaughtered and cooked.

A nametere is made to represent the deceased. The nametere is a bundle of grass and sticks tied together. Beer is given to the men who make it. During the funeral dance it is placed in the dance ground on a small platform of sticks and draped with skins. During the funeral, many songs about the deceased and his death are composed and sung by relatives and friends. In one instance an impromptu dramatization was put on of a quarrel the deceased had had with his in-laws. During the aburio tulo a spear wielding man runs toward the edge of the dance ground repeatedly shouting, "Jok ilo", which means "God (or evil), go away." The female relatives sit near the nametere during the dance. After the dance the men who made the nametere throw it out into the bush.

A fire is to be kept burning near the grave for thirty days after the funeral. Baker records that the remains of the dead were regularly exhumed (2, p. 151). He cites the presence of large numbers of human bones round about Latuka villages. I have seen no evidence of human bones in the vicinity of Latuka villages. Latuka remains, at least in recent times, have not been regularly exhumed. Exhumation takes place only under particular circumstances. The bones of a rain-maker or an abaloni will be exhumed about one year after burial as previously discussed. If children become ill or a woman is barren, an eboni may determine the cause to be the curse of a dead relative. The appropriate cure is to exhume the bones of that relative and thus put his curse to rest.

Traditions Associated With Marriage

Certain traditions and ceremonies are associated with marriage. Marriage to a relative or within a clan even when no relationship can be traced is forbidden. Other than these restrictions, young people are free to choose their own mates. When a young man and woman have decided to marry they signal their intention by running off together during the night. When the young man has thus stolen away his future bride he must hide out of "fear" (more ceremonial than real) of his parents-in-law.

This event is celebrated by the other unmarried young people who spend most of the night singing. After these things have occurred the parents of the couple begin to plan for the transfer of the bride wealth. A meeting is called between the clans of the couple. All the members of the two clans from the home village group would be invited to this meeting. In addition the couple's uncles from other village groups would be expected to attend. At this meeting there is a decision about how many cattle, goats, and sheep will be given by the groom's family to the bride's family. At this meeting, the father of the groom gives a spear, or perhaps an equivalent amount of money, to each man, woman, and child of the bride's clan present.

A few days after this initial meeting, the fathers and uncles of the couple meet. Together they inspect the livestock pledged as the bride-price. The uncles of the groom often help provide the livestock. A few months later, the parents of the bride and the uncles of the groom meet to finalize the transfer of the bride-price. The father of the bride receives the livestock and in turn generally gives some to his oldest brother and his father-in-law. The brother is given his portion because of his corresponding responsibility to help the bride's father. Should the bride's father have any sons who marry, his brother will help him pay the bride-price. The father-in-law receives his portion as an extension of the principle of the bride-price, for it was his daughter who gave birth to the bride.

After this meeting, the bride is sent to live with her new husband. The economic responsibilities of the husband to his wife's family continue, however. It may be that he was unable to pay the bride price at the time of marriage. In this case he must continue to make occasional payments, as he is able, until the entire bride-price is paid. Futhermore, after the marriage the man is expected to do some work, such as house building or cultivation, for his parents-in-law.

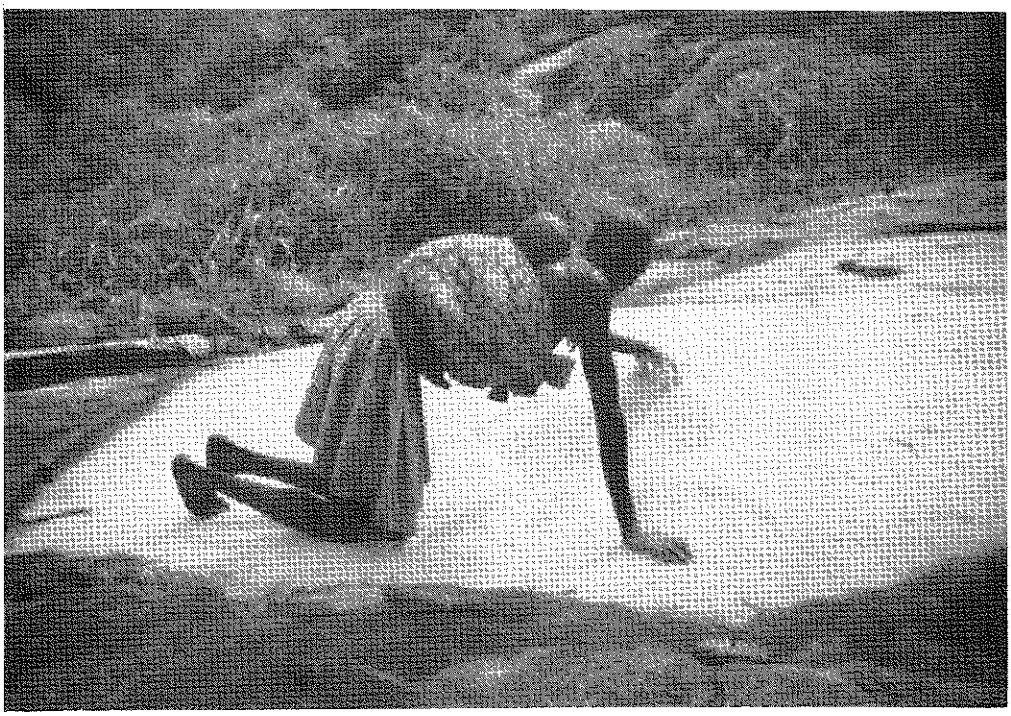
Adultery and fornication, seen as acts that threaten the institution of marriage, are punished both under traditional and governmental law. As recorded previously, a youth caught in fornication as well as all those in his age class will be punished. The monyemiji will fine them some livestock and give these to the old people of the village. If a man is tried before a traditional council of monyemiji and found guilty of adultery he will be sentenced to a beating. A man may also be tried before a government sub-chief for adultery. In a case I observed, the guilty party was required to pay sh15 of damages to the offended husband and a sh12 fine to the court.

PLATE III-1

Dancing is part of the observance of special occasions, whether joyful or sad. Latuka women (above) adorn themselves with ostrich feathers and beads for a dance. A man (upper right) wears beads, elephant tusk arm bands, a brass helmet and ostrich feathers.

Group hunts may only take place each year after dances have been done for the rainmaker and the abaloni. The tiang head at the right is carried back to the village after a successful hunt.

PLATE III-2



Most work around the house is performed by women. Above, a woman with a child on her back spreads moist sorghum flour to dry as part of the complicated beer-making process. The woman at the right grinds millet which will be boiled and eaten in a dough-like form.

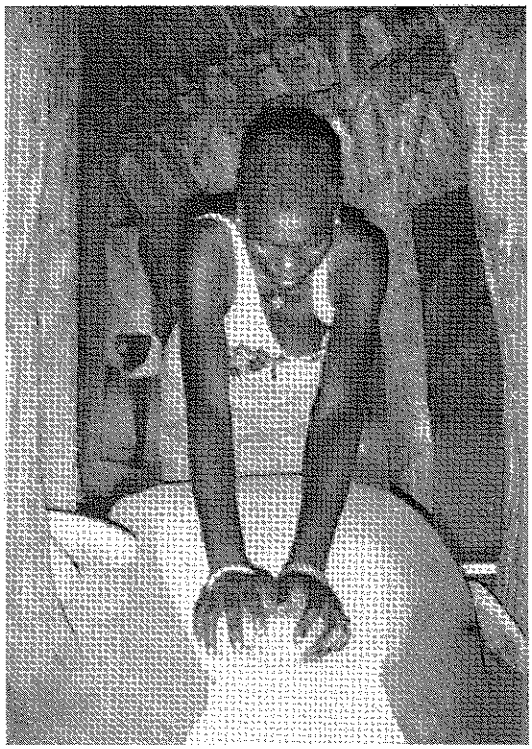
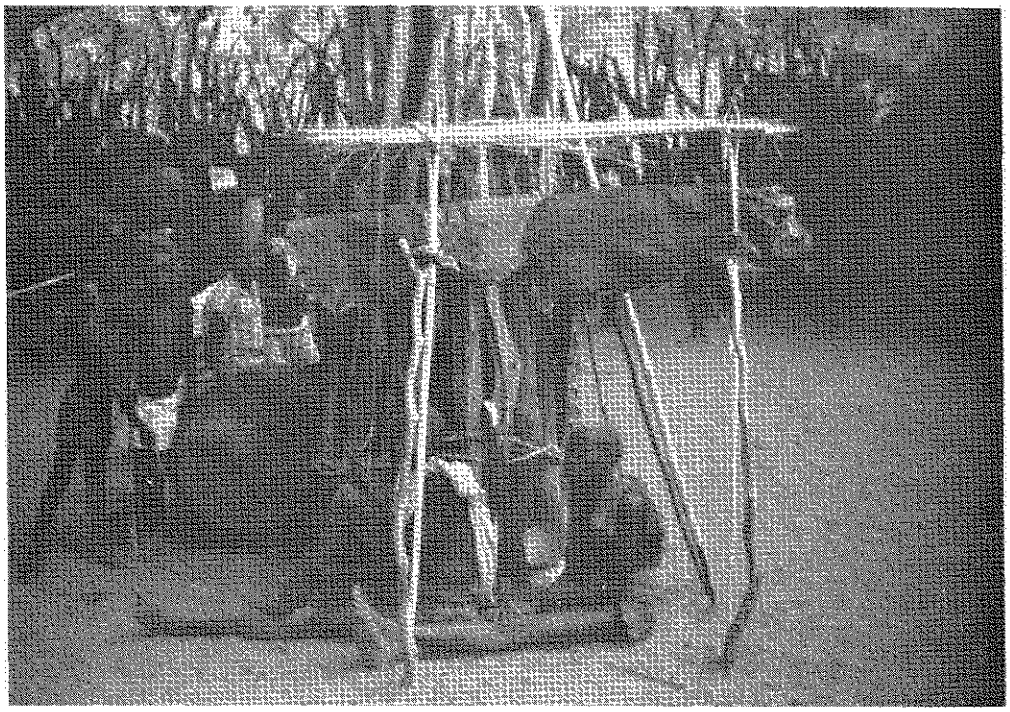
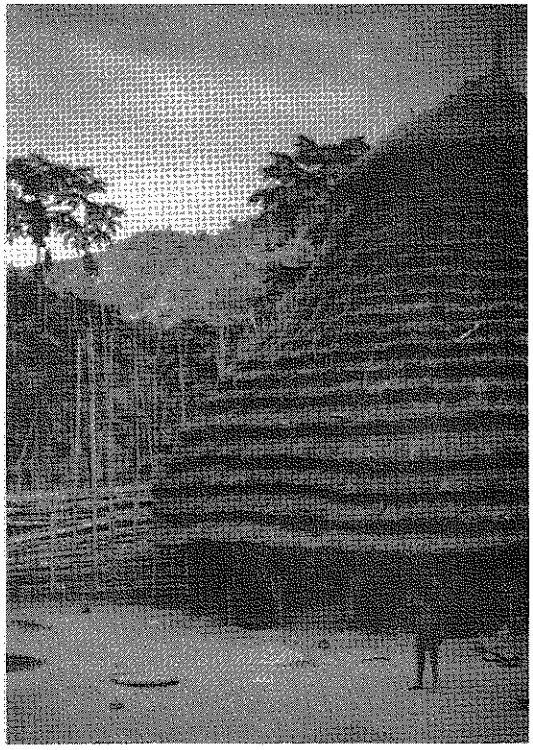


PLATE III-3



The nametere (above) represents the deceased at a funeral dance. One of the mourners sits below it.

The rain-maker's home at the right is larger and better built than an average Latuka house. The walls are of soil, termite mound, and cow dung. The thatch is elephant (or napier) grass.



CHAPTER IV

THE FARMING AND LIVESTOCK SYSTEMS

Thus far I have discussed a number of influences upon Latuka agriculture and life styles. Among these influences is the long history of external cultural and political pressure upon the Latuka and other southern Sudanese tribes. Government development policies and projects are a more recent influence. Culture may also be seen as an influence upon the agricultural practices chosen by the Latuka. It remains to discuss the more technical constraints upon Latuka agriculture. That is the purpose of this chapter. The significance of these influences and constraints as they relate to future development programs, policy, technology development and research will be discussed in the following chapter.

This chapter will deal with the technical aspects of the environment at Logotok. These include physical aspects such as topography, climate and soil. They also include biological parameters such as the set of available crop varieties, types of livestock and indigenous wild plants. These technical determinants are applicable not only at Logotok but also throughout the nearly sixty-five kilometer length of the Lopit Mountains. According to one sub-chief's estimate, between 7,500 and 12,500 Latuka live along these mountains. The description of the physical and biological aspects of the farming system should also fit the Dongotona Mountains and parts of the Imatong Mountains, where other Latuka live. Most parts of the Imatongs, however, are too high and receive too much rainfall to be comparable to the Lopit Mountains. Furthermore, it is likely that this description of the technical environment at Logotok is applicable to many sections of the Didinga and the Boya Hills inhabited respectively by the Didinga and Boya tribes. Needless to say, the cultural influences on farming systems in these latter two areas would differ from those at Logotok.

This chapter will also describe the farming system that has arisen at Logotok. This farming system has emerged from the inter-play of historical oppression by external forces, government policies and actions, and tribal culture all working within the parameters set by the biological and physical environment. Use of labor, adjustment to seasonality, allocation of the means of production and other aspects of the farming system will be discussed.

Topography and Climate

The physical environment at Logotok, especially the topography, is a major determinant of the farming system. The Lopit Mountains dominate the topography at Logotok. They rise from an altitude of about 600 meters at their bases to over 1,900 meters at the peak of Lodio, the highest mountain in the Lopit range. Among the mountains are found

valleys, some broad and flat and others narrow, steep and rocky. In great contrast to the mountains, very flat plains stretch north and east of Logotok to the horizon. During the wet season, large areas of these plains are waterlogged or swampy. Indeed, the streams that flow into this area never reach the Nile but instead empty themselves into vast swamplands. Such annually flooded lands are given the Dinka term toich. This gradation of topography from mountains into valleys and plains is paralleled by corresponding gradations in climate, soil, and natural vegetation.

Climatic data collected at Torit from 1922 to 1940 is included as Table 6 and Figure 2. Torit is located about 40 kilometers south-west of Logotok on a plain. Climate at Logotok should be quite similar to that at Torit. It can be seen that mean daily temperatures by month range only about 2° C on either side of the annual mean of 26.9° C. Mean daily minimum temperatures also vary little throughout the year. Mean daily maximum temperatures are, however, subject to greater variation, ranging from a high of 37.7° C in January which is the heart of the dry season to a low of 30.5° C in July during the wet season. The mean daily range in temperatures is lowest from June through August. This is during the wet season when cloud cover slows temperature changes.

Annual rainfall is just under one meter with monthly means ranging from 4 to 147 millimeters. The dry season at Torit runs for five months from November through March. The wet season lasts for seven months from April through October. An equatorial double maximum rainfall regime can just be distinguished with a minor peak in May and the major peak in July and August. Monthly evaporation from an open freshwater surface is greatest in the hot, dry season as would be expected. From November through March, this measure of evaporation exceeds rainfall. During the remainder of the year rainfall is the greater of the two. It should be noted, however, that evapotranspiration from a soil covered with vegetation can be substantially less than evaporation from an open fresh water surface (26, pp. 73-83).

Rainfall variability is of great agricultural importance. This is particularly true in dry regions. Rainfall will rarely be evenly distributed within a reporting period. Hence, even if rainfall over a period would otherwise be adequate, too long dry periods between rains may damage crops. Measurement of this type of variability has not been made in the Logotok area.

Year to year variations in rainfall are also of great importance. In semi-arid areas where production is for subsistence, a negative deviation from average rainfall can cause severe food shortages. An indicator of this variability was calculated and reported by Tothill for Torit (26, pp. 71, 82). To calculate this indicator, the deviations of actual annual totals from the mean were "summed irrespective of sign, meaned, and expressed as a percentage of the mean annual total." The value for Torit was nine percent for the years 1922 through 1940. This means that on average rainfall differs from the mean by 87 millimeters (9 percent of 971).

TABLE 6. CLIMATIC DATA FOR TORIT, SUDAN: 1922-1940

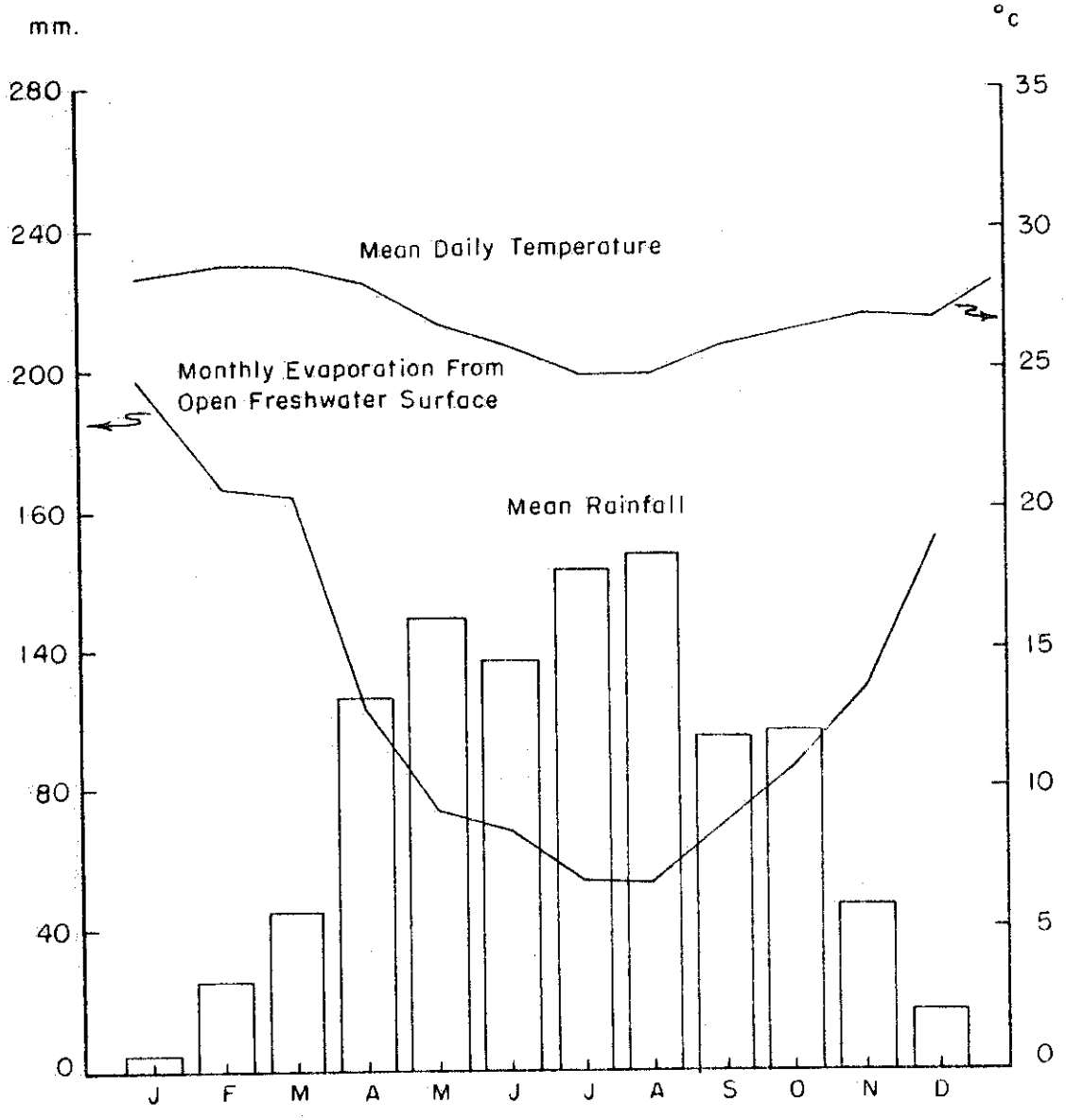
4° 25' N. 32° 33' E. 625 meters altitude

	J	F	M	A	M	J	J	A	S	O	N	D	Year
Highest maximum temperature, °C	43.0	42.1	41.4	43.6	39.8	37.3	35.4	35.6	38.3	39.9	39.8	39.7	43.6
Mean daily maximum temp., °C	37.7	37.4	36.5	35.5	33.5	32.3	30.5	30.8	32.9	34.1	35.6	35.6	34.4
Mean daily temperature, °C	28.3	28.9	28.8	28.1	26.8	25.9	24.8	24.8	25.8	26.4	27.0	26.9	26.9
Mean daily minimum temp., °C	18.9	20.3	21.1	20.7	20.1	19.5	19.0	18.8	18.6	18.7	18.4	18.2	19.4
Lowest minimum temperature, °C	13.1	13.1	15.1	16.0	13.4	16.0	15.0	13.8	14.5	13.2	13.5	13.2	13.1
Mean daily range in temp., °C	18.8	17.1	15.4	14.8	13.4	12.8	11.5	12.0	14.3	15.4	17.2	17.4	15.0
Mean relative humidity at 0800 hours, percent	39	45	53	67	73	75	79	79	74	72	62	53	64
Mean rainfall, mm.	4	25	45	106	129	117	143	147	95	96	47	17	971
Mean daily piche evaporation,* mm.	12.7	11.9	10.6	6.9	4.8	4.6	3.5	3.5	4.7	5.6	7.3	10.0	7.2
Monthly evaporation from an open freshwater surface, mm.	197	166	164	104	74	69	54	54	71	87	110	155	1305

*The values given are higher than those which would be obtained from the evaporation for an open freshwater surface. To obtain approximate values for the latter, the former must be multiplied by an experimentally determined reduction factor of 0.5.

Source: J.D. Tothill, editor, Agriculture in the Sudan (Oxford University Press, London, 1948), pp. 73-83.

FIGURE 2. CLIMATIC DATA FOR TORIT, SUDAN: 1922-1940



Source: J.D. Tothill, Agriculture in the Sudan, (Oxford, 1948) pp. 79, 82-83

Micro-Variation Associated with Topography

A type of climatic variation of very great importance in understanding the Logotok farming system is brought about by topography. Associated with topography, three major climatic zones can be identified at Logotok. One zone, on the mountains, has the highest rainfall. The mountains receive enough rain so that maize can be grown, although even on the mountains very little maize is grown. Furthermore, on the mountains, the rains begin early in the year. As will be discussed in more detail later, this characteristic is capitalized on to achieve a more even use of labor throughout the year. This is possible because planting can begin about one month earlier on the mountains than in other areas.

Rainfall is lower in the zone near the base of the mountains and the rainy season begins later. Some valley areas near the base of the mountains, receive regular runoff from the mountains. Such areas, along with the mountain fields, are the only areas where maize, a minor crop at Logotok, is grown. Maize is a crop that is sensitive to dry conditions, therefore it serves as a barometer of the adequacy and variability of water supply.

In the third zone, the one farthest from the mountains, rainfall is still lower and the wet season shorter. It is here that we will expect to see the most drought resistant crops.

Topography and Soils

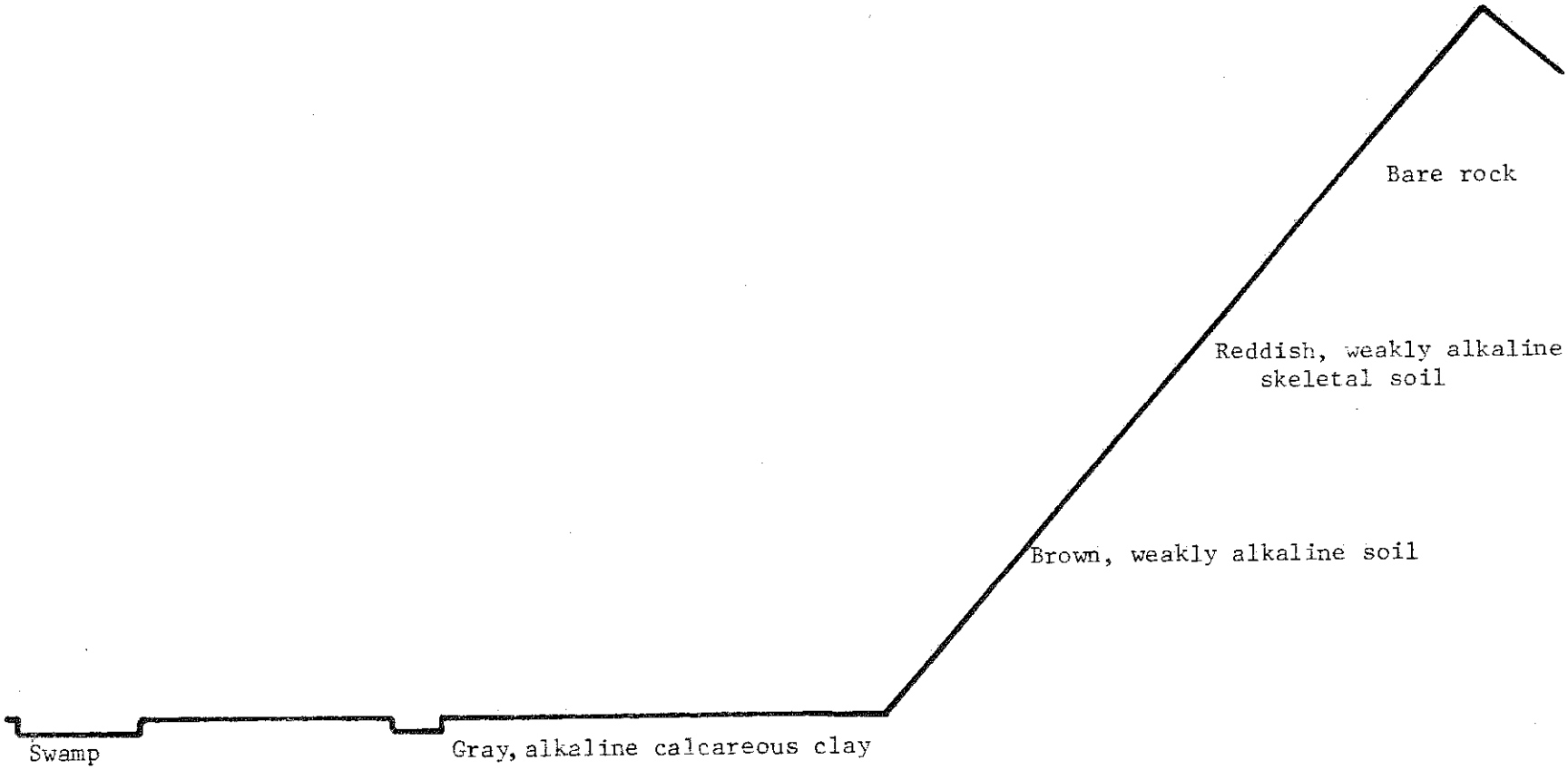
The Effect of Relief on Soils

Relief and climate are two factors of soil formation. Relief may affect soil formation via the erosion-deposition process. Soil material is washed away from areas of convex or steep slope and deposited in more level areas. Relief also affects soil formation through its interrelationships with other factors. Relief can be related to soil parent material (another factor of soil formation) in that mountains may be formed of different material than their surrounding plains. As discussed above, relief affects climate. Climate has an important effect on soil formation. Precipitation and temperature affect rates of weathering of minerals and of decomposition of organic material in the soil. Precipitation also affects the rate of leaching or downward movement of minerals through the soil profile. Given these factors and the variation in relief and climate, one should not be surprised to know there are at least five types of soil at Logotok.

A General Catena for Southern Sudan

Two idealized soil catenas germane to Logotok are shown. One is taken from Tothill (Figure 3). The other is based on my own

FIGURE 3. THE CATENA OF ALKALINE SOILS



Source: J. D. Tothill, Agriculture in the Sudan (Oxford. 1948), p. 147.

observations in the Lopit Mountains and at Logotok in particular (Figure 4). A catena is a sequence of soils found together which developed from similar parent material and under the same climate. The soils within the sequence differ from one another primarily through the effects of topography and drainage. The concept of the catena is most often used where the water table is located in the profile of the lowest soil. Thus a catena most often contains a continuum of soils ranging from well drained to poorly drained (5, p. 129).

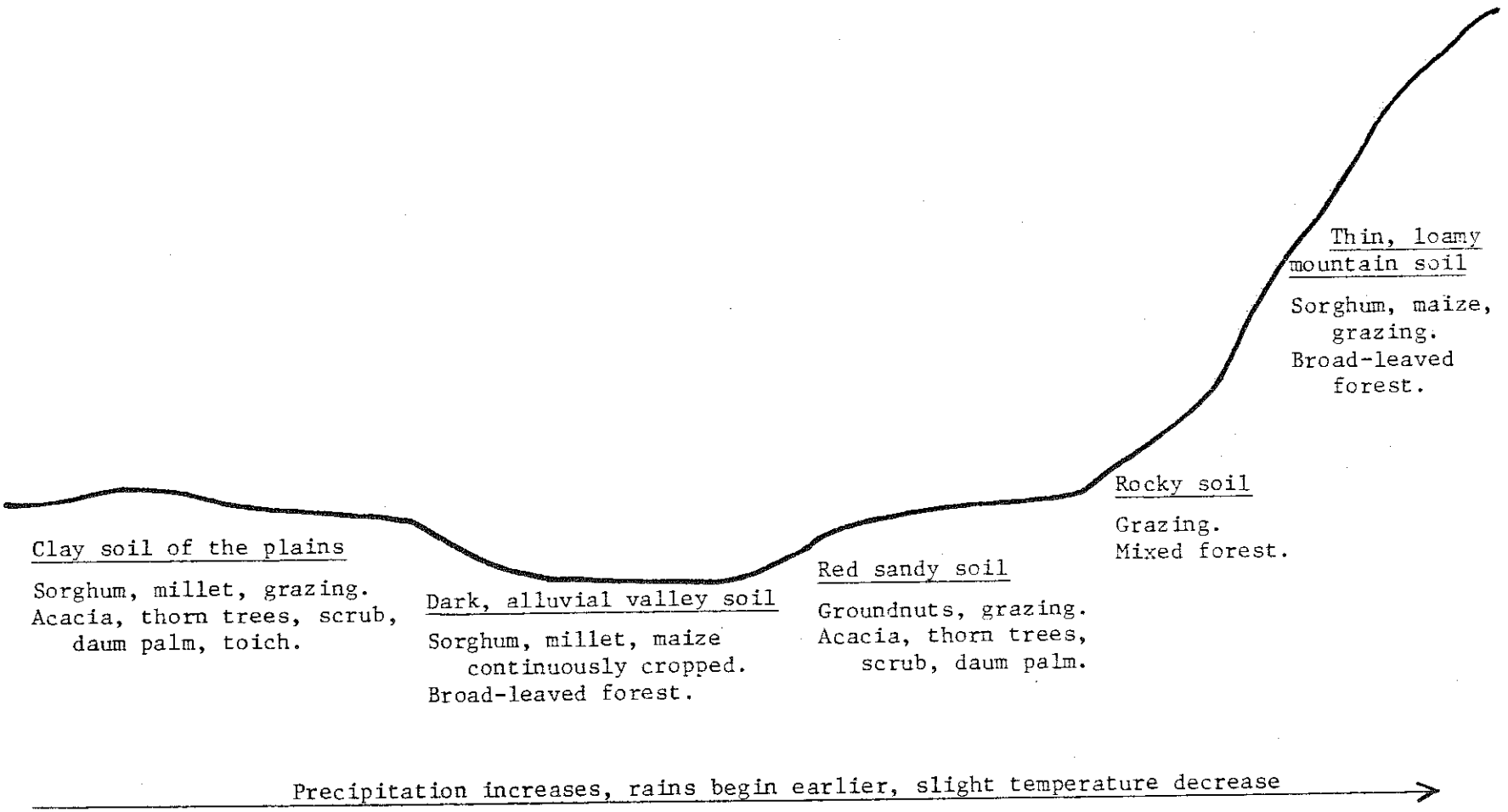
The catena from Tothill was designed as a general one, describing soils from the mountains near Uganda to the Sobat river. It is employed, for example, to describe soils at Liria and along the Lopit Mountains, Nuba Mountains, Didinga Hills, and portions of the Imatong Mountains. For a description of this catena, I rely heavily on Tothill. The highest soil in the sequence is partially decomposed rock. On this only drought resistant plants grow. The second soil in the catena is coarse, reddish, and weakly alkaline. This soil contains many loose fragments or particles formed from the disintegration of rocks. Next in the sequence is a fertile brown soil, moderately high in clay content. It is salt-free, weakly alkaline and calcareous, low in nitrogen content and contains some stones. The final member of the catena is a vertisol or what is often called "black cotton soil" or "cracking clay" soil. It has a high proportion of the shrinking, swelling montmorillonite clay. The clay is siliceous and calcareous. It is free from stones, is gray and low in salt and is more strongly alkaline than the preceding soil. According to Tothill, this gray cloddy clay is the most widely distributed soil in Sudan.

An example of the lowest member of the alkaline catena was sampled near Chalamini at the southern end of the Lopit Mountains. Table 7 reveals some of the results of an analysis of this soil. The soil is a fairly typical vertisol consisting largely of clay washed down from a nearby hill. Vertisols, by definition, need only have greater than 35% clay content. This soil has well in excess of 60% clay. The soil is sticky when wet and cracks deeply when dry. Below the top foot, the soil consists of small wedge-shaped units with slip surfaces or slickensides. Calcium carbonate has been leached into the lower layer where it forms white concretions. The surface layers contain no calcium carbonate. Salt content and, as is usual with vertisols, nitrogen content are very low. The soil is alkaline with a pH ranging from 8.0 in the upper foot to 9.0 at a depth of six feet (26, pp. 151-154, 165-169).

A Catena Specific to the Lopit Mountains

The second catena illustrated shows five types of soil. These five soils correspond roughly with those recognized by the local people. The vegetation on the mountains at Logotok is lusher than the drought resistant types that Tothill indicated were predominant in that part of his alkaline catena. The soils at Logotok, therefore, must vary somewhat from his idealized catena.

FIGURE 4. IDEALIZED SOIL CATENA FOR LOGOTOK, SUDAN *



*Typical crops and natural vegetation are listed under soil type.

TABLE 7. ANALYSIS OF A SOIL AT CHALAMINI
4° 28' N., 32° 52' E.; 1,900 ft.

Silica/alumina ratio of top foot clay 4.43. Moderate crop of American cotton; natural vegetation, tall grass and Acacia.

	Mechanical Composition: percent					Data for Fine Soil				
Foot	Stones and gravel	Coarse sand	Fine sand	Silt	Clay	Percent salts	Percent CaCO3	pH	Percent nitrogen	
1	1	6	20	8	63	.04	-	8.0	.05	Gray, slight horizontal cleavage
2	1	5	19	10	63	.05	-	8.3	.03	Gray, slightly plastic, closely packed wedge shaped units, some flattened roots
3	1	4	17	10	66	.07	trace	8.7	.04	
4	-	3	13	9	72	.07	trace	8.6	.04	
5	1	2	13	7	75	.08	1.1	8.8	.03	Pale gray, friable, calcareous
6	14	4	14	9	59	.08	7.1	9.0	.02	

Source: J. D. Tothill, editor, Agriculture in the Sudan (Oxford University Press, London, 1948), p. 169.

The upper part of the Logotok catena is a thin loamy soil on the mountain slope. The major crop grown on this soil is sorghum. Using man days to plant as a proxy for acreage, I estimated from my survey results that 92% of the cultivated land on the mountains is planted to sorghum. Approximately 7% of the cultivated mountain area is planted to bulrush millet. Some maize, about 2% of cultivated area, is grown in those mountain fields which receive the most rain. Rainfall varies both with altitude and the side of the mountain the field is on. This is a fertile soil capable of producing good crops but it can be subject to severe erosion.

The next soil in the catena is a very rocky one on the lower slopes of the mountains. Rocks, ranging from small stones to large boulders tumble from the upper slopes and cliffs into this area. Because it is so rocky it is little used for crops. Its major use is grazing.

The third soil in the sequence is a reddish or light colored sandy soil. This soil has formed where runoff from the mountains begins to slow and drop the heavier components of its sedimentary load. The soil's light, sandy texture makes it ideal for the growth and easy harvesting of root crops. Groundnuts are extensively grown on this soil but are not grown at all on the other soils. A major limitation of this soil is its tendency to drought because of its low water supplying capacity.

Fourth in the catena is a dark alluvial soil found in the valleys. At Logotok there is a large valley which is relatively level yet well drained. The fertility of the soil of this valley is continually replenished by runoff from the mountains. This makes it the most heavily utilized soil at Logotok for the growing of bulrush millet and sorghum. About 95% of the cropped valley area is planted to bulrush millet and 5% to sorghum, according to my estimates. Some maize is also grown here because of the relatively reliable supply of water from runoff. Maize, however, did not show up in the survey for the valley fields. Because this soil is so heavily cropped, it is litle used for grazing except during the dry season.

The final soil in the catena is the clay soil of the plains. This soil corresponds to the vertisol described by Tothill. It should be noted, though, that soils on the plains can vary significantly as a result of small differences in topography. This soil is available in great abundance and is used for sorghum and, to a lesser extent, bulrush millet. The cultivated area of this soil together with those transition areas where it borders on the sandy, groundnut soil were estimated to be planted 79% to sorghum and 21% to millet. According to Purseglove sorghum is very tolerant of drought periods and temporary waterlogging, both of which occur on the plains (20, p. 270). Furthermore, he notes that sorghum tolerates a wide range of soil conditions. It is especially well adapted to deep cracking, black cotton soils, although it also grows well on light sandy soils. The difficulty of tilling the heavy clay is a limitation of the soil on the plains. So also is the narrow range of moisture conditions under which it can be tilled. Soils high in montmorillonite clay are much of the time either too wet or too dry for cultivation.

Total cultivated land at Logotok is estimated to consist of 14% mountain soil, 18% sandy groundnut soil, 23% valley soil, and 44% clay soil of the plains. The latter varies substantially in its content of expanding type clay.

Topography and Natural Vegetation

The climatic zones and the soil catena are further paralleled by vegetation zones. On the mountains large broad-leaved, non-thorny trees predominate where the land has not been recently cultivated. Species present include ebony (Diospyros mespiliformis Hochst) and the sausage tree (Kigelia pinnata). Beneath the trees is a dense growth of grass. Bamboo of an inferior quality grows on some of the upper reaches of the mountains as do a very few wild bananas. The latter were recently introduced to the area from the Imatong Mountains to the south.

The rocky soil at the base of the mountains supports drought resistant vegetation suited to its low water supplying capacity. Desert rose (Ademium obesum) and the candelabra euphorbia (Euphorbia candelabrum) are often found here. Acacia and other thorny tree species predominate. The grass cover is not so dense here as on the mountains.

The sandy groundnut soil carries vegetation very similar to the soil at the base of the mountains. In some areas, the daum palm is abundant. The nature of the vegetation varies according to the amount of runoff the soil receives from the mountains and its water holding capacity.

The valley soil, were it not cultivated, would have a natural vegetative cover of large, thornless trees. Such trees are liberally scattered about the valley fields, generally being left undisturbed if they produce some useful product. The species found here, except for the absence of bamboo and banana, are quite similar to those found on the mountains. Along with the mountain soil, this soil has the lushest growth of woody vegetation.

The clay soil of the plains can have either of two types of vegetation. In most of the well drained areas, acacia and thorn scrub predominate. In the less well drained areas typical toich grasslands relatively free of trees are found. On these grasslands gilgai micro-relief (the pattern of ridges and depressions formed by the heaving of vertisols) is encountered. Gilgai micro-relief and the toich vegetation associated with it generally begin some distance from the mountains.

Topography and Transport

One effect of the topography and soils along the mountain ranges in the Southern Region is to make road transportation difficult. Roads are generally built along the base of the mountains. This makes them prone to being regularly washed out by flash floods during the wet season.

Were roads built further from the mountains the cracking clay soils which become nearly impassable when wet would have to be dealt with. Furthermore, roads on the plains would be isolated from the main population centers. Commercial truck drivers are very reluctant to travel to Logotok because of the damage their vehicles inevitably suffer on the road along the eastern side of the Lopit Mountains.

Crops and Cultivars

Sorghum, bulrush millet, and groundnuts surpass all other crops in their importance in Latuka farming systems. The great bulk of the time and land devoted to agriculture is given to the production of these crops. They also dominate the diet. When a Latuka says he has no food he may have fruit, vegetables, and wild spinach in abundance. In saying he has no food he simply means he has no grain or groundnuts. In his way of thinking other plants are eaten primarily to add flavor to his food. Sorghum, bulrush millet, and groundnuts supply most of the calories and protein in the Latuka diet. Of these crops, half of the cultivated area was estimated as planted to sorghum, one-third to millet, and about 17% to groundnuts in 1980 at Logotok.*

Several factors influence the comparative advantage of each crop relative to the others. Sorghum is tolerant of dry periods and well adapted to the cracking clay soils on the plains. However, it is also subject to severe attacks by witchweed (Striga hermontheca) which is a major problem at Logotok. Witchweed is parasitic to sorghum. It is stimulated to germinate by sorghum root exudates. It does not seriously affect millet or groundnuts. I observed the disease caused by Colletotrichum graminicolum on sorghum at Logotok. Smut (Sphathelotheca spp.) is also believed to occur.

The millet variety at Logotok requires a long growing season, hence it grows best in the valley where the season of moisture availability is long. It competes well with weeds, even early in the season when sorghum does not. Millet is more resistant to spoilage and insect damage in storage than sorghum. Because of this, sorghum is consumed most heavily in the first months after harvest while millet is conserved for later use. The only disease I identified on millet was green ear, caused by the downy mildew Sclerospora graminicola.

Groundnuts are limited to the sandier soils at Logotok. Most other soils would be unsuitable either because their high bulk density would impede proper nut development or because they are subject to waterlogging. Because of this, groundnuts compete very little with sorghum or millet for land. Among the diseases present are rosette virus and Cercospora leaf spot.

Crops other than the above three are important in adding flavor, variety and nutritive value to the diet. Some of the minor crops grown include okra, papaya, mango, pumpkins, squash, calabash gourds,

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*See Table 16 in Chapter V.

cucumbers, sweet potatoes, cassava, tomatoes, yams and tobacco. The major form of inter-cropping practiced at Logotok is the growing of members of the cucurbita species (cucumbers, pumpkins, squash and gourds) beneath a canopy of sorghum. These vine type crops are planted at the same time as sorghum. They are not planted with millet as it quickly forms too dense a canopy for other crops to grow beneath. Inter-cropping of other crops with groundnuts does not occur at Logotok. Except for the cucurbita species, the minor crops are nearly always grown in or near the compound where they can be easily tended and are not prone to damage by livestock.

Cultivars of Sorghum and Groundnuts

Of the three major crops, there are many cultivars available locally of sorghum and groundnuts. There is but one variety of bulrush millet. This is partly because millet cross pollinates readily, making the maintenance of different varieties difficult. It is also because millet is a relatively recent introduction as is indicated by its absence from Latuka ceremonies. Bulrush millet almost certainly originated in West Africa where there are cultivars of various maturity lengths available (20, pp. 205-206). Apparently only a small variety of genetic material for a long seasoned millet reached the Logotok area.

A great variety of sorghum genetic material is available at Logotok. This is primarily because sorghum originated in the north-eastern quadrant of Africa, probably in Ethiopia. There is thus great genetic variation in the sorghum of this area. The separate varieties are readily maintained as sorghum is typically only 5% cross-pollinated. The local people recognize twenty distinct varieties at Logotok.

The sorghum cultivars recognized at Logotok are shown in Table 8. Of these, only Serena is an "improved" variety. It was introduced to Logotok in 1980 by the headmaster of the village school. These cultivars exhibit much variation in a wide range of characteristics. Only a sample of the most easily measured characteristics is shown in Table 8. Height varies from about five feet for several cultivars up to twelve twelve feet or more for the tallest. Grain color ranges from white or buff to yellow, red and brown. In many countries white sorghum is preferred for food and the more bitter, dark seeded varieties are sought for brewing beer. The people at Logotok, however, attach little importance to differences in taste among sorghum varieties. Panicle type varies from extremely open and bushy to very closed and compact. Open panicle sorghum is generally considered less subject to bird damage than closed panicle varieties. The latter's heads offer birds an easy perch.

There are two main planting groups of sorghum at Logotok: the atari group and the osingo group. A mixture of atari varieties or a mixture of osingo varieties will be planted in a field. The atari and osingo planting groups, however, are almost never planted together in the same field. I was unable to ascertain why this is so. It is associated in some way with the timing or manner of panicle exsertion.

TABLE 8. SORGHUM CULTIVARS AT LOGOTOK

NAME	HEIGHT*	GRAIN COLOR	PANICLE TYPE	PLANTING GROUP**	MATURITY GROUP***	OTHER CHARACTERISTICS
Aderi	6	Red, white, brown	Open	A	5	Chew
Adieng	4	Red	Open	O	3	Chew
Akunati	4	Red	Closed	O	3	Goose necked
Ameterita	1	White	Closed	O	1	
Arabi	1	White	Open	O	1	
Chaliwai	5	Red	Very open	A	4	
Habirongi	4	Red	Closed	O	3	Chew
Ife	4	Red	Very open	A	2	
Kele	1	Red & White	Closed	O	2	Chew
Konglogi	4	White	Open	O	1	
Ngaboli	3	Off-white, yellow	Very open	O	1	Chew
Ngirengire	5	Red	Open	A	4	
Ngotirani	4	Red	Open	O	3	Chew
Obilet	4	Red	Closed	O	3	
Odoko	5	White	Very open	A	4	
Okoro	2	White, brown	Very open	O	1	Chew
Oriamatengeok	4	Red	Very closed	O	3	
Otuhoni	4	Red	Closed	O	3	Chew
Serena	1	Red, White	Closed	O	0	
Tuhunyi	1	Red	Open	O	2	Chew

*1=shortest, 6=tallest

**O=Osingo group, A=Atari group.

***0=earliest maturity, 5=latest maturity. If these are planted in March, 1 will normally be harvested in mid-June, 2 in late June, 3 in July, 4 in August, 5 in November or December.

Apparently it is difficult to see birds attacking the grain where a mixture of varieties from the atari and osingo groups are planted.

Time to maturity ranges from 2 1/2 to 8 or 9 months for the cultivars grown. A number of cultivars have stalks high in sugar content. In season, these may be cut and chewed in the same way that sugar cane would be. One cultivar, akunati, is goose-necked. This gives it some resistance to birds which dislike perching on its upside-down head. Because of the great variety of sorghum cultivars available at Logotok, there is one suited to each ecological niche. The amount of genetic material available could be a boon to plant breeders but at the same time would make it unlikely that any new variety could improve on or replace much of a traditional variety.

The Latuka sorghum variety ameterita is almost certainly related to the sorghum group Snowden termed Feterita. Feterita was brought from Sudan into the U.S.A. in 1907 where it has been used for hybridizing. It has compact panicles and white grain and is not goose-necked. Ameterita has these same characteristics (23, pp. 165-166).

There are at least eight groundnut cultivars recognized at Logotok. These and their characteristics are shown in Table 9. Harvesting method and plant type are closely related. Erect bunch varieties produce all their nuts at the base of the plant. Because of this they can easily be pulled when ripe. The spreading bunch and vine type plants produce nuts in a larger area beneath their outspread branches or vines. Hence they must be dug, a much more laborious and time-consuming operation than pulling. Cultivars differ in number of nuts per shell, the color of the seed coat on the dry nut and nut size. A final and important characteristic of the cultivars is time to maturity. There are two maturity groups of groundnuts, one of which matures about one month earlier than the other. Most of the area in groundnuts is planted to the early maturing varieties. Atuye is by far the most popular variety. All the early maturing varieties may be harvested by pulling. All but one of the late maturing varieties must be dug.

Tools and Techniques

All cultivation at Logotok is done with hand tools. The long handled push hoe is the primary tool used. It consists of a handle from ten to fifteen feet long tipped with a semicircular blade. The hoe is grasped part way up the handle, leaving most of it to extend into the air beyond the user. Unlike a conventional hoe which is pulled toward the user, the push hoe is swung forward and away from the user. The long handle is intended to impart momentum to the forward swing. Other tools include short handled hoes for digging groundnuts, sickles for harvesting and axes and hatchets for felling trees and cutting firewood.

The method of planting is unusual. First the seed is broadcast among the standing weeds and grass. Next the land is hoed to cover the seed and uproot the weeds. Finally the weeds are piled in bunches in

TABLE 9. GROUNDNUT CULTIVARS AT LOGOTOK

NAME	HARVESTING METHOD	PLANT TYPE	NUTS/ SHELL	DRY NUT COLOR	NUT SIZE	MATURITY GROUP**
Aful	Dig	Vine	2	Brown	Big	2
Aheto	Pull	Erect bunch	4	White	Big	1
Amakarara	Dig	Spreading bunch	2	Brown	Big	2
Amilo	Pull	Erect bunch	4	Red	Big	1
Atuye	Pull	Erect bunch	2	Brown with white spots	Small	1
Elonge	Dig	Spreading bunch	2	Brown	Very Big	2
Kabir	Dig	Spreading bunch	2	Brown	Big	2
Logum	Pull	Erect bunch	2	Red-brown	Big	2

*Ful is the general term for groundnuts. Perhaps aful was the original cultivar grown by the Latuka.

**Group 1 matures about one month earlier than Group 2.

the fields to prevent their re-rooting. This procedure applies to sorghum, millet, groundnuts and maize. This method of cultivation minimizes exposure of the soil to the sun and rain. Erosion and damage done to soil physical structure are thus minimized. After emergence of sorghum and millet, transplanting to achieve a uniform stand may be done.

Commercial inputs such as herbicides, insecticides and fertilizer are not used at all by the Latuka. Serena, an improved (non-hybrid) sorghum variety developed in East Africa was introduced at Logotok in 1980. The seed was obtained by the headmaster of the local school whose pupils planted a small plot. This was the only visible effect of any agricultural development project at Logotok.

Rotations and Fallow

Fallow periods and crop rotations are used to maintain soil fertility and control weeds. Fallow period varies with soil type. The Latuka use size and type of regrowth vegetation as indicators of when a fallow area is again ready for cropping. Generally, a spot with many mature trees is chosen for new fields on the mountains or plains. Degree of weed infestation and yield depression indicate when cropping should cease on a field. Estimates of the lengths of these periods as given below are what local farmers considered typical. The estimates are not necessarily accurate for any particular field.

Mountain fields are generally cropped for two to four years before a return to fallow is necessary. A fallow period of from ten to twenty years follows. Mountain land is abundant relative to the demand for it. There are large areas on the mountains with mature vegetation not being cropped. On the mountains the shorter seasoned cultivars of sorghum are grown and are not rotated with other crops.

On the sandy soil, groundnuts are grown for one year followed by a fallow of about two years. A crop of sorghum may be planted the year following groundnuts, but this is not common. Other than this, there is no crop rotation on the sandy soil. Of all the soils at Logotok, this comes closest to having too short a fallow period because of the high demand for it relative to availability.

Valley fields are typically cropped every year. There is no need for a fallow period as soil fertility is replenished by runoff from the mountains. Hence, even though demand for valley fields seems high relative to availability there is no problem of a decreasing fallow period. Bulrush millet is the major crop in the valley. It is well suited to this continuous cropping regime as it crowds out weeds and prevents the build-up of witchweed. It is occasionally rotated with sorghum, usually a long season variety. One of my informants indicated the purpose of the rotation by saying, "The millet grows faster after sorghum."

Fields on the plains are said to be cropped for three to six years before weed problems prompt a return to fallow. The fallow lasts

fifteen to twenty years. No specific rotation is followed, though a field may be planted to millet if the witchweed infestation becomes too severe for growing sorghum.

The Role of Livestock

Livestock play an important role in the Logotok farming system. They are the primary store of wealth and a source of food. They make use of fallow land and diversify production. However, they are little integrated with the cropping system. Crop residues are not gathered or stored for feed. Manure is sometimes applied to vegetable crops in the compound, but never to the staple grains or groundnuts. Livestock are not used as a power source. The elimination from the farming system of either livestock or crops would have little direct effect on the other. The elimination of either of these, however, certainly would have a marked effect on level of living.

About half of the households at Logotok own some chickens. Chickens are regularly eaten but eggs are never consumed. The local chickens lay irregularly and are very broody.

Other animals kept are goats, sheep and cattle. These are kept by men who have stables. Someone who does not own a stable but has goats, sheep or cattle will put them under the charge of someone with a stable. Often the owner of a stable chooses not to herd the livestock himself but rather selects a herdsman. The owner will typically give a heifer or five to ten goats to the herdsman. This gives him both an opportunity to begin his own herd and a greater motivation to do a conscientious job. The stable owner and herdsman share any milk produced by the herd. The milk is not necessarily split equally. In one case I observed, the stable owner received three-fifths of it because he had more people to feed than the herdsman. Thus, at least in this case, distribution of the product was based on considerations of equity rather than economic contribution.

Goats are quite numerous and, together with sheep, are often herded by small boys. Goats use much browse which other livestock are unable to utilize. Goats and sheep serve a great many purposes. They are the animals farmers most often slaughter for those cultivating their fields. As discussed in the previous chapter, they may be slaughtered for ceremonial and sacrificial purposes or for celebrations. They may be included in the bride price. They serve as a store of wealth. They are widely used in barter, especially to obtain grain during times of shortage. Merchants take cash for grain but tribespeople often demand livestock. Owning livestock or having a relative with livestock is thus a most effective way of minimizing the risk of hunger and starvation.

Cattle serve many of the same purposes as goats and sheep. Cattle are more highly prized than goats or sheep. They are used in ceremony and celebration. They are slaughtered for groups of workers at planting or bartered for grain. They are preferred for the bride price. As a store of wealth they are a less liquid asset than goats or sheep.

Historical Changes in Cattle Numbers

Cattle are less numerous than goats. Historically the Latuka had many cattle. Baker indicates that there were ten or twelve thousand head in every large town in 1863 (2, pp. 149-150). The Seligmans state that by the early 1920's the Latuka had far fewer cattle than during Baker's time (22, p. 306). It may be that in the southern Latuka areas, the introduction of the tsetse fly partially caused this decline (4, pp. 141, 144). The tsetse fly does not extend as far as Logotok, however. The 19th century slave traders must also have greatly contributed to the decline.

More recently, cattle and goats were greatly decimated at Logotok during the civil war. Both northern and rebel soldiers took livestock for food. Furthermore, the neighboring Taposa tribe did not fight in the civil war but took advantage of the unsettled conditions to raid the Latuka's cattle. Since the war ended in 1972 the Latuka have been gradually rebuilding their herds. Some cattle have been acquired by buying guns east of the Nile at Yei and trading them at a profit for cattle from the Taposa. The cattle were sold and this process repeated until a sizeable herd was built. This seldom occurs now for the Latuka prefer to keep their guns as defense against cattle raids which are quite common. During my five months at Logotok two or three cattle raids occurred at nearby villages. Shortly after I left a raid was made on Logotok. One of the raids was made by another Latuka village area, the remainder by Taposa.

Herd Composition and Annual Changes

The composition of the herds is of interest and was estimated from survey data (Table 10). These figures should be quite accurate as livestock owners know their animals well. Bulls made up about 22% of the cattle herd; steers, 17%; cows, 45%; and calves of up to one year, 16%. The reproduction rate, as measured by number of calves divided by number of cows was 36 percent. Separately, I was told by a stable owner that he expects his cows to produce their first calves at four years of age and every second year thereafter. This is consistent with a 36% reproduction rate.*

Data about selected uses of livestock were also collected (Table 11). These figures are subject to the errors inherent in questions based on recall over a one year period. The 61 households surveyed had a total of 545 head of cattle. Over the year preceding the survey 24 cattle were slaughtered, 101 died, 45 were stolen and 83 were sold or bartered. Questioning of some stable owners revealed contagious bovine pleuropneumonia as a probable cause of many of the deaths. There had been a drought the previous year increasing the number bartered and

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*Eg. if half the herd lived five years and the rest eight years and each cow had a calf at age four and every second year thereafter, a 36% reproduction rate would be achieved.

TABLE 10. COMPOSITION OF LOGOTOK LIVESTOCK HERDS FOR 61 HOUSEHOLDS, OCTOBER 1980**

	Adult			Young	1980 Total	Estimated Reproduction Rate
	Male	Castrate	Female			
Cattle	122 (22)	91 (17)	244 (45)	88 (16)	545 (100)	36%
Goats	189 (18)	197 (19)	477 (46)	186 (18)	1049 (100)	78%
Sheep	109 (22)	75 (15)	233 (48)	74 (15)	491 (100)	64%

**Numbers in parentheses are percentages.

TABLE 11. USES OF LIVESTOCK AT LOGOTOK FOR 61 HOUSEHOLDS, OCTOBER 1979 - OCTOBER 1980**

	Estimated 1979 Total*	Slaughtered	Died	Stolen	Sold	1980 Total
Cattle	627	24	101	45	83	545
	(100)	(4)	(16)	(7)	(13)	(87)
Goats	914	63	115	59	153	1049
	(100)	(7)	(13)	(6)	(17)	(115)
Sheep	468	33	68	24	49	491
	(100)	(7)	(15)	(5)	(10)	(105)

*Estimated 1979 Total = 1980 Total + Young born during year - Number slaughtered - Number died - Number stolen. Those sold are assumed to stay within the village.

**Numbers in parentheses are percentages.

slaughtered for food. Thus, total number of cattle used was likely greater than normal. If all cattle sold or bartered remained within the village area, the cattle in the survey lost to the village herds were those that died, were slaughtered or were stolen. These totaled 170. Comparing that to 88, the number of calves less than one year old at the end of the period, reveals a substantial decrease in the herd for the year.

Males were estimated to make up 18% of the goats; castrated males, 19%, females, 46% and kids of less than six months, 18 percent. The ratio of kids less than six months old to females was 39 percent. This results in an annual reproduction rate of 78 percent. Total goats owned by the 61 surveyed households was 1,049. During the preceding year 63 goats were slaughtered, 115 died, 59 were stolen and 153 were sold or bartered. The owners indicated many of the deaths were from the same cause as those of cattle. This is assumed to be contagious caprine pleuropneumonia. Goats lost through death, theft and slaughter totaled 237. If kiddings were evenly distributed over the year, 372 kids were available to replace the goats lost.*

Rams made up 22% of the sheep for the households surveyed; castrated males, 15%; ewes, 48% and lambs of less than six months, 15 percent. The ratio of lambs to ewes was 32 percent. This gives an estimated annual reproduction rate of 64 percent. In total 491 sheep were owned by the surveyed households. During the preceding year 33 sheep were slaughtered, 68 died, 24 were stolen, and 49 were sold or bartered. The number lost to the village group totaled 125. Assuming lambing was evenly spread over the year, 148 lambs were available to replace them.

Wild Plants and Animals

Plants for Food

Cultivated plants and domesticated animals do not provide all that the Latuka require. For many foods, raw materials and medicines they rely on a wide variety of wild plants and animals. Table 12 shows many trees and herbaceous plants used for food. Most of the trees listed provide some sort of fruit. Amule (or malwa) was an especially important food source during the hungry period of 1980. The fibrous amule fruits must be cooked slowly in water for about two days before they are edible. Most wild fruits ripen during or just after the wet season. Trees that produce fruit are normally left standing when new fields are cleared.

Two of the trees provide leaves which are boiled as a spinach to eat with sorghum or millet. All the herbaceous plants are eaten in this same way. Amagwe and emoloto are the two most important wild spinaches.

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*Twice the number of kids six months old or less on the survey date was 372.

TABLE 12. WILD TREES AND HERBS USED AS FOOD SOURCES

NAME	Plant Part Used		Months Available	Comments
	Fruit or Seed	Leaves		
TREES				
Abule	X		March, Sept.	
Abiongi	X		Feb.-March, Sept.	
Achahi	X		May-June	
Alonge	X		June-July	
Alywari	X	X	Feb.-April	Also called eduti
Amule	X		March-July	Also called malwa
Ebonge	X		June-July	
Ebonge		X	Feb.-March	
Elumi	X		Sept.-Oct.	
Enguri	X		March-May	
Isyarem	X		Oct.-Nov.	
Ngaboli	X		Jan.-Feb., Sept.-Oct.	
Olobitik	X		March	
Titibo	X		Sept.-Oct.	
HERBS				
Amagwe**		X	May-Oct.	Also called magi
Arigila*		X	May-Oct.	
Atagiri*		X	June-Sept.	
Chobo*		X	March-Sept.	
Emoloto**		X	March-Oct.	Dried for later use
Ingore		X	March-Sept.	Of minor importance

*Can be cooked together.

**Cannot be cooked together. Very important foods.

Both are available in large quantities throughout the wet season. Furthermore, emoloto can be dried and stored for consumption during the dry season when other wild spinaches are unavailable. Latuka tastes dictate that emoloto and amagwe not be cooked together. Certain other wild spinaches may be cooked in a mixture.

Plants for Building and Handcrafts

The Latuka names and, when known, the common names of plants used for building and handcrafts are shown in Table 13. Trees used for making stables, poles for houses or the legs of grain stores are very resistant to termites. Those used for hoe handles, spears, bows and arrows must be straight, strong and slightly flexible. Particular species are recognized as best for rafters, chicken coops, baskets for grain stores, thatching and smoking bees. Helmets, hats and sleeping mats are skillfully crafted from the fibers of the daum palm. Nearly every item used by the Latuka is crafted from material found in their environment. They are thus knowledgeable of the useful properties of most plants around them. Table 13 represents only a portion of the plants that might be used for such purposes.

Medicinal Plants

The medicinal plants used by the Latuka (Table 14) are particularly interesting. Ahiyir is a tree whose bark is boiled in water. This water is drunk for general body pain or upset stomach. Amamoi, the sausage tree (Kigelia pinnata), is used in treating upset stomach. One of my informants said the bark is used, another that the juice from inside the fruit is used. It works by inducing vomiting and diarrhea. It may also be used as a wound dressing. The root of the papaya is mashed and boiled to obtain a medicine for hepatitis. The sap of the desert rose (Adenium obesum) is used to keep flies away from wounds on cattle. My informants said that the bark of himeto is used to treat "swelling of the face, hands, feet, and stomach which condition is caused by eating too much meat and fat." It works by inducing diarrhea. It is said to be so powerful that if a dose much larger than half a peanut shell is taken, death might ensue. Juada is the bulb or root of a grass chewed to treat malaria. It tastes like chloroquine, a drug commonly used to treat malaria. Obulang is a root that is mashed, boiled and taken to relieve upset stomach. Otobwaha is the root of a vine. It also tastes like chloroquine and is used to treat malaria.

The December 1979 issue of Sudanow states that there is a Medicinal and Aromatics Research Unit in Sudan (14, pp. 34-36). This unit is examining traditional herbal medicines to determine which are beneficial and how they should be administered. Information arising from such research could be very useful in the Southern Region where medicine shortages are chronic. Though some of the traditional medicines used at Logotok are not likely beneficial, others are almost certainly efficacious.

TABLE 13. PLANTS USED FOR BUILDING AND LOCAL HANDCRAFTS

NAME	USES
Abuhe	House poles, axe handles
Afati (Ebony)	House poles, stables, hoe handles
Agirisa	Chicken coops
Ahuro (Bamboo)	House rafters, compound fences, bows
Alanga	Grain store poles
Alioto	Spear, hoe, & hatchet handles, clubs, arrows, bows
Ejuti (Napier grass)	Thatching, arrows for birds.
Hafore (Daum palm)	Thatching, tying sorghum stalks
Hebiala	Arrows, bee smoking
Kuyala	Grain store baskets
Olihai	Hoe handles
Otimoti	Clubs
? (Acacia & other thorny species)	Fencing around gardens

TABLE 14. PLANTS USED AS MEDICINE

NAME	PART USED	CONDITION TREATED
Ahiyir	Bark	Body pain, upset stomach
Amamoi (Sausage tree, *Kigelia pinnata*)		Upset stomach, (causes vomitting & diarrhea)
Apaipai (Papaya)	Root	Hepatitis
Boyaboya (Desert rose, *Adenium obesum*)	Sap	Wound dressing for cattle
Himeto	Bark	Swelling of face, hands, feet, or stomach from eating too much meat and fat. (Very powerful!)
Juada	Bulb	Malaria
Obulang	Root	Upset stomach
Otobwaha	Root	Malaria

Wild Animals

Wild animals are a source of meat and leather. Spears are always carried to the fields by the men not only for self defense but also because they may have a chance to slay an animal. Large hunts are organized during the dry season. The slaying of a large animal such as a giraffe, buffalo or tiang is occasion for a feast. Skins may be crafted into clothing, shields, sleeping mats, knife sheaths, drum skins or numerous other articles.

Hives for wild bees are set out in trees. A hive consists of a hollowed out log. When the hive is full, the bees are smoked out and the honey collected. Honey can be a good source of income if sold. In 1980 one man at Logotok collected the money equivalent of four or five goats by selling honey.

Labor Use

It is important to know the seasonal labor needs of a farming system in order to understand that system. Table 15 shows monthly labor use for the cropping system at Logotok. I have indicated whether each operation is performed by men, women or both. Sex roles are rather strictly defined among the Latuka and will be discussed below. The amount of time devoted to each activity is denoted in a general way. To those denoted as major activities many long days are devoted during the indicated time period. To those called low level or intermittent activities only a few days or portions of days are devoted on an occasional basis.

In October or November, the men begin to burn off the previous season's growth of grass. This continues intermittently until the next wet season begins. Burning the grass causes growth of tender easily digestible grass for the livestock the next season. It makes walking easier and removes the danger of an uncontrollable wildfire sweeping through the dense growth of old grass.

The cropping cycle itself begins in November. At that time the men begin to clear new mountain fields of trees even while the women are still harvesting the last of the previous cycle's crops. It is an arduous task. The trees are burnt in January.

In February, the month after the burning of the mountain fields, sorghum is planted there. If maize is to be grown on the mountains, it is also planted at this time. The first planting occurs on the mountains because the rains begin earliest there.

In March planting of sorghum begins on the plains and in the valley. This planting continues through April. If maize is planted in the valley it will be planted during March. In March, monkey scaring begins in the mountain fields. Monkeys will pull and eat the young plants if they are not chased from the fields. From March until the last fields

TABLE 15. FARMING CALENDAR FOR LOGOTOK, SUDAN

XXXXXXXX========++++++++
Male Both Female
Major Activity

X X X X X = = = = = + + + + +
Male Both Female
Low Level or Intermittent Activity

OPERATION	J	F	M	A	M	J	J	A	S	O	N	D
Burn grass	X X X X X X X X										X X X X X X X X	
Cut trees, mountains											XXXXX X X	
Burn trees, mountains	XXXXX											
Plant sorghum, mountains		=====										
Weed sorghum, mountains				+++++								
Tie sorghum, mountains					XXXXXX							
Harvest sorghum, mountains						+++++++++++++++						XXXXX
Cut trees, plains	XX											
Burn trees, plains		XXXXX										
Plant sorghum, plains			==========		= = = = =							
Weed sorghum, plains					++++++++++							
Tie sorghum, plains						XXX X X X X X						
Harvest sorghum, plains							+ + + + + + + +					++++++++++++++++++
Plant sorghum, valley			==========									
Weed sorghum, valley					++++++++++							
Tie sorghum, valley						XXX X X X X X						
Harvest sorghum, valley							+ + + + + + + + +					++++++++++++++++
Plant millet, valley					=========							
Weed millet, valley								++++++++++				
Tie millet, valley										XXX		
Harvest millet, valley												+++++
Plant millet, plains					=====							
Weed millet, plains							++++++++++					
Tie millet, plains										XX		
Harvest millet, plains											+++++	
Plant groundnuts					=====							
Weed groundnuts							++++++++++					
Pull groundnuts								======				
Dig groundnuts									======			
Harvest cucumbers					+ + + + + + + + + + + + +							
Harvest pumpkins							+ + + + + + + + + + +					
Plant maize		Mtn. Valley = = = = = = = = =										
Weed maize				Mtn. Valley + + + + + + + +								
Harvest maize					Mtn. Valley + + + + + + + +							
Plant sweet potatoes						X X X						
Weed sweet potatoes									= = =			
Dig sweet potatoes	= =											= = = = = =
Bird & monkey scaring		==========										

are harvested on the plains and in the valley, monkey and bird scarers are on duty each day.

In April the sorghum and maize planted on the mountains in February are weeded. March and April mark the beginning of the busiest time at Logotok. The cropping system's requirements for labor remain at a high level until the end of October.

In May groundnuts and bulrush millet are planted, the latter on the plains. Weeding of sorghum on the plains and in the valley begins in May and continues through June. The sorghum on the mountains is tied up in late May and early June. The standing sorghum is tied in bunches to prevent it from lodging before harvest and to make harvesting easier. The harvesting of maize begins in mid-May on the mountains and continues through June and July in the valley. Cucumbers also begin ripening during May and June.

Some sorghum may be planted in June and July on the plains. In June millet is planted in the valley. In late June sorghum is tied in the valley and on the plains and the harvest of sorghum begins on the mountains. The mountain harvest continues through July and August. In June or July sweet potatoes are planted.

During July the harvest of early maturing sorghum in the valley and on the plains begins. This harvest continues intermittently through September as the various cultivars mature. Near the beginning of October the pace of the harvest accelerates. Weeding of millet on the plains and of groundnuts begins in July and continues into August. Pumpkins begin to ripen in July.

The millet in the valley is weeded beginning in August. This may continue into September. The harvesting of the early maturing groundnut varieties begins in the middle of August and lasts until early or mid-September. Millet is tied on the plains in late September and in the valley in early October. The last cucumbers are picked in September.

In late September and early October the harvest of the late maturing groundnut varieties occurs. In September or October sweet potatoes may be weeded. This is not considered a critical operation and hence may be neglected. The harvesting of sorghum on the plains and in the valley moves into full swing during October. It continues until all the sorghum is ripe and harvested which may be late December. The last of the pumpkins are harvested in October. Millet is normally harvested on the plains in November and in the valley in December. If sweet potatoes were planted, they will be dug beginning in November.

The main labor bottleneck appears to be associated with planting and weeding. This period extends roughly from April through August. This conclusion is not based on measurements. It is drawn from conversations with farmers about which times are busiest and from general impressions gained in observing agricultural activity.

Sex And Age Roles

Sex and age roles affect nearly every agricultural activity of the Latuka. Each task is considered either women's work or men's work. It is men who burn the grass during the dry season and who fell and burn trees for new fields. It is men who tie the sorghum and millet to prevent its lodging. On the other hand the women are charged with weeding and harvesting the crops. The main exception to this is sweet potatoes which may be weeded or harvested by either men or women. Apparently definition of these tasks as being male or female is not considered important because sweet potatoes are a minor crop grown away from the compound.

On the farming calendar, Table 15, certain operations are shown to be performed by both men and women. However each of these operations is composed of several tasks and each of these tasks is defined as male or female. For example, when groundnuts are harvested, men pull the weeds from the fields then pull or dig up the nuts. The women then remove the nuts from the plants, put them in containers and carry them to the village. When sorghum, millet, maize or groundnuts are planted the men scatter the seed and hoe the fields. The women follow, placing the uprooted weeds in piles.

Other tasks relegated to women include winnowing grain, making flour, preparing beer, cooking and gathering firewood. They also gather wild spinaches. Men hunt and make handcrafts, tools and weapons.

From an early age Latuka children assist their parents in agricultural and household tasks. Very young girls help with cooking and care for their younger siblings. It is generally children who act as monkey and bird scarers. Adults of either sex also may perform these tasks, however. Children sometimes herd livestock, especially goats and sheep, near the village.

When technology changes are contemplated it is exceedingly important to examine the labor requirements of the new technology. New technology injected into the farming system must be compatible with current seasonal labor patterns. The effects of a technology on male and female labor requirements can also be crucial to its success. An oxen mechanization program, for example, might substantially increase the amount of land men could plant. This would, however, greatly increase the amount of female labor required to harvest the crop. Barring a change in female work roles such technology could be infeasible or at least unadvisable from an equity point of view.

Adjusting To Variations In Labor Needs

A major problem in agriculture is to adapt to seasonal and other variations in labor requirements. Several means of adjusting to seasonality are part of the Logotok farming system. Most of these have been mentioned above but will be summarized here.

The mountains provide an important way of leveling seasonal variation in labor needs. Because the rains begin earlier on the mountain fields, they can be planted before the main planting bottleneck. Later, while men are planting on the plains and in the valley the women may spend the early mornings weeding on the mountains then move to the lower lands to pile up the weeds where the men have been planting. Furthermore, weeds are not normally a severe problem in the mountain fields. Thus the mountain fields can be planted and weeded while interfering little with cultivation of the valley and plains.

Different cultivars of sorghum and groundnuts are used very effectively to spread out the harvest. On the plains, for example, some varieties of sorghum may mature as early as July. Other varieties are not harvested until December. Pulling of the early maturing groundnuts begins in late August. Digging of late maturing varieties commences in late September. Were both types to mature simultaneously not nearly so many could be planted.

Activities whose timing is discretionary are performed at non-bottleneck times. Most hunting is done during the dry season. Land clearing is also a dry season task. Most celebrations and feasts occur during harvest, after planting and weeding are completed, or during the dry season. The making of tools, weapons and pottery, the building of houses, the erection of grain stores and other such tasks are largely confined to the dry season.

Group working arrangements tend to promote full employment during the cropping season. Under these arrangements groups of people work together on one another's fields. The man in whose field the group works on a particular day is expected to supply food and beer for that day. (During a year of famine some people may encounter difficulty in providing the food and beer. Generally though, they can obtain these through a relative. On the other hand working on another's fields enables those short of food to get more.) Work groups provide additional employment for those whose fields are not large enough to fully employ them. It also enables those with larger fields to acquire more labor. Work groups are regularly used for planting, weeding and harvest. The Latuka, however, say they use work groups not to fully employ the labor force but simply to make their labor more enjoyable. Anyone who has worked with these groups in their fields must certainly agree that this end is achieved.

Land Tenure

Traditional institutions controlling land ownership and use tend to promote economic equality. As discussed in the previous chapter, land is not sold among the Latuka. Its ownership can only be transferred through inheritance. The eldest son has the primary right to inherit land. This privilege is accompanied by a responsibility to his siblings. For example, he is expected to assist them in times of hunger. If there are enough fields, offspring other than the eldest son may inherit land. Because land cannot be sold it does not serve as a means of capital accumulation.

Land ownership confers the right to decide who will use the land. It does not give the right to charge rent. A man will allow others to use some of his land at no charge. This can benefit the owner by ensuring that others will be near his crops to help scare birds and monkeys. It promotes social justice by ensuring everyone access to the basic resource needed for subsistence.

The distribution of land use is of interest. Figure 5 shows the number of households on the vertical axis and man-days of labor utilized per household in planting staple crops on the horizontal axis. Man-days of labor to plant a crop is used as a proxy for area. Planting method is identical for all the staple crops. The amount of work an individual can do in a day varies. The effect of this variation on the correlation between area and man-days to plant, however, is reduced by the use of work groups. Just as variation among samples drawn from a population is less than variation among individuals from that population, differences in work rates among work groups should be less than differences among individuals. Hence, it would seem reasonable to use man-days to plant as an indicator of relative areas planted by households.

About 44% of the households utilized from 51 to 75 man-days of labor to plant their crops. Twenty-seven percent used 26 to 50 man-days and another 15% used 76 to 100 man-days. In all, 86% of the 59 households used from 26 to 100 man-days in planting. Only 2% used fewer man-days and 12%, more man-days. For this sample $\bar{x}$ = 69.5 and s = 37.3. Were one outlier eliminated the values would be $\bar{x}$ = 66.4 and s = 28.7. This seems a reasonably equitable distribution of cultivated land.

Livestock Ownership

Wealth tends to be closely associated with livestock ownership. Livestock are a major means of generating wealth. Those who accumulate wealth in other ways also store it in the form of livestock. Some have accumulated large herds through the gun trade. One man planted much tobacco in the 1960's. He used the profits to build a large goat herd which he still has. Those who have many daughters may accumulate much livestock through the bride price.

Figure 6 shows number of livestock on the vertical axis and value of livestock in Sudanese pounds on the horizontal axis. Value of livestock is a sum of values for cattle, goats and sheep. Values used were approximate market values in mid-1980. The prices per head used in the computations were: cattle, sE 35; calves, sE 4; goats, sE 6; kids, sE 1; sheep, sE 6 and lambs, sE 1.

About half of the 61 households sampled owned no livestock other than chickens. Approximately a quarter of the households had livestock valued at up to sE 750. Eighteen percent had livestock worth from sE 751 to sE 1,500 while another 7% owned more than sE 1,500 worth. For the sampled households x = sE 396 and s = sE 564. This indicates substantial variation among households in value of livestock owned.

FIGURE 5. MAN-DAYS OF LABOR UTILIZED PER SAMPLED HOUSEHOLD IN PLANTING CROPS, LOGOTOK, SUDAN, 1980

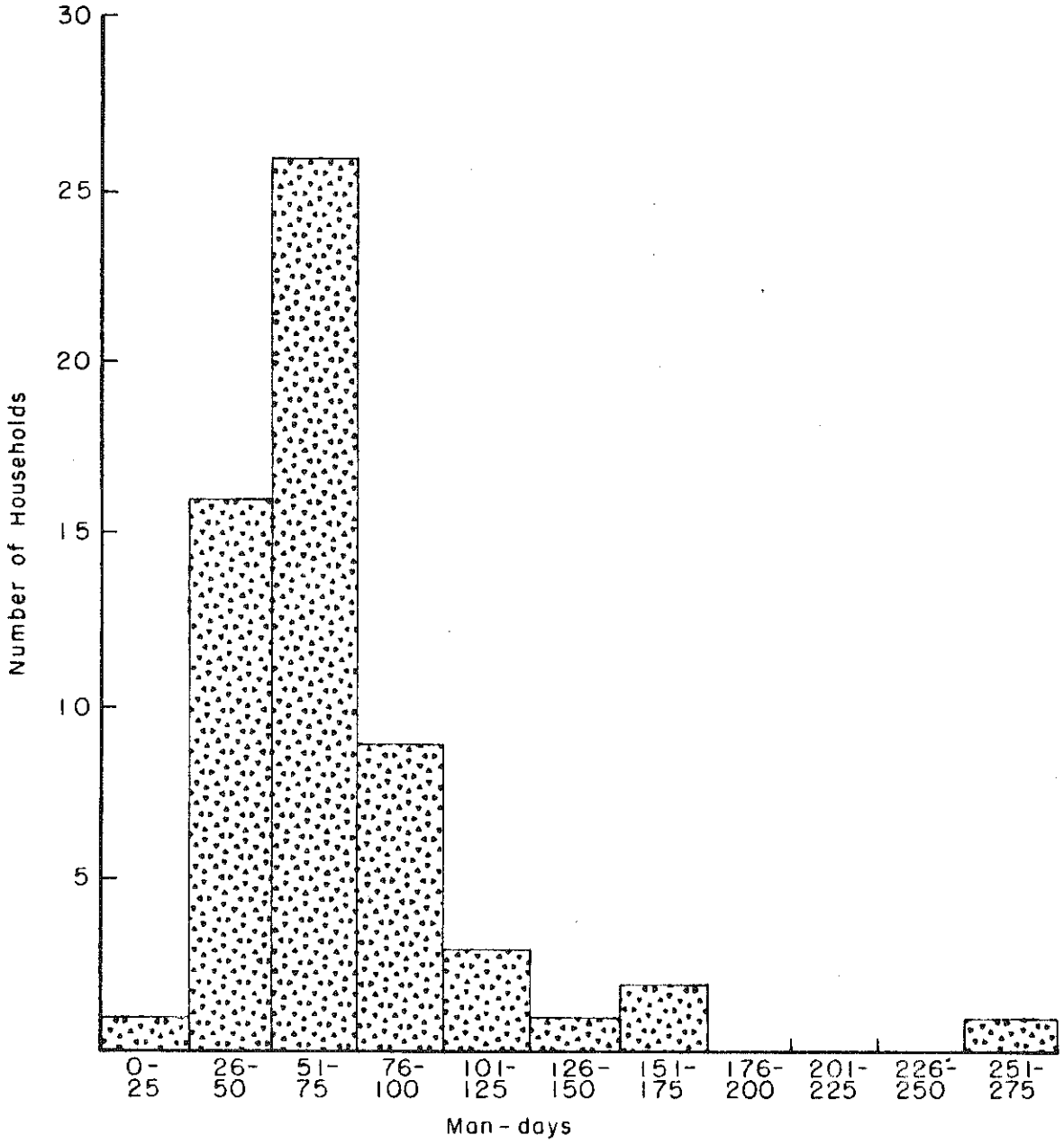


FIGURE 6. VALUE OF LIVESTOCK OWNED PER SAMPLED HOUSEHOLD, 1980

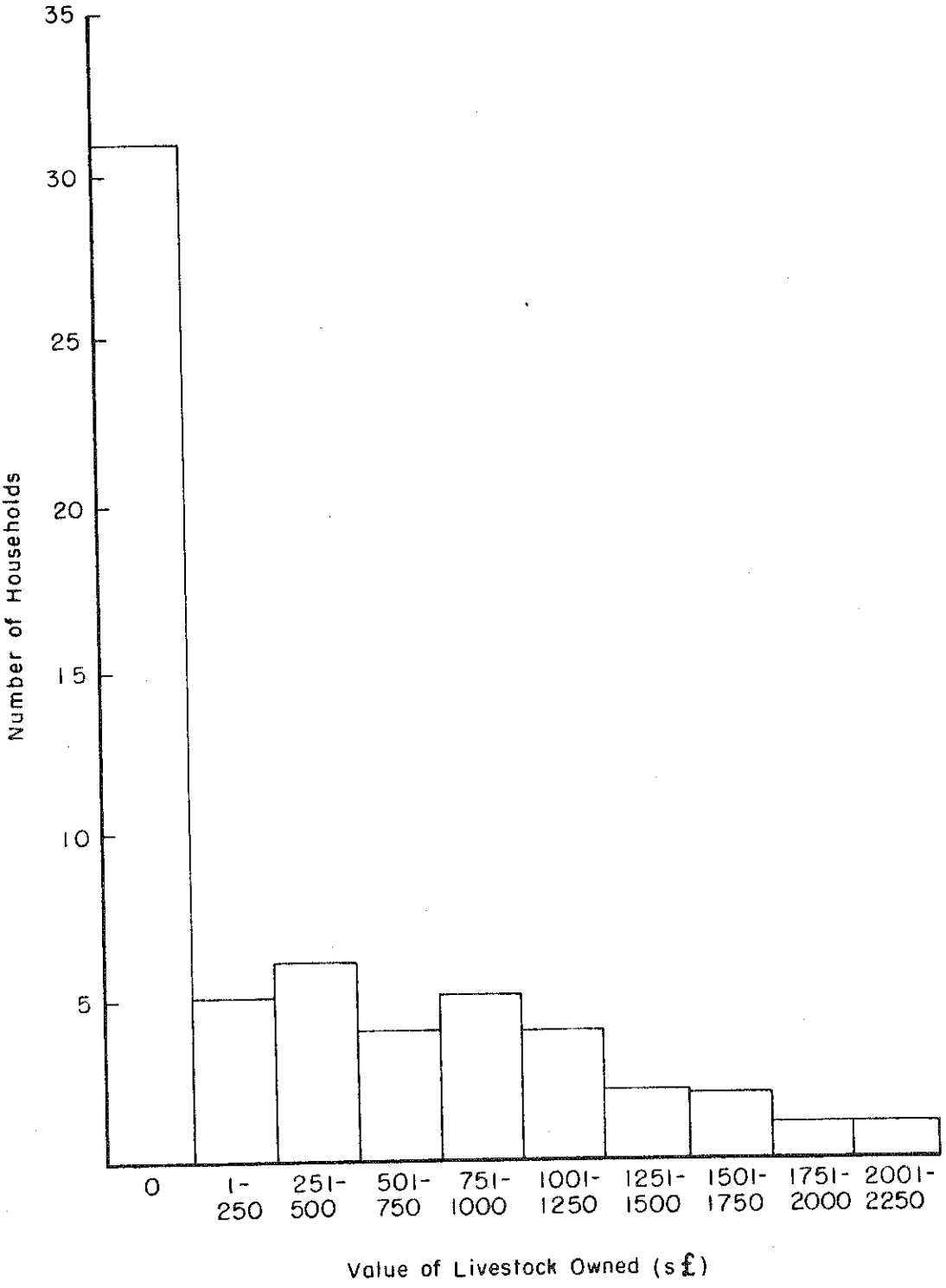
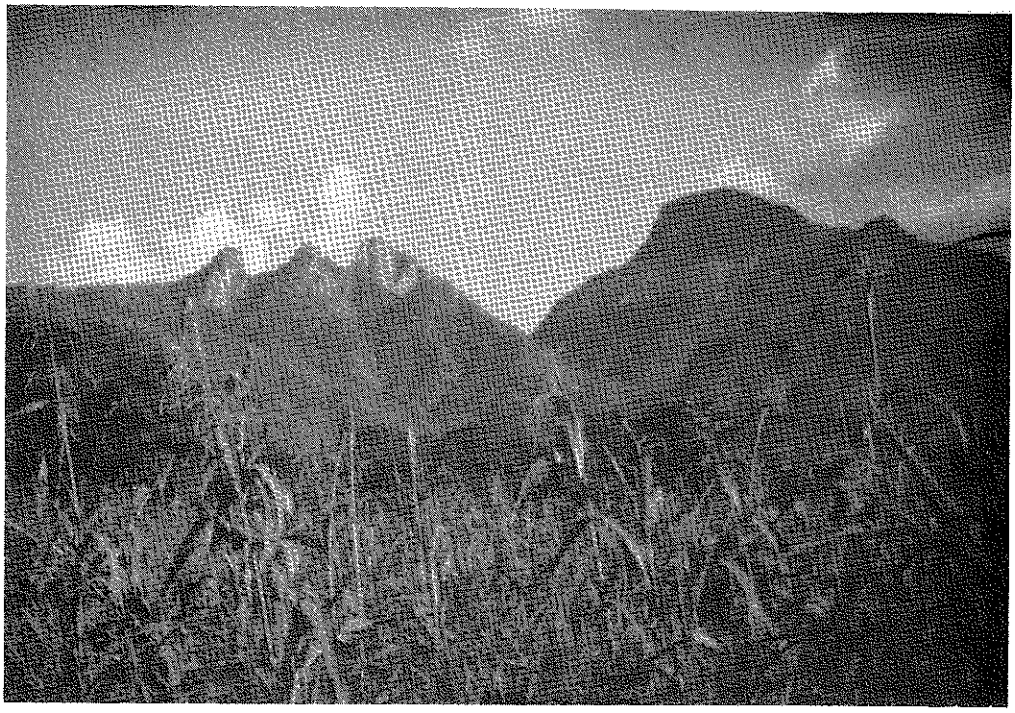


PLATE IV-1



The progression from the Lopit Mountains (above) to the valley and plains (below) is associated with changes in climate, soils, water regime, and natural vegetation that affect cropping patterns chosen.

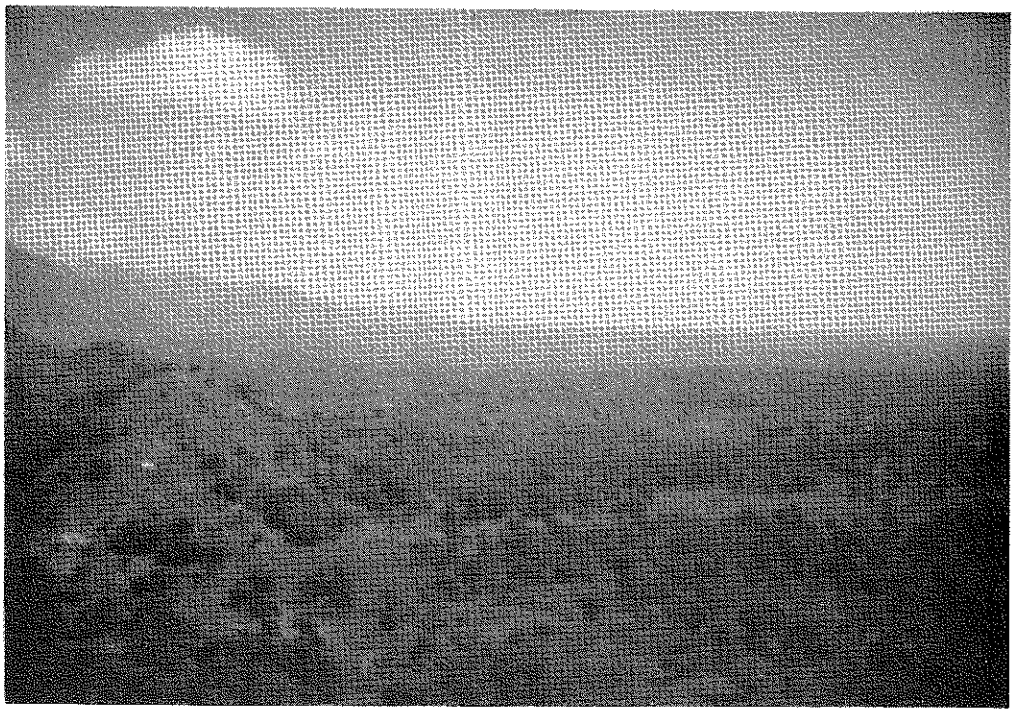


PLATE IV-2

Men use push hoes to uproot weeds in the valley field (above) where millet has been sown. Below, a woman follows them, piling weeds to prevent their rerooting.

PLATE IV-3

Above is a valley field just planted to millet. This is among the most productive land at Logotok.

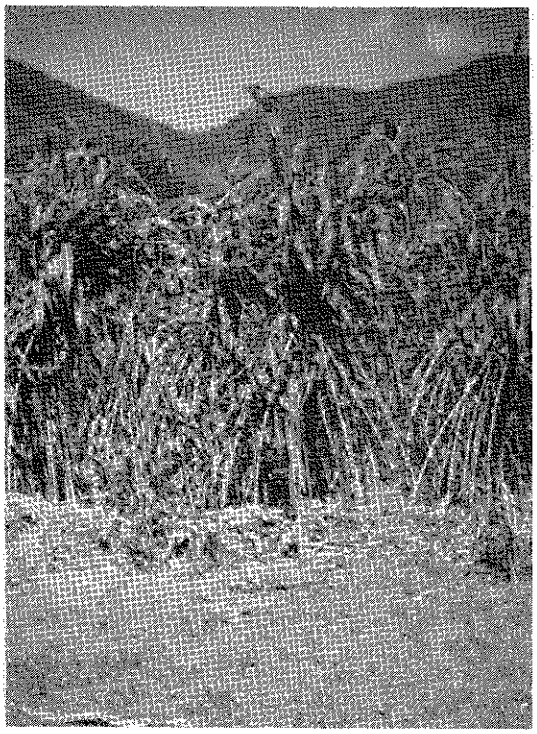
The boy at the right guards from birds a sorghum field nearing maturity on the plains.

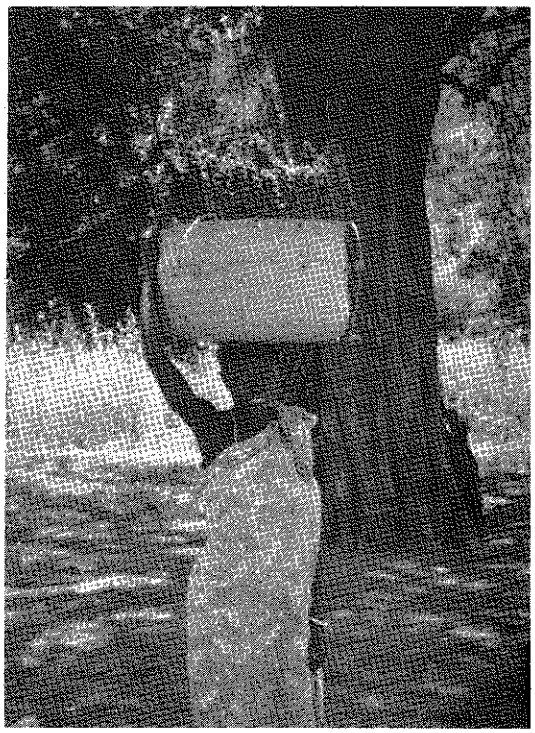
PLATE IV-4

Boulders and the remnants of trees protrude from a mountain field (above) a few weeks after planting.

Sorghum and maize form a dense canopy (right) over the same field two months later.

PLATE IV-5





Above, sorghum has been tied in bunches to prevent its lodging before harvest.

A woman (upper right) carries a heavy basket of sorghum from the harvest field to the village.

At the right, a group of men harvest groundnuts in a grass-infested field. Weeding late in the season might have interfered with nut formation.

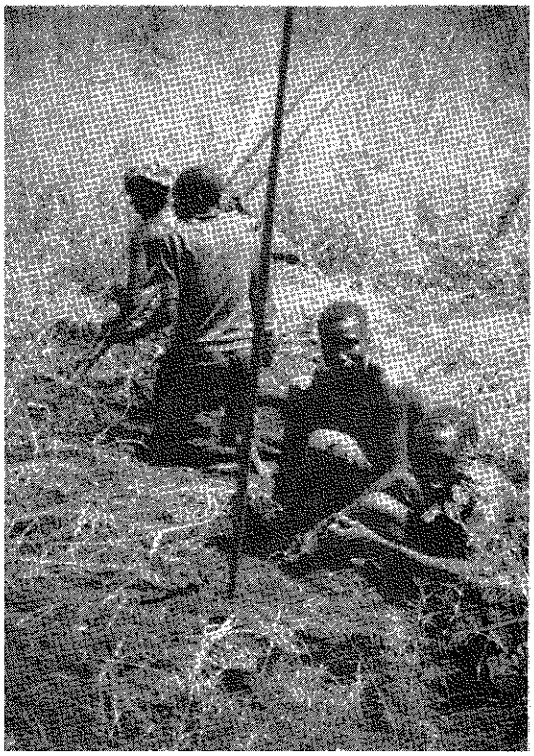
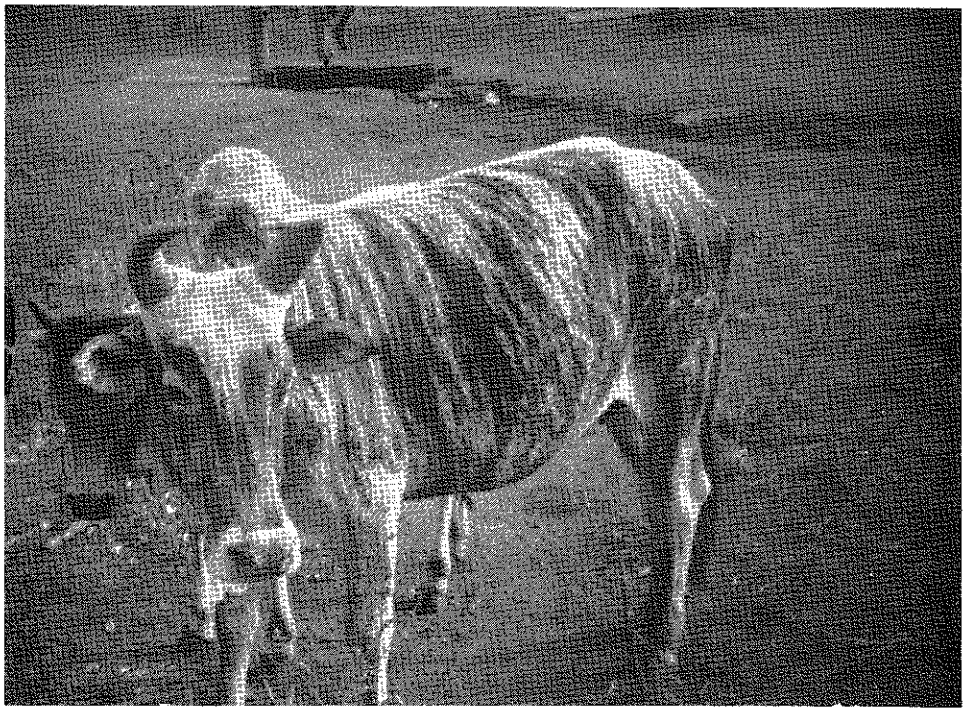


PLATE IV-6



Livestock, especially cattle, goats and sheep, contribute to Latuka food supplies. They are a means of storing wealth, form part of the bride price, and may be traded for other goods. They are also the object of raids made by neighboring tribes. This cow is typical of Latuka stock.

CHAPTER V

A STRATEGY FOR DEVELOPMENT

The preceding chapters have described historical, political and cultural influences upon the Latuka. Technical constraints, such as soils, climate and cultivars available, on Latuka agriculture were examined. The complex system of agriculture at Logotok arising from these influences and constraints was outlined. This chapter will discuss development programs, policies and technologies suggested by the analysis of the agricultural system. In doing this, it will also critique some aspects of the government's development plans.

Sudan has followed a large scale project approach to development in the past. Often this involved settling semi-nomadic herders and traditional cultivators on irrigated tenancies. This has not been unreasonable in parts of the north. Nile water near large, dry but irrigable plains made projects such as the Gezira feasible. The development of traditional rainfed agriculture in such areas was not possible. Rainfall was inadequate and, except on the river banks, there was no population of settled cultivators to work with.

In the south, however, a different approach to development is in order. Rainfall is adequate for a wide variety of crops. There is a population of cultivators operating traditional, yet complex and efficient, agricultural systems. An agricultural development program designed to build on the strengths of these traditional systems, not to replace them, seems most promising. The government has recognized this and is building its development program in Eastern Equatoria around rural development centers. These centers, discussed in Chapter 2, will supply research and extension services to traditional farmers. The government should be applauded in this effort.

Development Needs

The primary need to be met by a development program at Logotok is the need for increased food production. Estimates given in Table 16 support this contention. In Table 16, the amounts of various foods produced per household are estimated. These estimates are converted to calories of energy and grams of protein available per adult equivalent per day.* The estimates are based on a year of reasonably good rainfall. Calories available per adult equivalent are shown to be almost equal to those required. Protein available greatly exceeds requirements. Nearly all the protein and calories are supplied by sorghum, bulrush millet and groundnuts.

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*An adult equivalent equals a male adult in nutritional requirements. Females and children are considered to be some fraction of an adult equivalent.

TABLE 16. ESTIMATED FOOD AVAILABILITY FOR AN AVERAGE HOUSEHOLD AT LOGOTOK, 1980

Product	Units	Number of Units	Yield per Unit (Kg)	Production or Slaughter[e] (Kg)	Trade[c] (Kg)	Total Supplies[f] (Kg)	Annual Uses: Seed[g] (Kg)	Annual Uses: Losses[h] (Kg)	Annual Uses: Food[i] (Kg)	Nutrients Available[j] per Adult Equivalent[k] per day: Calories	Nutrients Available[j] per Adult Equivalent[k] per day: Protein (grams)
Sorghum	ha	0.6[a]	1500[d]	900	-90	810	3.6	40.5	765.9	1,833	56
Millet	ha	0.4[a]	800[d]	320	-	320	2.4	16.0	301.6	722	26
Groundnuts	ha	0.2[a]	450[d]	90	-15	75	16.0	3.8	55.3	228	12
Cattle	head	0.4[b]	70[c]	28	-	28	-	1.4	26.6	27	4
Goats	head	1.0[b]	10[c]	10	-	10	-	0.5	9.5	18	-
Sheep	head	0.5[b]	10[c]	5	-	5	-	0.3	4.8	9	-
Chickens	head	6.0[c]	0.2[c]	1.2	-	1.2	-	0.1	1.1	2	-
Wild Meat	tiang	0.3[c]	20[c]	6	-	6	-	0.3	5.7	5	-
Honey	hives	1.0[c]	5[c]	5	-2	3	-	0.2	2.9	6	-
Papaya	trees	4.0[c]	30[d]	120	-	120	-	6.0	114.0	22	-
Total										2,872	98
Requirements per adult equivalent[l]										2,900	48

[a] I visually estimated the total cultivated area at Logotok to be 300 hectares. This was divided by 238, the number of households as determined by a 1980 census. This resulted in an estimate for cultivated area per household of 1.2 hectares. This is very close to measurements made of cultivated area for a tribe west of Juba in 1948 by Staniforth (24, p. 224) and to estimates made recently among the Ngok Dinka (6, p. 19). Based on my survey, 50 percent of the area was assumed planted to sorghum, 30 percent to millet and 20 percent to groundnuts.

[b] Household averages computed from survey.

[c] Estimates based on personal judgment.

[d] Estimates based on personal judgment and ranges given in Purseglove, Cole and Vail, NCA and Acland. In kilograms per hectare, sorghum yields were listed as 650 - 750 by Purseglove (20, p. 276), 1200 - 1500 by Cole and Vail (6, p. 19). 2100 for a local variety by NCA (18, p. 17) and 550 - 1700 by Acland (1, p. 189).
Millet yields were 250 - 750 in Purseglove (20, p. 211), 1100 for a local variety in NCA (18, p. 17), and 450 in Acland (1, p. 28).
Groundnut yield ranges were given as 350 to 1350 in Purseglove (19, p. 233), 850 for one improved variety by NCA (18, p. 17), and 450 to 670 by Acland (1, p. 1-2).
Papaya yields were listed as 30 to 150 fruits per tree by Purseglove. (19, p. 49)

[e] Area or number multiplied by yield.

[f] Production or slaughter less trade.

[g] Purseglove (19, p 231; 20, pp. 210, 275-276) was the source of these estimates.

[h] Post harvest losses were estimated at a uniform 5 percent for all foods.

[i] Food uses are a residual of total supplies not included in losses or used as seed.

[j] Nutrient conversion factors were from Purseglove (19, pp. 210, 274; 20, p. 231) and Goldbeck (8, pp. 167-185, 247, 262, 273). Computations were based on good grade flank steak for cattle, on good grade boneless shoulder of lamb for goats and sheep, on whole hen for chicken and on venison for wild meat.

[k] To convert to adult equivalents an adult male was considered to be 1.0 adult equivalents, an adult female to be 0.8 adult equivalents and a child to be 0.6 adult equivalents. An average household at Logotok, according to a 1980 census, contained 1.04 adult males, 1.35 adult females and 2.69 children. A household thus contained 3.73 adult equivalents.

[l] Calorie requirements per adult equivalent were based on an FAO figure of 2900 calories per day for males over 13 years old. (7, p. 43) Protein requirements were calculated from Goldbeck as 0.8 grams daily per kilogram body weight for adults. (8, pp. 296-297) An adult male was assumed to weigh 60 kilograms, giving a daily protein requirement of 48 grams per adult equivalent.

These estimates show that food production is marginally adequate in a good year. However, in a year of low rainfall, severe hunger occurs. This situation makes increased per capita food production important. Future increases in population will be rapid because of a high proportion of children in the population and improving medical care. This will cause increased needs for food production from traditional agriculture beyond the per capita increases. Furthermore, because there are few employment opportunities outside traditional agriculture, this sector will have to absorb most increases in the labor force for at least the next ten or twenty years. Increasing production above subsistence is also desirable to enable the Latuka to sell crops and purchase more consumer goods.

The Strategy Outlined

I would recommend a development program having several components. I will outline this program here then discuss the components in more detail in the following sections.

The main resources this program would have available are the intricate farming system which is already in place, the large number of traditional sorghum varieties, the surfeit of clay soil on the plains and the current equitable distribution of land use rights. The major constraints it works within are the Latuka's lack of capital, their lack of surplus time for labor, especially during the busy weeding and planting period, and their limited amounts of groundnut soil, valley soil and mountain soil.

A necessary component of nearly any development program in the south is an improved system of roads. This will decrease the costs of development projects and increase marketing possibilities. The major innovation to increase per capita production will be ox-plowing. There is much unutilized clay soil on the plains. The most logical way to increase production is to expand cultivation into this area. This can be done by introducing ox-plowing. However, technical problems related to the nature of the heavy clay soils, weed control and seasonal labor requirements may reduce benefits derived from ox-plowing. Were ox-plowing immediately introduced, only a minority of the wealthier cultivators would benefit. For the sake of equity, I would recommend delaying the implementation of ox-plowing until other innovations raise the general level of wealth so that more individuals can afford it. The government has given lip service to eventually introducing mechanization. However, the impoverished state of the Latuka indicates they will be unable to invest in mechanization for many decades to come if ever.

I will recommend the introduction of new crop varieties and new crops which have characteristics filling particular needs in the farming system. One major need is for a crop variety (a short season bullrush millet) that can be grown on the plains in rotation with sorghum. This would contribute to per capita and total production, especially when ox-plowing brings more area on the plains into production.

Groundnut production will not be able to keep up with population growth for it is limited to already heavily utilized sandy soils. A crop similar in nutritive value, perhaps a dry bean, should be introduced to fill the gap and maintain a balanced diet. New varieties of sorghum and groundnuts should be introduced which will increase yields. New fruit and vegetable crops should be sought to add variety to the diet.

Livestock health services should be made available. This would increase livestock production to supply food for an expanding population. It would provide savings to be drawn on during famines. Finally, expanded production of cattle might enable those without cattle to more easily obtain oxen for plowing. This, however, will also depend on other parts of the development program to generate surpluses which can be used to purchase oxen.

Finally, I would recommend the encouragement of cooperatives. Cooperatives would serve as conduits for increasing services, inputs and marketing opportunities for traditional cultivators.

The components of the development program outlined above will now be discussed in more detail.

Road Development

Improved transport facilities are widely recognized as crucial to the development of the south. Improvement of river transport is needed to strengthen links with the prosperous markets of the north.

A major effort should be made to further develop a road system in the south. Recently a road was established linking Juba with the Kenyan port of Mombassa via Torit, Kapoeta and Kenya's Northern Frontier District. Substantial quantities of supplies for development projects are now brought in over this route. It is, however, largely impassable during the wet season and even in the dry season large trucks can rarely exceed fifteen kilometers per hour. Vehicles often suffer much damage traveling on this road. It is soon to be replaced by a tarmac road. When this is completed, costs of tansport both from Mombassa into the south and within Eastern Equatoria should decrease substantially. This road should be supplemented by an improved network of secondary roads.

An improved road system should benefit southern villagers, especially those in remote areas, in many ways. Agricultural, domestic water supply and construction projects will become cheaper as transport costs fall. Development projects will be implemented more quickly. Medical care will improve greatly as transport bottlenecks for medicines are removed. Pump repair and other services will become more timely. Development projects of every sort will be administered more effectively. Police protection from cattle raids will be extended to remote villages.

Improved marketing possibilities will also provide new incentives for increasing agricultural production. As discussed in Chapter II, there is much scope for increased trade in agricultural products within the Equatoria provinces. In the east, there is a surplus of livestock which could be sold in the tsetse infested areas of the southwest. The Latuka and other nearby tribes are already selling some groundnuts to the Taposa whose soil is not suited to the crop. The Latuka also market small amounts of sorghum and honey. If programs discussed below are implemented they will achieve increased production of sorghum and bulrush millet. If population growth does not outstrip production increases, the marketable surplus of these crops will increase. Tribes west of the Nile have a comparative advantage in fruit and vegetable production. These could be marketed in the drier eastern areas. Fish from the Nile could be dried and marketed throughout the Equatoria provinces. The effects of improved roads on marketing could thus be great.

Ox-Plowing

Ox-plowing is being promoted by the rural development centers in Eastern Equatoria. This effort is just beginning so its effects are not yet known. The primary advantage of ox-plowing seen by its promoters is an increase in cropland and hence output per person. Some increase in output will be forthcoming if ox-plowing is successfully introduced at Logotok. Certain limitations, however, will make increases in production less than proportional to increases in area cropped. There will also be problems in achieving an equitable distribution of returns to the introduction of ox-plowing.

Most of the expansion in area from ox-plowing at Logotok will necessarily be onto the clay soil of the plains. The rich valley soil is already fully utilized. If the sandy groundnut soil were much more intensely cultivated, problems associated with too short a fallow period would arise. The mountain fields are too steep for easy cultivation by oxen. Furthermore, increased cultivation on the mountains would increase risk of erosion. Thus it is only on the plains that expansion is possible.

Many of the problems of ox-plowing are associated with its extending the cropped area into the clay soils. The clay soils currently being exploited are in the transition area between the mountains and the plains and are relatively light. Expansion will be into the heavier clay soils farther from the mountainside settlements. These soils are difficult to cultivate. When dry they become very hard. When wet they are extremely slippery and plastic. There is but a narrow range of moisture conditions under which they can be tilled. The limited time available for cultivation when soil moisture conditions are favorable will be a bottleneck. This will limit the amount of new land brought into production.

Sorghum is the only crop used at Logotok well adapted to the relatively dry clay soils on the plains. (The possibility of developing

a bulrush millet variety suited to the plains will be discussed below.) Ox-plowing will thus lead primarily to an increased area being planted to sorghum. This expansion of sorghum cultivation will increase the incidence of witchweed (Striga sp.). Any ox-plowing program, then, ought also to include measures for combating this parasitic weed.

As with any program expanding cultivated area in a region of shifting cultivation, ox-plowing may cause falling soil fertility and increased weed, insect and disease problems. There is some room for expansion before these problems arise for arable clay soils are not yet fully utilized. However, the clay soils now being cultivated are the most desirable of those available. New land will thus be less productive than that already in cultivation.

Ox-plowing may also reduce yields on land already being cultivated at Logotok. It is not unusual for ox-plowing to cause yield reductions. Much of any yield reduction at Logotok will be linked to weed control. If good weed control were to be achieved, weeds would have to be removed by hand, as is done after hoeing, to prevent re-rooting. As this is traditionally a female task, the increased area from ox-plowing may be limited by the female labor available for this task. Weeding and harvesting of sorghum and millet are also female tasks. Any shortage of female labor at weeding or harvest times could also limit yields or area cultivated. Weeding is already a busy time so it could easily become a greater bottleneck.

Planting in rows may be introduced to overcome the weeding bottleneck. Oxen could then be used to weed the crops. Row planting, however, introduces new problems. The traditional broadcasting method of seeding evenly distributes plants over the field. Compared with row planting this reduces erosion and more fully uses land area. It is therefore doubtful that row planting could increase yields.

Ox-plowing would interfere with the practice of working in groups. Latuka men enjoy the social aspect of hoeing their fields together. The same sort of camaraderie is unlikely to develop with ox-plowing. The owner of a field supplies food to those working on his field. Work groups can thus serve to distribute food to those in need during a famine. This benefit of work groups might also be lost by the introduction of ox-plowing.

Any benefits coming from ox-plowing would not be equitably distributed within the Logotok villages. The previous chapter showed that whereas rights to use land were fairly evenly distributed among households, livestock ownership was not. Half the sampled households had no livestock. Nearly 65 percent owned no cattle. Livestock are the primary means of storing wealth. It will thus be very difficult for the majority of small farmers to profit from ox-plowing. Those without livestock will have to accumulate enough capital to purchase both the oxen and the equipment to take advantage of ox-plowing. They might also be dependent on a stable owner to care for their oxen.

If ox-plowing proves feasible, a credit program targeted at those farmers without livestock might be considered. However, paucity of

institutions to extend credit, almost nonexistence of extension services to supervise credit and lack of previous experience with credit hint that a credit program might not succeed. Much effort and commitment would be required for its success.

Mechanization

The aim of the southern regional government is to produce surplus food for the whole Sudan by encouraging production by small farmers and eventually by large mechanized farms (12, p. 26). Such an emphasis on large mechanized farms, if it comes about, would create a highly inequitable distribution of wealth in the south for the same reasons that benefits of ox-plowing would be inequitably distributed. Mechanization, however, would create much greater inequities.

Very few, if any, rural villagers have the capital needed for participating in private mechanized schemes. It is unlikely that they will in the foreseeable future. I would anticipate that the main beneficiaries of such schemes would be a few northerners and southerners with substantial capital. The effects of cooperative mechanized schemes on equity would be less severe. The capital required for an individual to participate could be much smaller than for a private scheme because tractor and other services could be shared. Certainly, though, cultivators participating in even a cooperative scheme would be much wealthier than the average southerner. Most mechanized schemes in the north employ many workers at least during certain parts of the year, such as harvest. This would likely be true in the south also. Emphasis on mechanized schemes, private or cooperative, would thus eventually create classes of capitalists and landless workers. These classes are now almost non-existant in the south.

Crop Improvement

Much of the initial effort of the rural development centers is focused on testing improved varieties. This emphasis is likely to benefit most households at Logotok.

As discussed in Chapter IV, many indigenous sorghum varieties are grown. There are varieties suited to every niche in the farming system. Spectacular yield improvements for the crop through breeding should thus not be expected. Only if fertilizers become available at relatively low cost after road improvements are made might large yield increases for sorghum be possible through varietal improvement. The availability of fertilizers however, should not be counted on. Unless Sudan's balance of payments position greatly improves, the government is unlikely to allocate foreign exchange to fertilizer imports for the traditional sector.

There is more scope for introducing new varieties of bulrush millet. There is but one traditional variety grown at Logotok. Because

it is quite long seasoned it is grown predominantly in the valley where the season of water availability is long. New varieties of bulrush millet, short seasoned and suited to conditions on the plains, would be particularly desirable. These could be grown in rotation with sorghum to combat buildups of witchweed. This will be particularly important if ox-plowing is introduced and cultivated area is expanded on the plains. However, even before cultivated area is increased, a sorghum/short season millet rotation on the plains would be very helpful in combating witchweed.

The potential for increasing yields through improved groundnut varieties is not certain. Breeding for resistance to diseases such as that caused by rosette virus might be worthwhile. Breeding might focus on late maturing varieties which could be harvested by pulling (ie. erect bunch varieties). Varieties that can be pulled are preferred by the Latuka for they require less labor to harvest. Early and late maturing varieties are grown to spread out demand for labor to harvest the crop. All the early maturing varieties may be harvested by pulling. However, all but one of the late maturing varieties must be dug. There is thus a specific need for additional late maturing erect bunch type varieties.

The Ministry of Agriculture, through the rural development centers, is encouraging the planting of cassava. This is to provide a source of food during famine periods. The rural development centers are testing cassava varieties which appear resistant to cassava mosaic. Cassava mosaic is endemic at Logotok. A resistant variety might well increase yields and area planted to cassava. This could improve food supplies during famine periods as cassava may be stored by leaving it in the ground until it is needed. One problem with expanding cassava production at Logotok is the difficulty of protecting it from goats. Fences of thorny trees are built around cassava patches and must periodically be repaired as they are destroyed by termites.

Crop Introduction

Tomatoes, papaya and mangoes are examples of crops widely accepted at Logotok after relatively recent introduction. Papaya in particular has become a very important part of the diet. The plant produces well at Logotok with very little attention. The Ministry of Agriculture hopes to introduce new fruit and vegetable crops through the Torit Rural Development Center which is the center nearest Logotok. Guavas, mangoes and citrus are among the seedlings available. Pineapple is another fruit which is not grown at Logotok but would likely be well received. Large investments in the introduction of new fruits and vegetables would not be worthwhile. On a smaller scale, however, such efforts are desirable for increasing diversity in the Latuka diet. It is unlikely that Logotok could compete with well-watered areas west of the Nile and in the Imatong Mountains in commercially supplying these fruit crops to such markets as Juba and Torit. Many Latuka had experience with such crops as citrus and pineapple when they were in Uganda as refugees.

Thus if these crops prove well adapted to local conditions, little extension effort, beyond supplying planting material, will be required.

A pulse crop which could partially replace groundnuts in the diet should be identified. Because of the limited amount of sandy soil at Logotok, groundnut production cannot be much increased. However, rapid increases in population should be anticipated. Children make up over half the population of Logotok. The rapid expansion of the health care program will ensure that an increasing proportion of these children survive to adulthood. Cultivators at Logotok have said they used to grow some sort of dried bean and would do so again if they could get seed. Apparently their seed stock was lost during the civil war. Beans might be easily re-introduced and help fill the groundnut's position in the diet.

Livestock Production

Livestock production at Logotok could be expanded somewhat. There appears to be enough grazing to support a moderate increase in the herds at Logotok. Increases in livestock production might be achieved through two means. First improved roads should bring better police protection and thus fewer livestock raids. Second, the introduction of livestock vaccination and health services would decrease mortality and morbidity.

The estimated annual mortality for 1979/80 ranged from 13 percent for goats to 16 percent for cattle. Losses from raids were about 6 percent for all species. Losses from both causes were thus about 20 percent for all species. When these risks are decreased, offtake (livestock slaughtered and sold) may increase. Improved roads could open up new markets and raise prices for livestock. This would further encourage livestock sales. Increased offtake would reduce the chance of increased production causing excessive herd buildup and overgrazing.

Cooperatives

The cooperative movement in Eastern Equatoria is involved in providing supplies to farmers and in the marketing of some crops. Supplies sold include implements such as hoes, sickles and axes and seeds such as sorghum, maize, groundnuts and a variety of vegetables. Produce marketed has chiefly been sorghum, cassava and Irish potatoes. As development proceeds, increased marketing services and more inputs will be needed. A credit program and other banking services may become necessary. The cooperative movement will likely be important in filling these needs. It should be given the resources and flexibility to meet such needs as they arise.

Timing

In combining these components into an overall strategy, timing of implementation will be of particular importance. A suggested timetable is given in Table 17 for a ten year program beginning in 1982. A first priority for agricultural development in the south ought to be the improvement of the road network. Beyond this, I would suggest that a development strategy for Logotok ought first to emphasize the identification and introduction of a short-seasoned varity of bulrush millet. As discussed previously, this could be used in rotation with sorghum on the plains. This would reduce infestations of witchweed and increase productivity of fields on the plains.

The establishment of veterinary services should also receive early emphasis. Increases in livestock numbers should result. Hopefully this would not only benefit those who already have livestock but also those who wish to accumulate some. Another early emphasis of development strategy should be the identification and introduction of new sorghum and groundnut cultivars if suitable ones can be found. So also should the introduction of new crops such as beans, guavas, pineapple and citrus be early emphasized.

The above programs should increase per capita production, improve the diet and enable more cultivators to accumulate enough capital to buy oxen and plows. At such time, ox-plowing could be introduced with fewer equity problems. Ox-plowing will likely be the major innovation for increasing per capita production and, in the longer run, meeting the food needs of an expanding population. Many of the technical constraints which were discussed previously, however, would remain. These constraints include the difficulty of cultivating heavy clay soil where expansion of cultivated area would take place and the difficulty of controlling weeds on and harvesting the increased area. Because the latter two tasks are traditionally performed by women, special labor bottlenecks may be encountered.

For technical as well as equity reasons it is important that a short season bulrush millet variety suitable for the plains be developed before ox-plowing is introduced. This variety would be used in rotation with sorghum to prevent a buildup of witchweed as ox-plowing brings into production more land on the plains. Were sorghum grown without such a rotation witchweed infestation would become severe under ox-plowing.

Suggested Changes In The Existing Plan

Differences between the strategy outlined above and that followed by the Ministry of Agriculture are not great in the short run. The Ministry of Agriculture in the Southern Region is now encouraging ox-plowing. This program will soon get underway in the Latuka area. I would simply recommend that this be delayed until more cultivators can afford it. Ox-plowing is an easily seen innovation. Immediate implementation may be politically attractive to administrators. It will give the impression that their programs are rapidly producing significant

TABLE 17. SUGGESTED TIMING OF ACTIVITIES WITHIN THE DEVELOPMENT STRATEGY

Activity	YEARS									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Upgrade major roads	XXXXXXXXXXXXXXXXXXXXX									
Upgrade feeder roads	xxxxxxxxxxxxxxxxxxxxxxxXXXXXXXXXXXXXXXXXXXXX									
Identify improved short-season millet variety	XXXXXXXXXXXXXXX									
Identify other improved crop varieties and suitable new crops		xxxxxxxxxxxxxxxxxxxxx								
Introduce veterinary services		xxxxxxxxxxxxxxxxxxxxx								
Introduce short-season millet to farmers			XXXXXXXXXXXXXXxxxxxxx							
Introduce improved crop varieties and new crops to farmers				xxxxxxxxxxxxxxxxxxxxx						
Experiment with ox-plowing					xxxxxxxxxxxxxxXXXXXXXXXXXXXX					
Introduce ox-plowing to farmers										XXXXXXXXXXXXXX

XXXXXXX Activity given major emphasis

xxxxxxx Activity given minor emphasis

results. This desire for immediate and easily seen results may be difficult to overcome.

The Ministry of Agriculture is testing varieties of sorghum, millet and groundnuts at the rural development centers in Eastern Equatoria. Most of these tests are for sorghum and groundnuts. This should be changed so that more attention is given to bulrush millet. Testing of new crops such as various sorts of beans, fruits and vegetables is also being undertaken at the rural development centers. I would recommend a continuation of this effort but with slightly more attention being given to beans.

In the longer run, differences between the strategy outlined in this chapter and that espoused by the Ministry of Agriculture will be great. In 1981 Dr. David Bassiouni, then Director General of the Regional Ministry of Agriculture but since elevated to Minister, stated that large mechanized farms are enventually to be utilized to achieve expanded food production (12, p. 26). I have argued that this will cause great inequities. If followed far enough, it could create classes of landless workers and wealthy capitalists. Mechanized schemes are being promoted in the north. When the transport infrastructure is improved in the south, mechanization will become cheaper and marketing of crops, easier. This will likely increase pressure from a wealthy and influential minority to introduce mechanization in the south as well. Such pressure should be resisted for the sake of equity.

Prospects for Logotok

In the end, I view the future with cautious optimism for the people of Logotok. They have been blessed with reasonably productive land. Their mountains, valleys and plains give them several soils and climatic zones which can support a wide variety of crops and wild plants. Nature is sometimes stingy with rain but agricultural development programs may yet enable them to accumulate enough of a surplus to weather occasional droughts.

Above all, after seventeen years of civil strife, the people of Logotok have peace. It is only peace and a good relationship with the north that make development possible in the south. Yet, this very dependence of southern development on national stability is the one dark cloud on the horizon of an otherwise promising sky. If the government in Khartoum is replaced by another, will the southward flow of development aid be cut off? Might conflict again break out between north and south? Will political developments in western or Arab nations restrict the flow of aid to Sudan? Surely such questions must trouble southern leaders as they design programs to aid their people.

The prophet Isaiah, speaking to the people of Cush (ie. the upper Nile region) foretold times of destruction, hardship and captivity. (Isaiah 18:1-6; 20:3-6) However, he went on to hint at a time of prosperity for Cush in the distant future, saying (17, p. 652):

> At that time gifts will be brought to the Lord Almighty from a people tall and smooth skinned, from a people feared far and wide, an aggressive nation of strange speech whose land is divided by rivers. (Isaiah 18:7)

It is my hope that this time of prosperity prophesied so long ago will very soon become reality for the people of Logotok.

BIBLIOGRAPHY

1. Acland, J. D., East African Crops (Longmans, Hong Kong, 1971).

2. Baker, Sir Samuel White, The Albert N'Yanza: Great Basin of the Nile and Explorations of the Nile Sources, Vols. 1 & 2 (Horizon Press, New York, 1962, First published 1866).

3. Barbour, K. M., The Republic of the Sudan: A Regional Geography, (University of London Press, London, 1961).

4. Bloss, J. F. E., "The Tsetse Fly in the Sudan," Sudan Notes and Records, Vol. XXVI, 1945.

5. Buol, S. W., F. D. Hole and R. J. McCracken, Soil Genesis and Classification, Second Edition (The Iowa State University Press, Ames, 1980).

6. Cole, David C. and David J. Vail, Action Research in Abyei: An Approach to the Identification, Testing and Selection of Appropriate Technologies in a Rural Development Context (Harvard Institute for International Development, Development Discussion Paper 89, March 1980).

7. Food and Agriculture Organization of the United Nations, Calorie Requirements (Italy, 1957).

8. Goldbeck, Nikki and David, The Dieter's Companion (Signet Books, Chicago, 1975).

9. Henderson, K. D. D., Sudan Republic (Frederick A. Praeger, New York, 1965).

10. Hoogstraal, Harry, "South in the Sudan," The National Geographic Magazine, Vol. CIII, No. 2, 1953.

11. International Labour Office, Growth, Employment and Equity: A Comprehensive Strategy for the Sudan, Report of the ILO/UNDP Employment Mission 1975 (ILO, Geneva, 1976).

12. Madut, Arop, "Pursuing Self-Sufficiency," Sudanow, Vol. 6, No. 4, 1981.

13. Ministry of Health, Sudan, Primary Health Care Programme Southern Region Sudan, 1977/78 - 1983/84 (Ministry of Health, Juba, 1976).

14. Mohamed, Sidahmed, "Traditional Medicine: Industrial Plant?" Sudanow, Vol. 4, No. 12, 1979.

15. Moorehead, Alan, The White Nile (Penguin Books, Middlesex, England, 1973).

16. Muratori, Fr. Carlo V. F. M., "Lomoro Xujang (1853-1912) A Lotuxo Chief, Tirrangore," Sudan Notes and Records, Vol. XXX, Part I, 1949.

17. New York International Bible Society, "Isaiah," The Holy Bible, New International Version (Zondervan Bible Publishers, Grand Rapids, 1978).

18. Norwegian Church Aid/Sudan Program, Progress Report Number 10: 1 January to 31 December 1979 (Norwegian Church Aid, Torit, Sudan, March 1979).

19. Purseglove, J. W., Tropical Crops: Dicotyledons (Longmans, London, 1968).

20. Purseglove, J. W., Tropical Crops: Monocotyledons (Longmans, London, 1968).

21. Schweitzer, Georg, Emin Pasha: His Life and Work, Vol. 1 (Originally published by Archibald Constable & Co., Westminster, 1898, Reprinted by Negro Universities Press, New York, 1969).

22. Seligman, C. G. and Brenda Z., Pagan Tribes of the Nilotic Sudan (George Routledge & Sons, London, 1932).

23. Snowden, J. D., The Cultivated Races of Sorghum (Adlard & Son, Ltd., London, May 1936).

24. Staniforth, G. R., "A Trial Economic Survey of Twenty Families Among the Morokodu Tribe of Amadi District, Equatoria Province," Sudan Notes and Records, Vol. XXIX, Part II, 1948.

25. Sudanow, "Sudantistics," Vol. 6, No. 6, 1981.

26. Tothill, J. D., editor, Agriculture in the Sudan (Oxford University Press, London, 1948).

27. Turner, Sue and Phil Butterworth Hayes, "Mechanized Farming: A Change for the Better?" Sudanow, Vol. No. 10, 1979.

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