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## A Study of the Traditional Grazing System of the Nomadic Rezeigat in Darfur Province of the Sudan

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A STUDY OF THE TRADITIONAL GRAZING SYSTEM  
OF THE NOMADIC REZEIGAT IN DARFUR PROVINCE  
OF THE SUDAN

by

Moustafa Ahmed Rahama

Report submitted in partial fulfillment  
of the requirements for the degree

of

MASTER OF SCIENCE

in

Range Science

Plan B

Approved:

UTAH STATE UNIVERSITY  
Logan, Utah  
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Moustafa Ahmed Rahama

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## INTRODUCTION

The Sudan is a country of Africa of nearly 1 million square miles (Fig. 1) with a population of 16 million people and lying between 3 and 21° latitude. In the tropical climate over 100°F can be recorded during any month of the year.

Darfur province is located in the west central portion of the Sudan (Fig. 2). Apart from the mountainous districts of Marra and Zalengi, it is semi-arid with a 521 mm average rainfall. Vegetation of Darfur province varies due to soil type and precipitation and ranges from scant-covered annual grass steppe to shrub-savannah. Cattle are the main form of livestock, but there are considerable numbers of sheep, goats and camels (Figure 3).

The open range of Southern Darfur is the forage country for cattle of the Rezeigat tribe (Fig. 1), a tribe exhibiting a migratory behavior and a way of life that has evolved over thousands of years. The tribesmen measure wealth and prestige by the size of their herds, and have no interest in capital gain, monetary assets or material possessions, beyond the minimum for survival and tending their stock. The Rezeigat tribe harvests forage from a large area, husbandry vast numbers of livestock, but contributes little to the national economy of the Sudan, neither as a primary producer for city consumption and export nor as a market for manufactured goods. The Rezeigat tribe is one of a group of Baggara or "cattle owning" tribes which

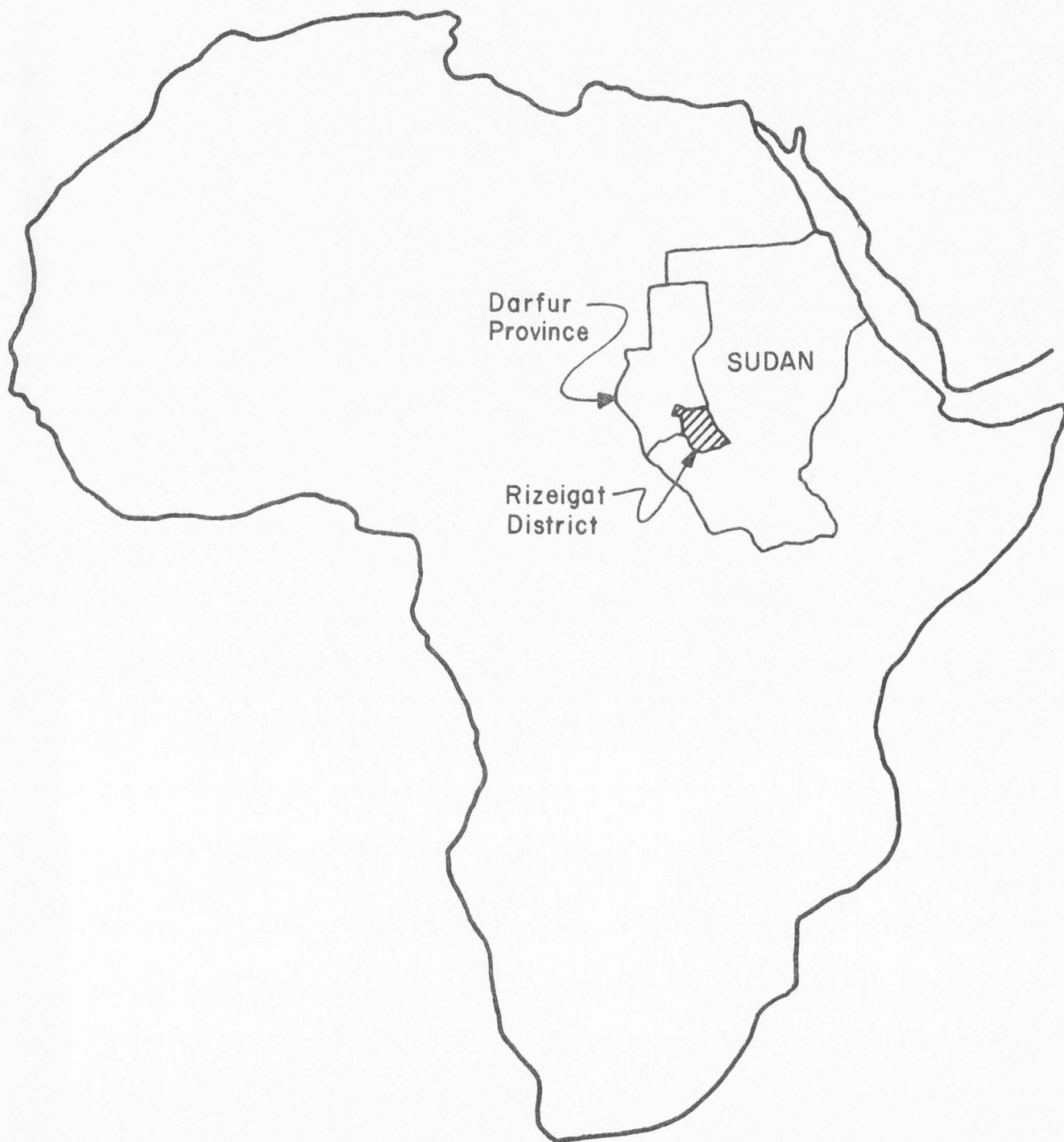


Figure 1. The African continent showing the country of Sudan and the location of Darfur province and the Rezeigat district.





Figure 2. The provinces of the Sudan. Rainfall at specified places in Darfur is given in Table 1. Adapted from Clark, 1971 (5).

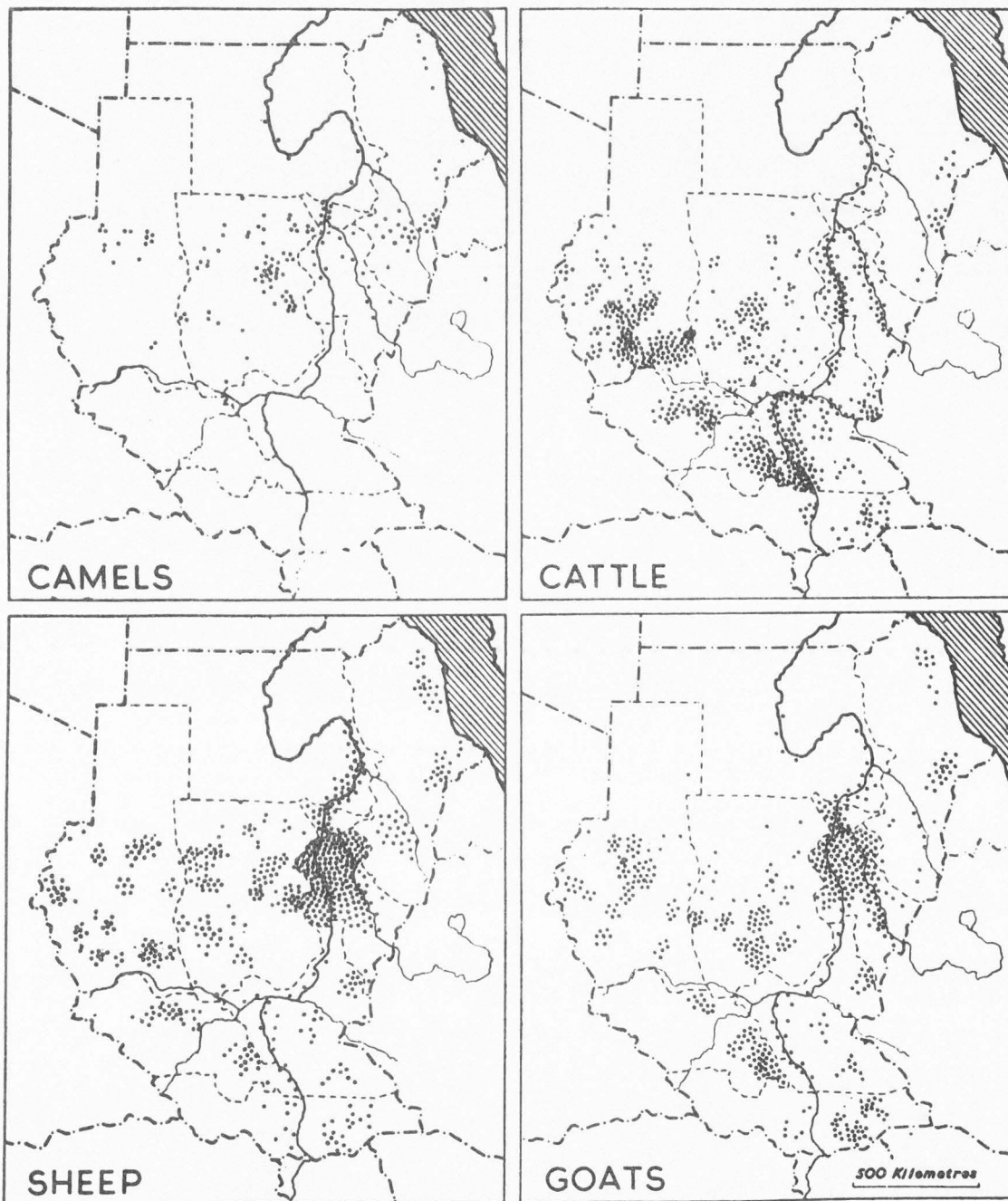


Figure 3. The distribution of camels, cattle, sheep and goats in the Sudan. Each dot represents approximately 10,000 animals. Source: Barbour, 1964 (2).

occupy the savannah-steppe regions of western Sudan. Size of the cattle herds is regulated by death due to starvation and exhaustion in the dry season.

Together the Baggara tribes represent a great potential for boosting the economy of the nation. In order to tap this potential it appears necessary to either settle the tribes onto ranches with conventional management systems or create a market need for selling cattle within the present nomadic management pattern.

Both possibilities require some disruption of the Rezeigat social system, traditional tribal administration, and attitudes to work and leisure. They could also disturb the balance between vegetation and wandering cattle herds that has developed over the past centuries. The migration is essential to cope with the extremes of the wet and dry seasons.

In the long-term view, in this harsh land, nomadic grazing as practiced by the Rezeigat may be the best method of managing the ecosystem without destroying its natural vegetation or the integrity of the soil and yet providing a livelihood for all its occupants and preserving the integrity of tribal society.

The purpose of this thesis is to examine this hypothesis with a detailed study of the relation between the tribe and its environment. Recommendations for increasing the livestock production of the Rezeigat are proposed and evaluated.

## ECOLOGICAL CHARACTERISTICS OF THE SUDAN AND THE REZEIGAT DISTRICT

Climate

North of latitude 20° N. there is less than 25 mm average rainfall and almost perpetual drought prevails (see Fig. 4). Southward rain falls and is increasingly reliable. As far south as 6°N. there is an almost imperceptible graduation into the tropical continental climate. Most important is the division of the year into two distinct seasons: (a) a hot summer or high sun period during which torrential showers or thunderstorms are experienced - mainly in the afternoon and evening. This season is called, perhaps inappropriately, the rainy season; (b) a dry and, for at least a few months, cooler season. Southward the period of the rainy season increases to over eight or nine months of the year. This continues southward until an attenuated Equatorial climate prevails where no month is completely without rainfall. Along the southern boundary with the Zaire (Congo) and Uganda, about 2,400 mm (50 in.) are received annually (1). Average rainfall in the Rezeigat district is illustrated in Table 1.

The Sudan is a very hot country, for temperatures are rarely mitigated by altitude. Cloud cover in the south is largely responsible for the reversal from summer to winter of the average monthly temperature gradient: the mean monthly temperature of January rises from 16°C (60°F) in the north to over 28°C (83°F) in the south, but in June it declines from over 32°C (90°F) in the north to about 26°C (78°F) in the south. Consequently, central Sudan experiences the

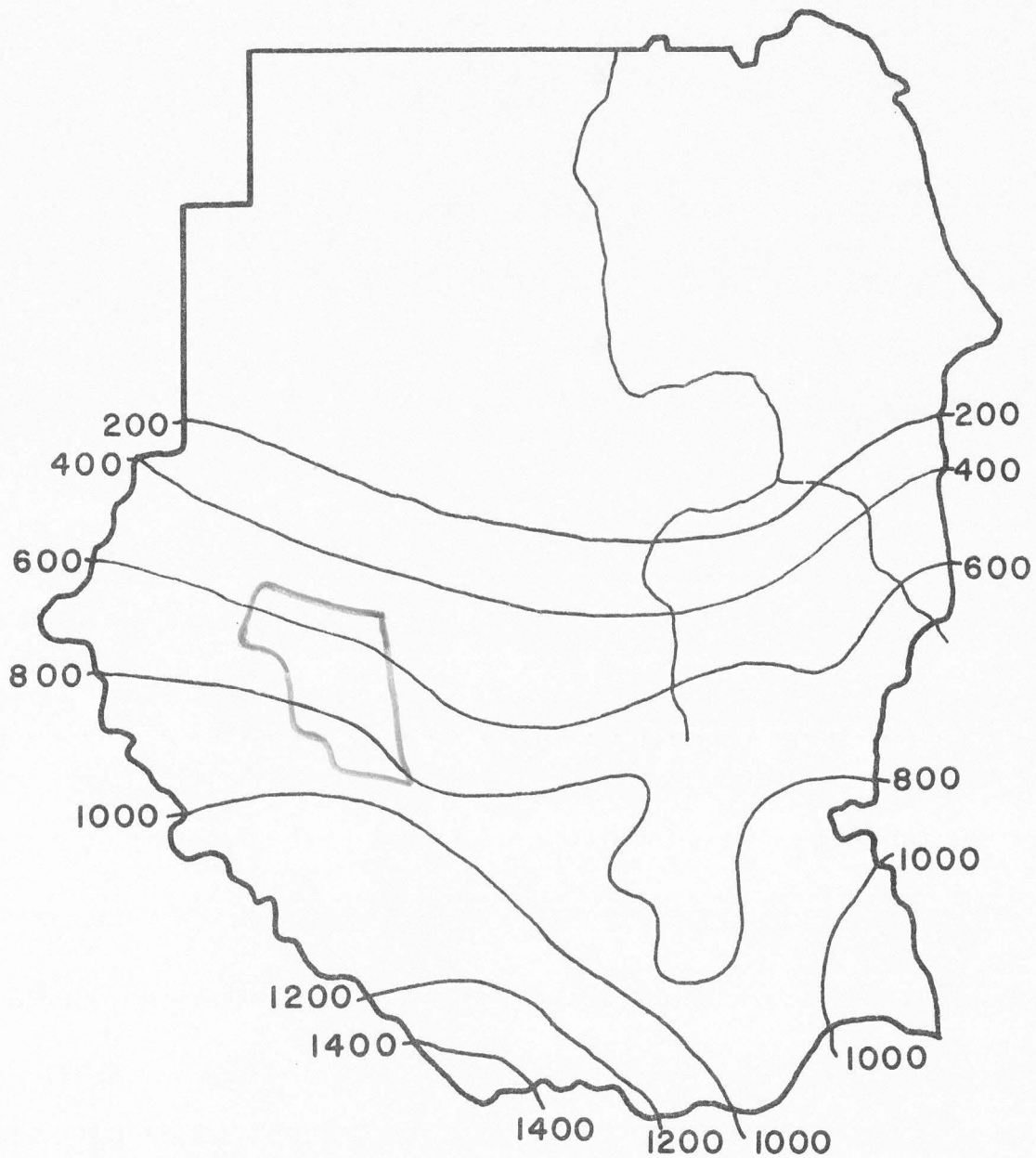


Figure 4. Mean annual rainfall (mm) of the Sudan. The red border delineates the Rezeigat district. Source: Clarke, 1971 (5).

highest mean temperatures at Khartoum; more than 38°C (100°F) can be recorded during any month of the year.

Most of the southern Darfur province is hot. The Marra Mountains and Zalengi plateau of this area, however, are relatively cool when compared to the rest of Darfur and the easterly provinces (20).

Table 1. Average rainfall (mm) of central and southern Darfur, 1918-30 inclusive.

Location (see Map 2)	May	June	July	Aug.	Sept.	Oct.	Annual mm.	Annual inches
Fasher	10	17	109	134	34	5	309	12.2
Nyala	37	69	130	171	95	19	521	20.5
1932-40								
Kutum	10	14	113	159	47	2	345	13.6
Zalingei	34	67	180	226	88	17	612	24.1
Geneina	24	47	167	228	69	5	540	21.4

#### General Vegetation of the Sudan

Sudan is a country of low relief, apart from mountainous regions in Kassala province and isolated areas such as Jebel Marra in central Darfur, which rises to 10,000 ft. For a general characterization of vegetation, the influence of topography can be ignored.

Variation in annual rainfall from almost 0 in. in the north to 50 in. in the south produces landscape varying from barren desert to tall forests. In the central Sudan the effective rainfall is concentrated within a period of 4-5 months, and during the bulk

of the year the plain is covered with dry parched herbage and such drought-resisting trees and shrubs as are able to survive the dry season. Southwards the rainfall periods lengthen until in the extreme south rain occurs in varying amounts almost throughout the year. This distribution of rainfall is reflected in the type of vegetation, which passes from thorny almost leafless drought-resistant types in the north to evergreen and deciduous forests in the south (1).

Temperatures show considerable diurnal variation in the northern desert areas where some of the highest maxima and lowest minima are recorded. Farther south the amplitude of variation is lessened, commensurate with increasing rainfall and humidity, and the day and night temperature range is in general narrower throughout the year. This trend from an arid towards a tropical temperature regime follows the vegetation pattern.

The influence of the soil on vegetation is reflected in its water-holding capacity and less prominently in its acidity or alkalinity. In the Northern Sudan are predominantly sandy types, often in sand dune formation. Acacia communities in the Central Sudan and in parts of the Southern Sudan occur on vast areas of heavy, almost impermeable alkaline clays. Woodlands in the Southern Sudan are associated with more permeable acid red ironstone soils. Along the river banks and in the flood plain of the Baraka and Gash (Kassala province) are found permeable river silts (1) carrying swamp and grassland communities.

The vegetation of the Sudan can be divided into seven principal types which in general form a consecutive series from north

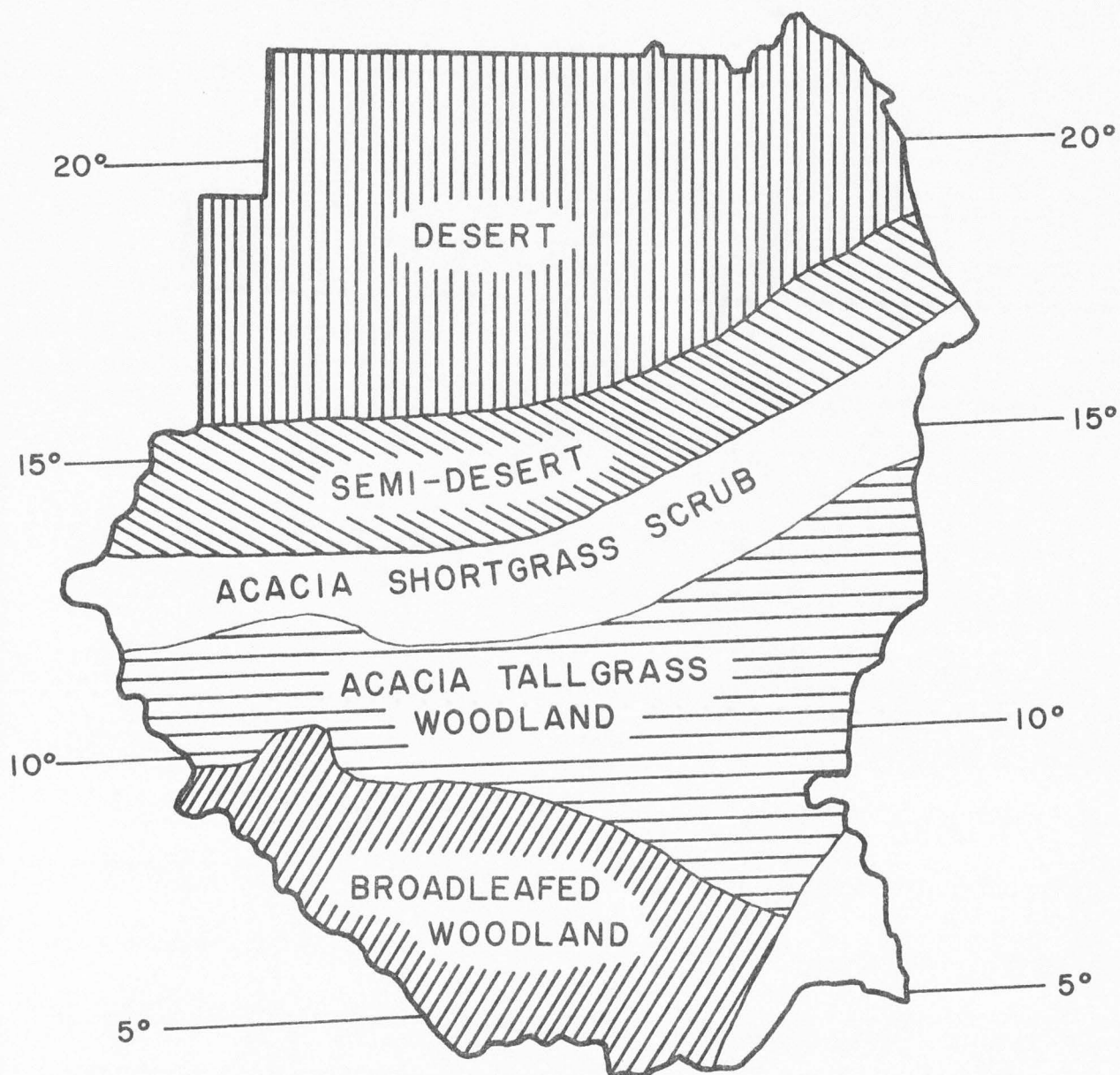


Figure 5. Generalized vegetation types of the Sudan.  
Source: Clarke, 1971 (5).



to south (Fig. 5). These types are as follows:

1. Desert
2. Acacia Desert Scrubs
3. Acacia Short Grass Scrub
4. Acacia Tall Grass Forest
5. Broad-leaved Woodland and Forest
6. Forests
7. Swamps and Grassland (River margins in eastern provinces)

#### Vegetation of Darfur Province

Darfur in the extreme north consists of desert; to the south of this is a belt of acacia desert shrub; further south, with El Fasher on the boundary line, is a somewhat narrower belt of 'acacia short grass scrub', the southern boundary of which curves round the north of the Jebel Marra range; then to the Bahr el Arab forming the southern boundary of Darfur is a broad belt of 'acacia tall grass forest'. The Jebel Marra uplift with a dry mountain flora has a climate suited to rain-grown wheat (20).

The elevated terrain of Jebel Marra displays a more diverse flora than that of the surrounding plains. The dominant but scarce tree above the level of the crater floor of Jebel Marra is the golden-leaved olive of the Red Sea hills, Olea chrysophylla Lam., although Acacia albida Del. occurs as a smallish tree in the crater and is an even smaller shrub up to about 1,000 ft. from the summit. A Rhus and a rough-leaved fig, Ficus palmater Forsk., also occur at the crater level. Above this level on the crater walls the herbaceous heather Blaeria spicata is common in places. Below the

level of the crater floor and above the level of the "acacia tall grass forest" a number of plants occur, such as Erythrina sp., Phoenix reclinata, Carissa edulis, Ximenia americana, which indicate considerable rainfall without great extreme of heat or cold.

The grazing grass 'haskanit', Cenchrus biflorus, is probably the most widely spread of all grasses in central Darfur province.

#### Vegetation of the Rezeigat District

The homeland (or "dar") of the migratory Rezeigat is located on a characteristic soil formation called the Baggara Repeating Pattern (Fig. 6). The Baggara Repeating Pattern may be described as frequently-alternating small patches of two contrasting types of soil, namely flat areas of non-cracking clay ("nagaa") and slightly higher areas of stabilized sand dune ("atamur"). The Pattern is thought to be alluvial in origin. The smooth hard-surfaced "nagaa", almost impenetrable to water, have a scanty grass cover although some areas are completely bare of all vegetation and other areas have poorly developed trees and bushes. The large run-off from the "nagaa" stands on the surface and then collects into shallow rain pools ("rahads"). Around the "rahads" are groups of tall trees. Between "nagaa" and "atamur" grasses grow.

Vegetation on the non-cracking clay ("nagaa") includes grasses: Aristida species (A. funiculata, A. submucronata, and A. mutabilis), Schoenefeldia gracilis, Tripogon minimus, Loudetia togonesis, and Sporobolus marginatus. Most of the "nagaa" is without trees but there are patches of Acacia mellifera, A. seyal, A. habecladoicles

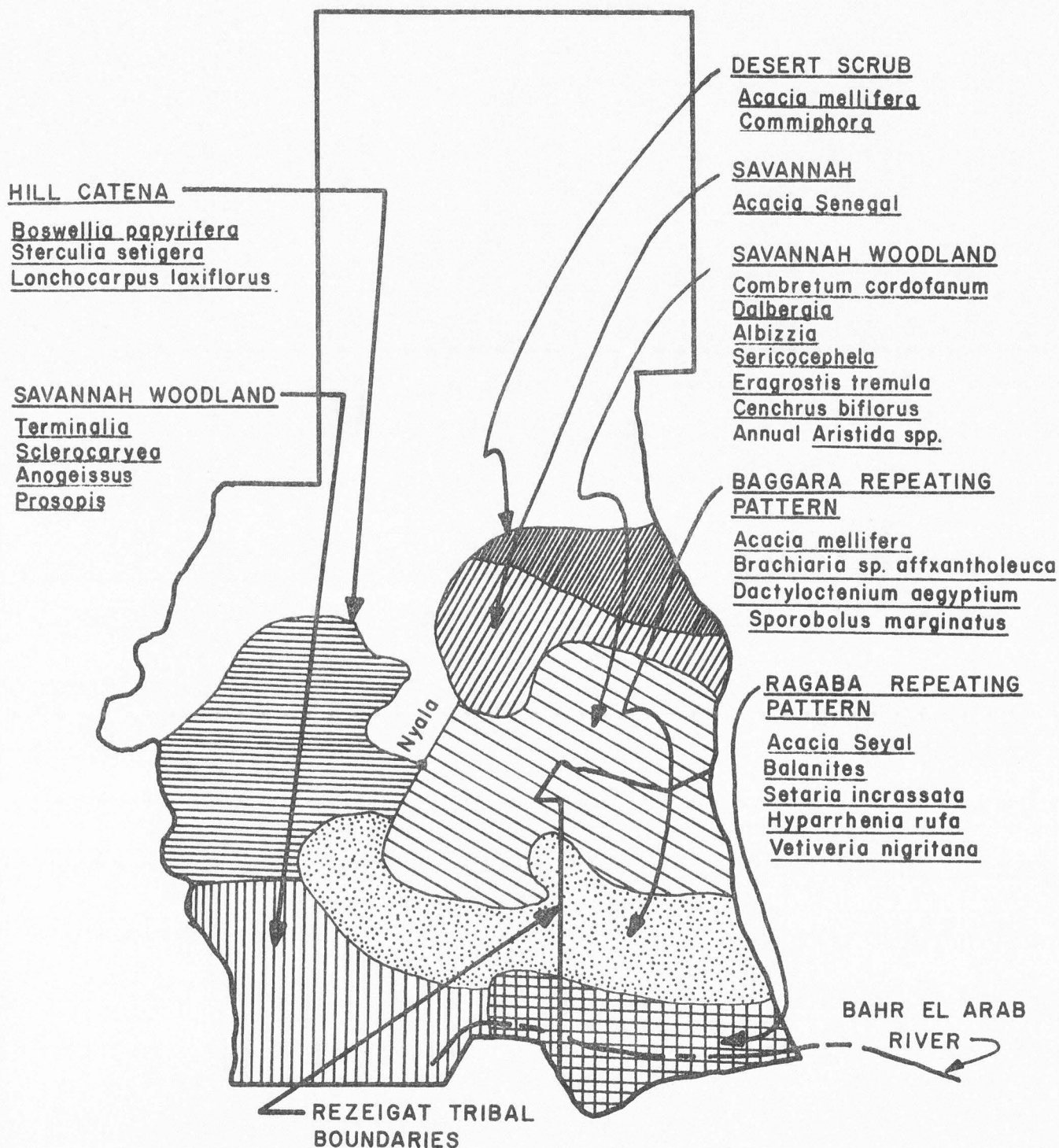


Figure 6. Types of vegetation in Darfur Province.  
 Source: author's compilation.

and Lannea humilis. The grasses between "atamur" and "nagaa" are: Sporobolus marginatus, Dactyloctenium aegyptium, Brachiaria spp., Chloris pilosa, C. prieurii, and C. gayana. These grasses are considered to be salty. The trees around the "rahads" include Tamarindus indica, Anogeissus schimperi, Diospyres mespiliformis, Mitragyne inermis, Crataeva adansonii, Celtis integrifolia, Acacia sieberiana, A. campylacantha and Ficus species (11).

The writer observed that the most widespread shrub between wells and other water points of the Baggara Repeating Pattern is Gulera senegalensis, which occurs on sandy soil where there is heavy grazing.

The dominant tree species in the Rezeigat area is Acacia mellifera which forms dense nearly pure thickets which occur on almost impenetrable dark clay soils, and beneath which the grass is greatly reduced so that the thickets are fire-proof. As the trees grow older, however, and the thicket is broken by the death of some trees, grasses invade the area and fire follows. Acacia mellifera ("kitter") is of no great value. Acacia senegal, which is a pioneer species following cultivation, is the gum tree from which comes about 75% of the Sudan's gum arabic. This represents about 75% of the world total supply. A rotation has developed of letting the land rest under naturally regenerated gum gardens, for restoration of fertility after a period of years under crops (11).

Acacia albida, "haraz", has clumps of spirally twisted pods which fall in the dry season and are easily picked up by the cattle. The most abundant grass under it is the excellent Cynodon dactylon ("nagiil").

In depressions in the sand into which a little clay has been washed the baobab tree Adansonia digitata is often found together with Acacia nubica. As the rainfall increases species begin to occur such as Albizza sericocephella, Dalbergia melanoxylon, Acacia senegal, A. seyal.

Best grazing grasses on the Baggara Repeating Pattern are (local names in parenthesis):

- (1) Cenchrus biflorus (heskanit)
- (2) Eragrostis tremula (bannu)
- (3) Annual Aristida spp. (gau)
- (4) Panicum turgidum
- (5) Brachiaria sp. (abu jigra)
- (6) Dactyloctenium aegyptium (Umm Usabi)
- (7) Chloris gayana
- (8) Cenchrus setigerus
- (9) C. ciliaris
- (10) C. prieurii
- (11) Andropogon gayanus
- (12) Cynodon dactylon (nagiil)
- (13) Sporobolus festivus (Umm dipejo)
- (14) Blepharis sp.
- (15) Zornia diphylla (lesseig, shillini)

Cenchrus biflorus increases often after cultivation and because of its barbed seeds, is of no use for cattle in the dry season, but is preferred in leafy stage. Blepharis is a good grazing plant for camels and sheep, but also is of no use in the dry season for cattle because leaves fall at maturity. Zornia diphylla's ability to cause "bloat" is well known.

During the dry season the Rezeigat move their livestock towards the Bahr el Arab river and onto the Ragaba Repeating Pattern. The soil of the area round the Bahr el Arab river is dark cracking clay covered by Acacia seyal and associated species such as Acacia senegal, A. albida, A. arabica, A. tortilis, Cordia abyssinica,

Khaya senegalensis, and Tamarindus indica. The dry season regrowth after burning of Andropogon gayanus on the Repeating Pattern country depends on good showers after the main rains have stopped (Figure 7). Burning must be done as early as possible, though the quantity of regrowth is very variable year to year. It is good quality, even when hayed off again, and supports many cattle in the dry season.

The Baggara cattle use the north part of the Rezeigat district when rains are heavy in the south, so as to get away from "fly" and mud. This practice rests the southern range from grazing and, in practice, the two best grasses actually increase under heavy rains and are found in great quantities even in the few eroded areas. These good grasses, a Brachiaria sp. and Dactyloctenium aegyptium, are then grazed during the dry season when the tribe moves south again.

The grazing areas now unused due to lack of water could be acquired cheaply and made available for grazing by developing bore holes and providing mineral supplement.

There are some undesirable forbs often found in areas where there is overgrazing. These herbs are: Acanthospermum hespidum (horab housa), Abutilon figarianum (niada), Cassia mimosoides (sacarnaba), and C. occidentalis (kaval).

#### Soil Characteristics in Darfur Province

Examination of soil profiles will, among other considerations, help the range manager determine which areas are basically different even though the present more or less depleted plant cover may be

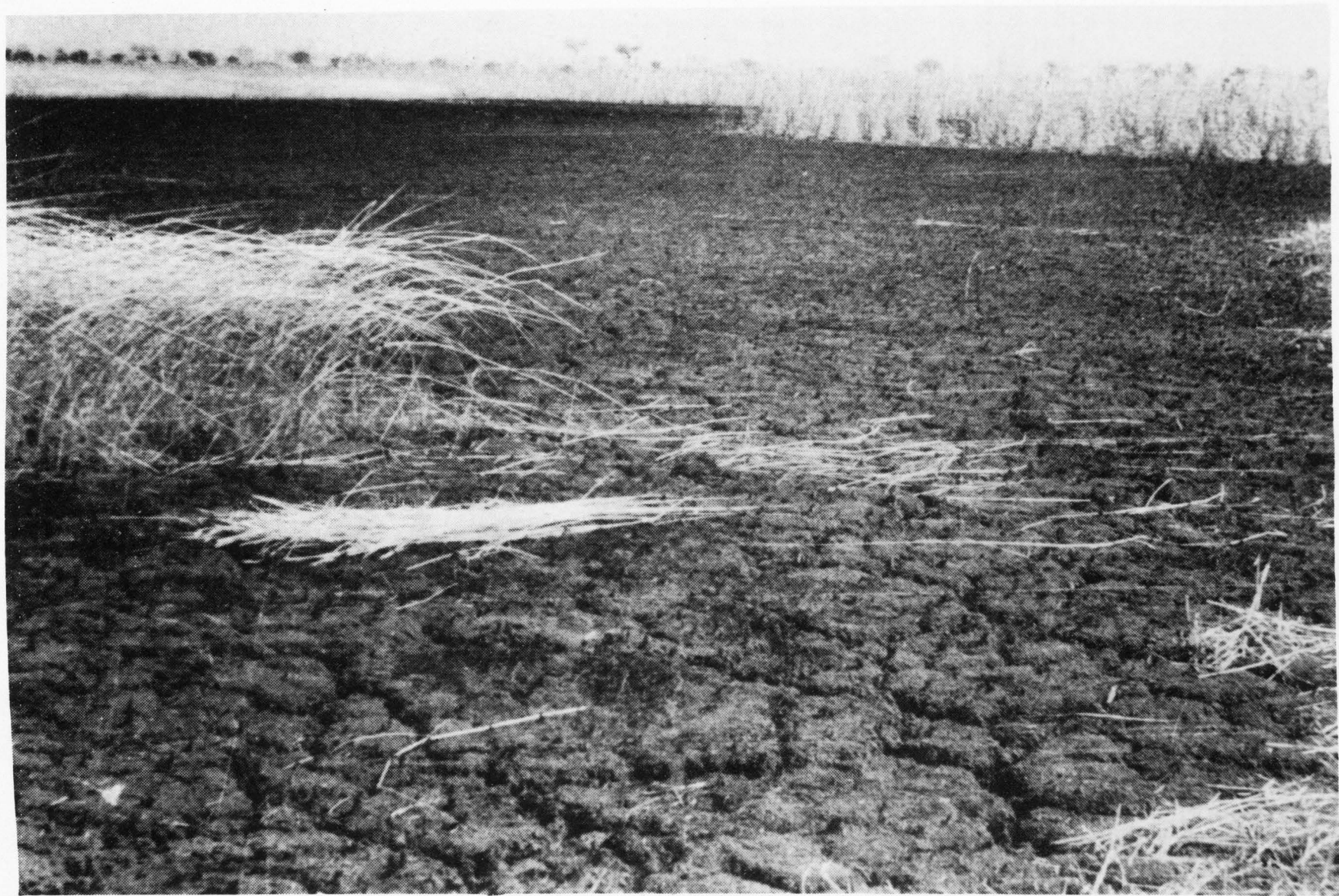


Figure 7. Dark cracking clay cleared by fire on the Ragaba Repeating Pattern.

quite similar. This is especially important in areas where one general range type is found overlying several kinds of soil, each of which may have a significantly different response to management. There are three important characteristics of soil profile: color, texture, and thickness or depth of soil.

Soil in Darfur province consists of the following types: continental or "Qoz", silt, clay, and volcanic deposits.

#### Continental sand or "Qoz"

The most important agricultural soil in Darfur consists of the vast area of now static billowy sand that spreads over much of the province with tongues running southward on both sides of the Jebel Marra. It is a soil of low fertility, but preserves for the use of crops practically all the rain that falls.

#### Silts

These are recent deposits that have been laid down generally only to shallow depth along the banks of all rivers and wadis. The silts are the most fertile of all Darfur soils. They are particularly suited to the successful culture of tobacco, vegetables, and fruits. Where silts occur extensively in areas of suitable rainfall as, for instance, along the Wadi Azum Valley, heavy grain (dura) crops are also obtained (20).

#### Clays

There are extensive deposits of alluvial clay in all the riverain lands of Darfur. Agriculturally they are unimportant because



the rainfall is inadequate for the growing of crops. In the extreme south the clay marshes of Bahr el Arab provide summer grazing for the cattle of Baggara tribes.

#### Volcanic deposits

Agricultural volcanic deposits are confined almost exclusively to the Marra Mountains and the Central range running northwards and ending slightly east and north of Kutum.

## SOCIOLOGICAL CHARACTERISTICS OF THE SUDAN AND THE REZEIGAT

Land Tenure

In Africa some countries are notably wealthier than others; and such differences may be due to one or both of two causes. Some people are actually or potentially wealthier than others because of the natural resources of national land: deep, fertile soil, for instance, or favorable climate, or mineral or fossil fuel resources.

Differences of wealth may be found, however, due to other factors, such as the degree of knowledge, skill and energy of the people in using the resources the land provides (3) and available capital.

The peoples of North Africa have a lower economic and primary productivity than the people of Western Europe and North America for both the reasons given above. Their lands appear to lack great potential wealth apart from fossil fuels, and less skill and energy have so far been applied to their development. Thus insofar as North Africans obtain social services and a standard of living comparable with those in Europe and America, they must overcome the initial disadvantage of few natural resources by an even greater application of knowledge, skill, effort, and capital investment.

The ideas which men hold about the land on which they live depend largely on the kind of use they are able to make of it, and the kind of land tenure therefore differs from one community to another. In Africa it is possible to distinguish some traditional ideas about land which are common in nearly every African society.

Thus there is no "ownership" of land in the European sense of freehold ownership, and although an individual might have the use of a particular farm, his rights to it, and what he could do with it are limited by other rights over the same land held by the members of his family, clan, or tribe.

There are many variations of custom within this broad generalization, just as there are many variations in the degree of development among African communities. Again, even among farming peoples, where the population is sparse and whole villages move every few years to new sites, land allocation is less definite than in more densely populated places. There, where village sites are permanent, the land boundaries of each family are recognized and land changes hands by inheritance (3).

This situation was sometimes modified by conquest in a semi-feudal system, or by the development of strong central governments ruling over large areas, as among the Chagga and the Baganda in East Africa, the Basuto in South Africa, and in West Africa, in the emirates of Northern Nigeria and the kingdoms of Dahomey, Ashanti, and Benin. Here the central authority was strong enough to take over from smaller groups their traditional function of allocating land.

Another important point which should be mentioned. Land is considered by most African people in much the same way as Europeans think of sunshine and air - equally plentiful, equally necessary, and equally to be shared by all members of the community according to their needs. Land has no price and is not for sale. It is true that

in areas of dense population where trade has developed and land is less plentiful, this idea was already being modified to some extent before the arrival of the European. Among the Kikuyu of Kenya a man could pledge his land to creditors, but he parted only with the use of it, and he retained the right of taking it back when he had paid his debt. Also, even before the coming of Europeans, persons from other tribes were allowed to hold land after they had given presents to the clan authorities. The gifts were not looked on as payment for the land; they were considered rather as a thank-offering for admittance into a new community, or as tribute in recognition of the authority of the chief or elders. Membership in the community, not payment of price, was the condition of land-holding.

The actions of the members of the tribe are to a great extent regulated by customs designed to avoid any individual initiative that might endanger the precarious equilibrium that has been achieved with the environment. The land belongs to the community. Its use is generally allotted to individuals or families on the basis of their subsistence needs, and it is rarely possible for the more able or energetic to enlarge their share. Especially where it is periodically reallocated, or in the many areas where shifting cultivation is still practiced, there is little incentive to make improvements that would lead to greater production. In most parts of Africa the individual has responsibilities to a very numerous "extended family" group, and this too discourages production for the market, since the proceeds must be so widely shared, while it also tends to consume any small surplus that he may occasionally produce (8).

### The Nomadic People

The name "Sudan" is derived from the Arabic term "Bilad-es-Sudan" meaning "Country of the Blacks", but, in fact, the essential negroid, non-Muslim and less developed people found south of latitude 12°N. account for only one-quarter of the total population (15.8 million total, 1970 estimate). To the north the peoples are largely of mixed negroid-semitic descent, Arabic in culture and Muslim in religion.

Significantly, the line dividing these two major cultural zones is not very far from the boundary between the desert and semi-desert of the north, and the savannahs and woodlands of the south. The peoples of northern Sudan, apart from the town-dwellers, belong to several distinct groups: the Beja of the Red Sea Hills, the Nubians of the northern Nile, the Arabs of the central rainlands, and the Nuba of the hill masses. The Beja are culturally distinct, and have been called "Fuzzy-Wuzzies" because of their shocks of dark frizzy hair. They restricted the incursions of Arab nomads, although there has been some mixture of Negro blood. Nubian cultivators have more Negro blood, revealed in rich chocolate brown skins. Nubia has been arbitrarily dissected by the Egypt-Sudan boundary, and recently flooded by Lake Nasser. The groups with the largest proportion of Arab or Semitic blood are undoubtedly the camel breeders of the desert and semi-desert zones. The Baggara cattle-owners have more negroid features but not as many as the very dark-skinned Nuba farmers inhabiting the hills of central Sudan. The Fur of Darfur are also

negroid, but their tribal complexity is pronounced. In the south there are Dinka, Shilluk, Nuer, Anuak, Burun and other tribes (3).

The population of Darfur is very mixed; however, it may be divided into nomad Arabs, the Fur of Jebel Marra, the Masalit of the Geneina area, and the Fellata immigrants. The nomad Arabs are to be found in all walks of life and are ubiquitous. In the north of Darfur they are completely nomadic, elsewhere they are mostly semi-nomadic. Quite a large number are sedentary and agrarian. They are noted horse-breeders and own many herds of camels, cattle, sheep, and goats. The camels feed largely on 'sallam' (Acacia flava), 'seyal' (Acacia raddiana), and 'samr' (Acacia tortillis), all of which occur in the desert scrub flora region fringing the desert. Annual migrations to the south take place, however, as routine, with the western wadis of Jebel Marra being one of the main objectives of the migration as there is grazing for the camels and grain to be purchased. The camels are used largely for transport purposes, and carrier contracts are normally arranged annually for carrying produce and trade goods over wide areas in the central and northern Sudan.

The food of northern nomads consists largely of milk and meat from camels, goats and sheep; and of dukhn grain (Pennisetum typhoides).

The southern nomads are cattle rather than camel owners and depend largely on cattle for their existence. In the rainy season they range as far as the thirteenth parallel of latitude and then return to their river grazing lands on the Bahr el Arab, Kava, or Azum rivers (20).

The diet of these Arabs is similar to that of the northern nomads except that milk and some meat are supplied by cattle instead of camels.

On the other hand Baggara are Arab. The name "Baggara" simply means cattle owners, as opposed to "Gumala" (camel owners), and could be applied to any Arab cattle owners. In the Sudan it is, however, restricted to a group of tribes of common origin and way of life who all live in the same belt of country. Though of mixed blood, the Baggara have retained the main characteristics of Arab culture and Islam.

All the Sudan Baggara tribes are derived from what is now part of Chad; many of the parent tribes are still to be found today in that country. In the Sudan the only camel owners are the small northern Rezeigat, or Jubul, in north-western Darfur, separated by about 300 miles from the main Rezeigat. In many ways the attitude to the animals did not change when cattle were adopted as the principal livestock. The traditional Arab nomadic way of life has been maintained and has proved to be, for arid conditions, as suitable for cattle as it was for camels. The Baggara make remarkably good use of the country covered by their seasonal migrations and are the most successful cattle owners in the Sudan.

Each Baggara tribe is centered on its own area of the Baggara Repeating Pattern or neighboring country, and has a north-south section of low rainfall woodland savannah in which to graze their cattle when forced away by climatic factors from the Repeating Pattern. In the rains, to get away from "fly" and mud, they go north almost, but not quite, to the boundary with the semi-desert.

In the dry season, in search of grass and water, they go south, with many of their cattle grazing onto the fringes of the flood region. The Baggara consider dark cracking clay country as very unsuitable for cattle due to mud and tsetse fly, and they do not extend east of the White Nile. Though they thus graze their cattle over the full extent of low rainfall woodland savannah, there are many other tribes, large and small, greater in total numbers of people, who also inhabit this region. The only part of the region to which the Baggara have undisputed, complete and exclusive ownership is the small areas of the Baggara Repeating Pattern and adjacent country (Fig. 6).

#### Seasonal Migration Pattern of the Nomads

The habit of seasonal migration applies principally to the five largest Baggara tribes of the Southern District of Darfur (the Rezeigat tribe being one of them) and to the Messeria Homur of the Western District Kordofan (Fig. 8). The outstanding grazing value of the Baggara Repeating Pattern country cannot be sufficiently stressed. It is the very best and the "saltiest" grazing. The geographical distribution of Baggara tribes is the same as the distribution of the Baggara Repeating Pattern and similar country. The largest Baggara tribes, with the most cattle, are associated with the Repeating Pattern itself. Dependent on this excellent grazing land, the Baggara have a large enough surplus of cattle to provide practically all the Sudan trade in beef cattle. The prosperity



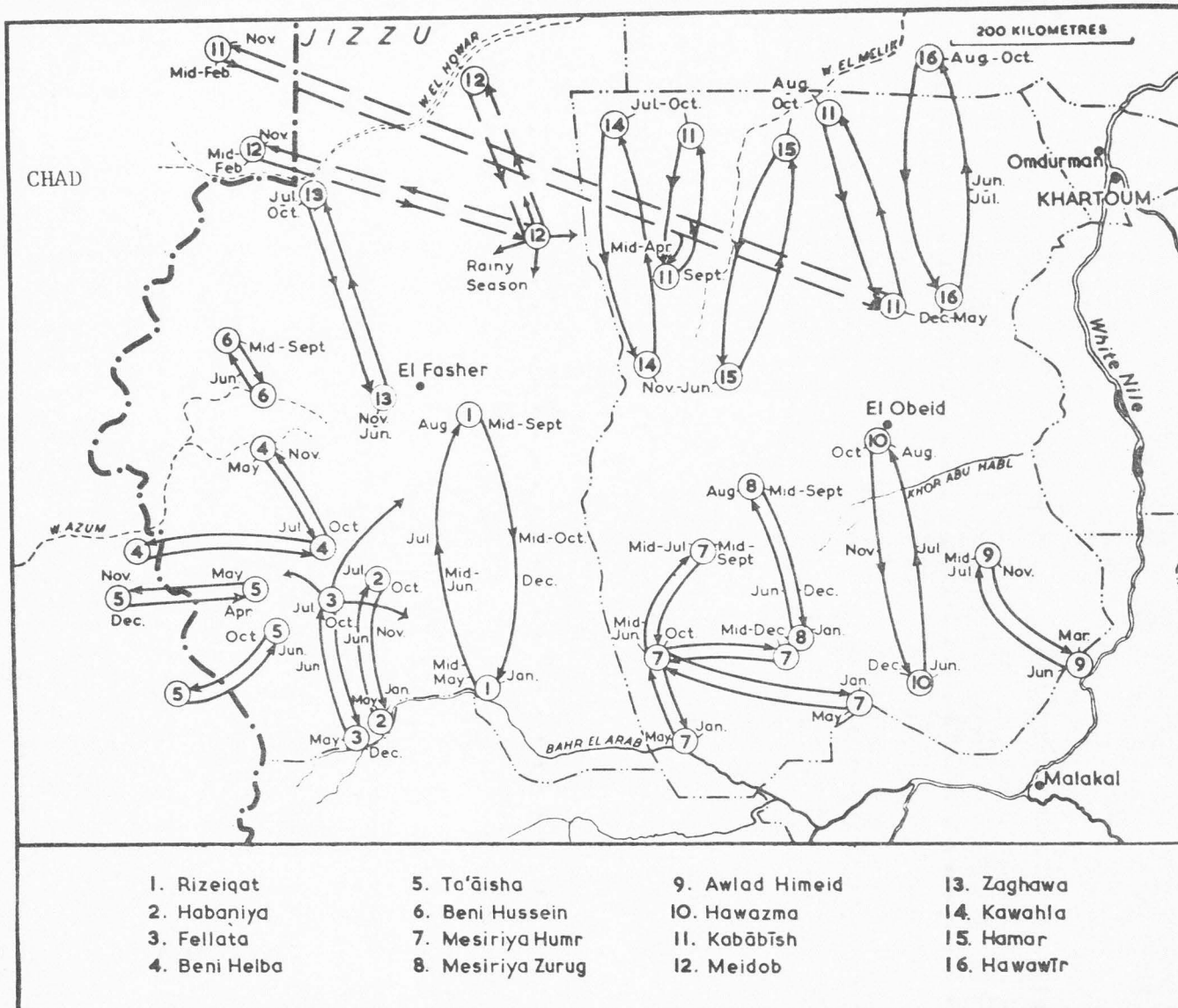


Figure 8. Seasonal movement of nomads in Western Sudan. Source: Barbour, 1964 (2).

of the Baggara tribes depends on the maintenance of the quality of the Baggara Repeating Pattern grazing region.

Each tribe speaks of its particular home area of Baggara Repeating Pattern country as its "dar", or homeland. Here are the tribal headquarters and the very best grazing, where the cattle are grazed during the first half of the rains and at the end of the rainy season, and here, on the "atamur" sand areas, the crops are grown. Baggara do not cultivate outside their own "dar" and do not claim any rights outside the "dar" other than the right to graze and the right to water their animals, and usually the right to hunt and collect honey.

At the end of the rains, in the early dry season, the "rahads" (water collection pools) in the "dar" begin to dry out and the grazing comes to an end during November and December. Gradually the cattle are forced south, from one watering point to the next, until they reach their final camp for the latter part of the dry season (Fig. 9). There is less migratory movement during these months than any other time of the year because grazing and water are both very scarce. At first there are some big pools and certain sections of the Bahr el Arab and the "raqubas" (muddy areas) also have open water. Later on these nearly all dry out and shallow wells have to be dug, even along most sections of the Bahr el Arab river. Forage is soon eaten out around the few remaining permanent water supplies and the cattle must then walk long distances between grass and water. It is usual for most Baggara cattle to be grazing about 8 miles away from water by the end of the dry season, drinking only once a day. In a dry



Figure 9. A Baggara family on the move in the qoz. Source: Barbour, 1964 (2)

year many animals have no forage less than twice that distance from water, and to graze out to that distance they are forced to drink on alternate days only. Perhaps only half the time may be spent grazing and the other half spent walking between water and grazing areas. Moreover, the little grazing that exists is of very poor quality and the animals steadily lose weight as a result. Young animals are checked in their growth and in a bad year there are large numbers of deaths among both young and old animals.

The onset of the new rains in May permits the animals at the dry season camps to travel to the good new grazing, wherever it has first appeared. Yet even then the difficulties and losses do not end because some animals, much weakened by the dry season, are unable to drag their feet through the mud. As soon as enough "rahads" have filled, both at the "dar" and on the route home, the cattle return.

This move is made quickly, in contrast to the slow movement away from the "dar" (homeland) at the beginning of the dry season; the speed of movement being limited only by lack of water in the "rahads" (water pools) and by the weak state of the animals at the end of the dry season. Sometimes a party of people may return ahead of the rest, to start preparing the land for the new season's crops. Soon they are joined by the remainder with the bulk of the cattle and the crops are then planted. The cattle begin a steady improvement in condition with the excellent new grass of the rainy season (which in the "dar" is also "salty"). This is the season of the year when the calves are born, as there is plenty of good

grazing to follow on before the hardship of the second half of the dry season arrives.

By the middle of the rains the clay flats hold much water and become uncomfortably muddy. Also there is much fly irriation. During July the cattle must therefore move north into low rainfall country, onto "qz" (sandy soil). There are by then plenty of pools and lots of grass everywhere. Movements are therefore very frequent, with small groups of people and cattle breaking off to go wherever the showers have brought up the youngest and best grass. Clean camp sites with fewer flies are also obtained by these frequent movements. A few people of most families are left behind in the "dar" during the rains, to do the weeding of the crops that is necessary.

By late September the cattle are able to return to the "dar" (homeland) and all the people are needed to help with the harvest. It is the happiest time of the year when there is plenty of new grain to eat. Also the cattle are in the best condition and producing the most milk. Tribal business is completed and, in Darfur, the horse shows and tribal gatherings are held, just before the "rahads" (water pools) dry out. Then the cattle and people are forced to start the slow movement back to the dry season grazing grounds, thus completing the migratory cycle. In areas with few good "rahads", the cattle may be forced away early and some people will then have to stay behind to complete the harvest, catching up with the main herds afterwards.

### Organizational Structure of the Nomadic Tribes

Not only the seasonal migration movements, but also the way of life of Baggara tribes has to be understood before changes can be made. No development or improvement can be planned without knowing the background in which it has to fit. The Baggara are good observers and intelligent people. Their way of life is surprisingly well adapted to their environment. The strong points and weaknesses have to be known.

Blood relationship and the family is the basis of all Baggara social groupings, from the "ferig", which is the smallest unit and is little more than an extended family, to the "gabila", or tribe, which is the largest unit (Figure 10). A number of related "ferigs" form a "Khashm beit", and a number of related "Khashm beits" form an "omodia" or "bedana", and a number of related "omodia" form a "gabila". In theory at least, all members of the tribe or tribal section have a family relationship and all are supposedly descended from the founder of the tribe from whom the tribe takes its name.

The "ferig", in its strictest meaning, consists of three or four generations of people all descended from a single man, who is the leader and father of the family group in the true patriarchal sense. The founder of the "ferig" may no longer be alive but it is his memory which keeps the related family group together as one unit. In numbers the size of the "ferig" varies from about ten to fifty persons. This unit of people always moves together and always

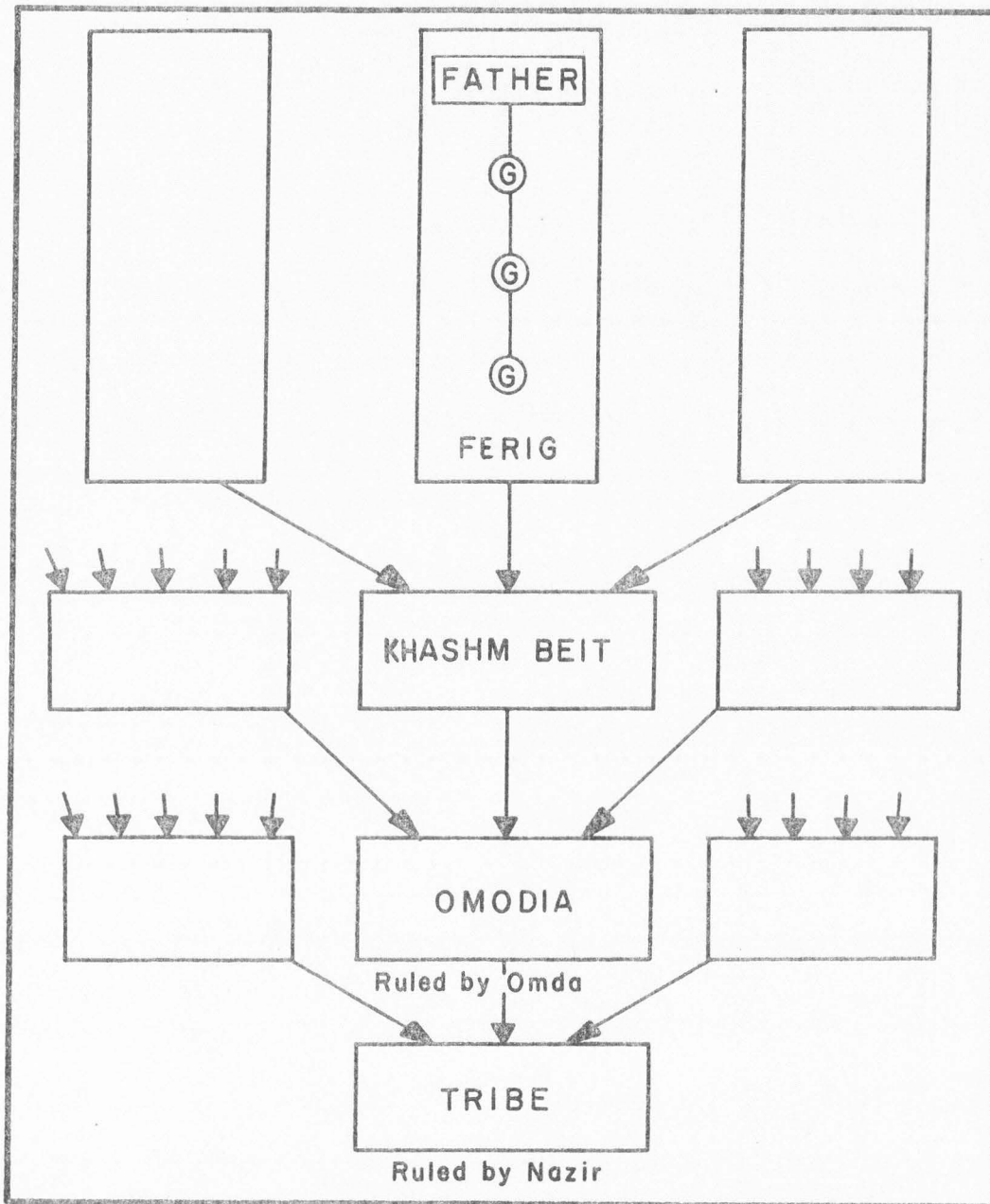


Figure 10. Tribal structure and organization of the Rezeigat.  
(G = 1 generation).

camps together; the word "ferig" being used indiscriminantly to describe the unit of people, the herd of cattle they own, and their camps; or, more often, to describe the migratory unit of cattle and people as a whole.

"Khashmbeit" is normally used to describe a group of related "ferigs" that usually move together and camp in the same vicinity.

An "omodia" is a primary division of a tribe and is ruled by an "Omda". The Omda is a comparatively recent office, introduced by the central government for ease of administration, but the "omodia" is roughly the same thing as the old "beduna" (a name which has now almost gone out of use).

A "gabila" is an independent tribe ruled by a "Nazir". "Ferigs" are grouped together into "Khashm beits", "Khashm beits" into "omodias", and "omodias" into "gabilas"; but a "gabilla" is an independent tribe with a separate entity and owes no allegiance to any other body (except to the Central Government directly). The Nazir is the apex of the pyramid of the authority and there is no higher within the tribe. There are big tribes consisting of many "omodias" and there are small tribes made up of a few "omodias" only (11).

Grazing areas are held by right of former tribal conquest. No individual man owns any particular bit of grazing land, and the land cannot be bought or sold. The grazing is in common ownership and management under the direction of the traditional leaders who settle any disputes which may arise about its use (11).



Dry season grazing is precious and the boundaries are clearly defined and strictly kept. But in the rains, with plenty of grass and water for all, there is no need for strict operation and some intermingling of tribes then takes place. A few small sections of a few tribes have a long-recognized practice of grazing during the dry season in an area predominantly used by another group; but this is a regular practice and not really an exception to the rule that tribes keep to their own territory. The only major exception is in times of unusual hardship and scarcity when a less fortunate neighbor will readily and cheerfully invite across the border "ferigs" and "omodias" of the tribe hardest hit, with the expectation that under reverse conditions the invitation would be returned.

Most people of each "omodia" normally travel by the same routes each year to the same areas, while a "ferig" often uses the same camp site as it did in previous years and spends the latter part of the dry season often on the same watering point.

Movements of the tribe are controlled by the Nazir, and of the "omodia" by the Omda. There is no need to give orders for every movement because the migrations are determined by custom and precedent; changes are enforced by abnormality of season. Instead, the leaders exercise their control by ensuring that ancient usage is observed and by settling any disputes that may arise. But, because they are bound by custom and seldom need to issue orders, it must not be supposed that control is obscure. Each Nazir knows where each "omodia" is at any particular time and each Omda knows where his "ferigs" are. It is because they have an intimate knowledge

of tribal matters, and because they have respect and authority in the tribe, that the leaders are able to make this traditional system work.

### Cultivation

Much of the agriculture is practiced on the "qoz" (sand soil), because "qoz" soils are easy to clear and cultivate. The good yield is due to good soil water availability; the physical condition of the soil and low soil "salt" content encourage extensive and efficient plant root systems.

"Dukhn" (Pennisetum typhoideum) and "batikh" water melon (Citrullus vulgaris) are the principal "qoz" crops. "Dukhn" is the staple grain of the people of the western Sudan. "Batikh" is grown for its moisture in waterless areas. While its seeds are used like chewing gum, most of the "Simsim" (Sesamum orientale), export from the Sudan also comes from the "qoz", as does most of the smaller exports of groundnuts.

During the dry season the people of large areas, particularly in the west, formerly depended for their dry season water supplies on "batikh" and on water stored in the hollow trunks of "tebelidi" trees, Adansonia digitata, the baobab tree. Even some milking cows had only "batikh" as their sole moisture supply in the dry season. Now the region is being opened up with deep wells and, in a few areas where they are possible, by shallow wells. On real "qoz" there are no water courses, because the soil is too sandy and large "hafirs" are of course impossible.

Generally speaking, by tradition, by birth and by inclination, the Bagarra are cattle men and they wish to remain so. In fact they dislike all manual labor in any shape or form; digging wells and drawing water is the only manual labor which they normally have to do. It is an inherent psychological attitude which is hard to modify. Every Baggara tribesman will invest his money in cattle or other stock if he can. To them cattle imply affluence, wealth and prestige and also a much more pleasant way of life.

The wealthiest tribes, richest in cattle, do practically no cultivation and nearly all Baggara rely on supplementing what little grain they grow themselves by purchases from other non-Baggara tribes. To raise the money they sell "samm" (clarified butter), bulls, sheep and hides. The exchange of these products for grain is advantageous to both parties. The Baggara have a market for their meat and milk and a supply of grain. The cultivators have a market for their grain and a supply of meat and milk. As the Baggara obtain grain from the local source of the area where they happen to be at the time, they have the additional benefit of being saved the long carry from their own crop fields in the "dar" (the home region). From Bahr el Arab, Baggara get grain grown by Dinka (a tribe inhabiting the other side of the river) in the south, not only by the sale of "samm", but also parties of Baggara with their bulls may be seen going to the markets of Aweil District carrying honey and dried fish, which they have collected from the area of the Bahr el Arab. In the rains there is plenty of milk, and the little grain the Baggara then eat comes from such small supplies of their own that they may have left in the "dar" (the home) and by purchase from the tribes who cultivate the "qoz".

Even in their own "dar" the Baggara encourage different people of non-Baggara tribal element to cultivate. These people are adopted into, or given protection by, the Baggara tribes. The aversion to growing crops is quite understandable. Baggara raise cattle because their country is the best suited for raising cattle. Nowhere else in the Sudan is there such good land for grazing as that of Baggara Repeating Pattern country. It was presumably this reason, and their preference for cattle, which led different tribes to occupy the same area. It is obviously best to concentrate on cattle raising and make a success of it, rather than try to combine some cattle with some cultivation and fail in both because of difficulties of the combination. With progress towards specialization, and the development of trade with neighboring tribes, the Baggara are able to devote all their attention to cattle. If there are market facilities and cultivating tribes willing to sell grain wherever they may happen to be, the Baggara are free to take their cattle to wherever the grazing is best at any particular season and the fullest use can be made of all available forage areas. Then the need to cultivate decreases further and the cattle can be given preferential attention and increase in number.

The crops are grown in the sand "atamur" areas of the Baggara Repeating Pattern. The non-cracking clay flats ("nagaa"), so valuable for grazing, are useless for cultivation. The staple grain crop is "dukhn", Pennisetum typhoideum. A little "simsim" and groundnuts are also grown.

## RECOMMENDATIONS FOR INCREASING PRODUCTION

### Introduction

Programs for developing areas such as Western Sudan must involve consideration of anthropology, sociology, education and general planning, as well as the usual sciences basic to range management. The program should include three different phases that consider a) evaluation of the resources, the people, and their cultural, social and economic interests; b) training and feasibility studies; and c) implementation and technical assistance (6).

In the developed countries, for a rancher, livestock production (and, therefore, range management) has an essential goal: economic profit. It is not the sole aim, but is the fundamental one. In the developing countries of Africa, pastoralists are still seeking security and survival. Most of the pastoral areas are located in arid or semi-arid zones, where rainfall is low, strictly seasonal, and where periods of drought are frequent and often pluriannual.

Many social and economic development schemes depend for success on people modifying their cultural ideas and attitudes about land. The systems of rotational grazing in East Africa and the demarcation of village land into fixed areas of grazing and cultivation in Rhodesia both involve Africans changing their concepts of land-holding. So also do resettlement schemes devised to move people from areas infested with sleeping sickness. In such schemes difficulties may arise both in the evacuation and receiving areas (3).

On the other hand, agriculturally-speaking, a considerable part of African production is still for subsistence only, largely because of the lack of food and marketing facilities. Yields are extremely low owing to traditional methods of cultivation and low quality seed. Although agricultural production in Africa has continued to expand faster than population, the level of food supply remains low in many areas and consumption of high-protein foods is inadequate in almost all African countries. Thus, the serious shortage of protein in many African diets results in a deficiency disease known as kwashiorkor. Imports into some territories of such products as condensed milk have increased, but over much of Africa any increase in livestock production is severely hampered by climate and disease, and also by the social attitude of having livestock as a store of wealth rather than as a productive resource. Furthermore, food supplies are very unstable in many areas and local famines are still liable to occur because of the uncertain climate and the lack of facilities to handle acute shortages (9).

In the area under study (Rezeigat district) there is no exact knowledge of the magnitude of losses of stock caused by disease and starvation. Consequently, it is not known how many animals a year could be saved by veterinary effort and providing more reliable water and forage resources. All that is certain is that the preventable losses are very great. For example, the Rezeigat in the season 1945/1946 lost 30,000 cattle from starvation and in the following season another 30,000 from rinderpest. The size of these

losses are not shown by the tax lists because Rezeigat cattle are under-listed, probably to a greater degree than those of other Baggara tribes. Actual cattle numbers are perhaps four times as many as listed cattle. On the government lists, the tax figures show that cattle numbers fell from 83,00 in 1945 to 58,000 in 1947. This reduction of only 15,000 is but a small indication of the tragedy that occurred. It is true that these losses were exceptional, but it must be remembered that they are the losses of a single tribe only.

#### Management of Herd Numbers

Because of the traditional grazing system of the Rezeigat tribe, it is very difficult to improve this region by developing a ranching system or substituting with agricultural development for livestock grazing. Also the economic condition of the country must be considered. There are two possible alternatives for improving the range inside the existing grazing system.

First, by increasing the numbers of animals which remain behind in the "dar" (home), which introduces an exception to the general pattern of seasonal migration. It has been noticed that shortage of water is one of the main reasons for cattle leaving the "dar". However, there do exist a few wells in the "dar", and it is the only tribal area where any cultivation is practiced. By increasing the number of wells in these areas the weakest and oldest animals could be left behind when the southern migration begins. This would permit the remainder of the herd to move faster. In the

rains, mud and fly irritation are serious, but the worst conditions can be avoided by keeping cattle in camps set up on the "atamur" sand areas close to the cultivator villages. It would also be necessary to increase cultivated forage production for the resident portion of the herds.

The second alternative might be to sell the weakest animals to the government. The government could feed these animals and help solve the problem of meat shortage in the capital (Khartoum). In fact there is a feeding station about 10 miles south of Khartoum. The cattle would have to be transported by walking about 300 miles from Nyala to Khartoum, because of shortage in transportation facilities and the great distance from a transportation line. One more problem facing this solution is that Rezeigat people would be reluctant to sell their cattle, due to the social prestige attached to numbers per se.

There are many advantages from selling a certain number or from cattle remaining behind at the "dar". (1) Dry season grazing with a smaller herd will reduce grazing pressure on the available forage. (2) Forage quantity may be increased the following year, because the vegetation is less stressed. A herd will return to the same wells from year to year, and can reap the benefit of better management. (3) The herd will remain in better health during the dry season and will probably have a higher survival rate. (4) The cattle will not have to move as far from each water point for forage at the end of the dry season, so the herd will be easier to control.



### Disease Control

In East Africa governmental attempts to halt cattle disease have sometimes been unwitting agents of other changes in the pastoral societies. By allowing cattle numbers to increase they have resulted in overstocking of the land, deterioration of pastures, and soil erosion (14). Correspondingly, if improvement of livestock production of the Rezeigat is enhanced by vaccination programs, some means of controlling stock numbers will need to be introduced to prevent land deterioration, or else forage production must be improved to meet the greater demand.

### Water Supplies

In the southern dry migration area, better water supplies would help mainly by reducing the walking distance between grazing and water in years when regrowth grazing is poor and rotation between additional wells could improve forage availability.

Seasonal opening and closing of water places in a 3,200-acre pasture on the Santa Rita Experimental Range in Arizona reduced overgrazing near the watering points (17). Most semidesert grass-shrub cattle ranges of the world are grazed yearlong. Even ranges that are properly stocked may be over-grazed every year near water, while remote areas are grazed lightly or not at all. Deferred-rotation grazing systems rest entire range units periodically, thereby giving all areas of concentrated use an opportunity to recover.

The nomadic movement of the Rezeigat is a natural example of deferred grazing, but the traditions of the tribe demand grazing the same area at the same season every year. Increases in forage production and watering points would provide flexibility for the tribe to occasionally omit individual wells and surrounding forage from a year's migration, then utilize those sites the following year.

The carrying capacity of the Rezeigat district would not be vastly increased by these measures, but losses from starvation and exhaustion would be greatly decreased so that annual take-off could thereby be improved from existing herd sizes.

#### Fire Control

At present, uncontrolled burning over large areas is a common feature early in the dry season, and unless following rains promote regrowth, much potential feed is lost. Fire control is being attempted by the government on a limited scale, but every year an estimated 80% of the potential dry season grazing is destroyed by fires in many parts of the Baggara country (11). In the absence of critical research in Darfur, an American report on the effect of fires on range composition is worth noting. Studies were made during the growth season of 1947-1948 on adjoining burned and unburned annual-plant range near Berkeley, California (12). They showed that the forage cover on four unburned areas consisted of approximately 90% grasses, while that on adjoining burned areas contained only 45% grasses with a significant decline in grass yield (Table 2).

Table 2. Effect of fire on forage yield. Average weight from square foot plots (12).

	<u>Yield in Grams</u>			
	<u>Exclosure I</u>		<u>Exclosure II</u>	
	<u>Unburned</u>	<u>Burned</u>	<u>Unburned</u>	<u>Burned</u>
All grasses	44.2	33.8	45.6	32.8
All forbs	2.4	11.5	1.6	12.1
Plot total	46.6	45.3	47.2	34.9

## SUMMARY AND CONCLUSIONS

Darfur province occurs in the west central portion of the Sudan, and apart from the mountainous districts of Marra and Zalengei it experiences a semi-arid climate with a 521 mm average precipitation falling in a wet season of 4 or 5 months. The Rezeigat tribe occupies savannah country in the south-east corner of the province and is one of the Baggara (cattle-owning) tribes which herd their livestock in traditional seasonal migration patterns. The commercial potential of the livestock is not realized due to the cultural independence of the tribes from government influence and economic pressures.

As with many other African tribes, for the Rezeigat there is no "ownership" of land in the European sense of freehold ownership. Rights of "possession" and management of the tribal district are exercised by traditional leaders and heads of groups of families within the tribe. Social structure, cultural attitudes to wealth and prestige, and range management practices, adhere strictly to the traditions maintained by tribal elders. The actions of the members of the tribe are to a great extent regulated by customs designed to avoid any individual initiative that might endanger the precarious equilibrium that has been achieved with the harsh environment.

The Rezeigat measure wealth and prestige by the size of their herds, and have no interest in capital gain, monetary assets or

material possession beyond the minimum for survival and tending their stock. Although the Rezeigat tribe has a large enough surplus of cattle to provide practically most of the Sudan trade in beef cattle, it makes no attempt to do so.

The Rezeigat is centered on its homeland in the Baggara Repeating Pattern and has a north-south section of low rainfall woodland savannah in which to graze cattle when forced away from the homeland by climatic factors. In the rains, to get away from tsetse fly and mud, they go north almost, but not quite, to the boundary with the semi-desert. In the dry season, in search of grass and water, they go south, with many of their cattle grazing onto the fringes of the flood region of the Bahr el Arab river. Though they graze their cattle over the full extent of low rainfall woodland savannah, there are many other groups, large and small, greater in total numbers of people, who also inhabit this region - most of them are Baggara tribes.

Given the fact that the tribe needs to manage large herds of cattle, its traditions are tuned to the environment of southern Darfur. Migratory movements are essential to avoid the problems of mud and fly in the wet season, and to utilize dwindling forage resources and seek water during the dry season. These movements also implement a deferred grazing pattern which permits recovery of the vegetation from one season to the next. The cultural precepts, however, encourage maintenance of herd numbers as large as possible without reference to quality or commercial harvest.

As a result, there are two important detrimental aspects of the traditional system: (1) a portion of the herds have starved to death by the close of the dry season migration, and (2) the remainder of the Sudan cannot reap any benefit from this livestock resource.

There are a number of ways in which the dry season wastage of cattle could be avoided.

- a. Leave the weakest animals behind on the dry season migration and provide cultivated forage and supplementary wells to support them in the homeland.
- b. Sell a portion of the herd to the Government at the onset of the dry season.
- c. Increase the number of wells in the Rezeigat migration area to meet the stress at the tail-end of the dry season, so that the problem of water shortage is minimized.
- d. Increase the number of wells south of the homeland but visit each well in alternate years so that the deferment period is doubled and the forage resource is improved. This would ameliorate the problem of scarce forage at the end of the dry season.
- e. Improve fire control early in the dry season and thereby reduce forage losses due to random burning.

A direct measure for increasing livestock production is to apply a vaccination program to reduce disease losses.

Evaluating the stated recommendations in terms of disturbance to the customs and migration patterns of the Rezeigat, fire control

would be the measure most likely to augment production with minimum interference, but it could be expensive to implement.

At present the Rezeigat have no need and no desire for goods they could purchase from selling more cattle than the minimum required for taxes; they are content with their current way of life. The consequences of commercial practices may be detrimental to the well-being of the tribal community. The life of the tribe and its herds is in harmony with the landscape, the tribe being satisfied with the ownership of cattle which are annually culled by the harshness of the environment. This relationship has stood the test of centuries. The extent to which this satisfaction might be sacrificed by "foreign" management is uncertain; the degree to which the social structure characterized by authority of the elders and adherence to traditions might be fractured by commercial behavior characterized by material gains and a sedentary existence, is unknown. The experience of working with the Rezeigat makes the author believe that disturbing the habits of the tribe would be at the expense of the happiness of the people.

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