Chapter 17 The Savanna or Sudan Climate

Distribution

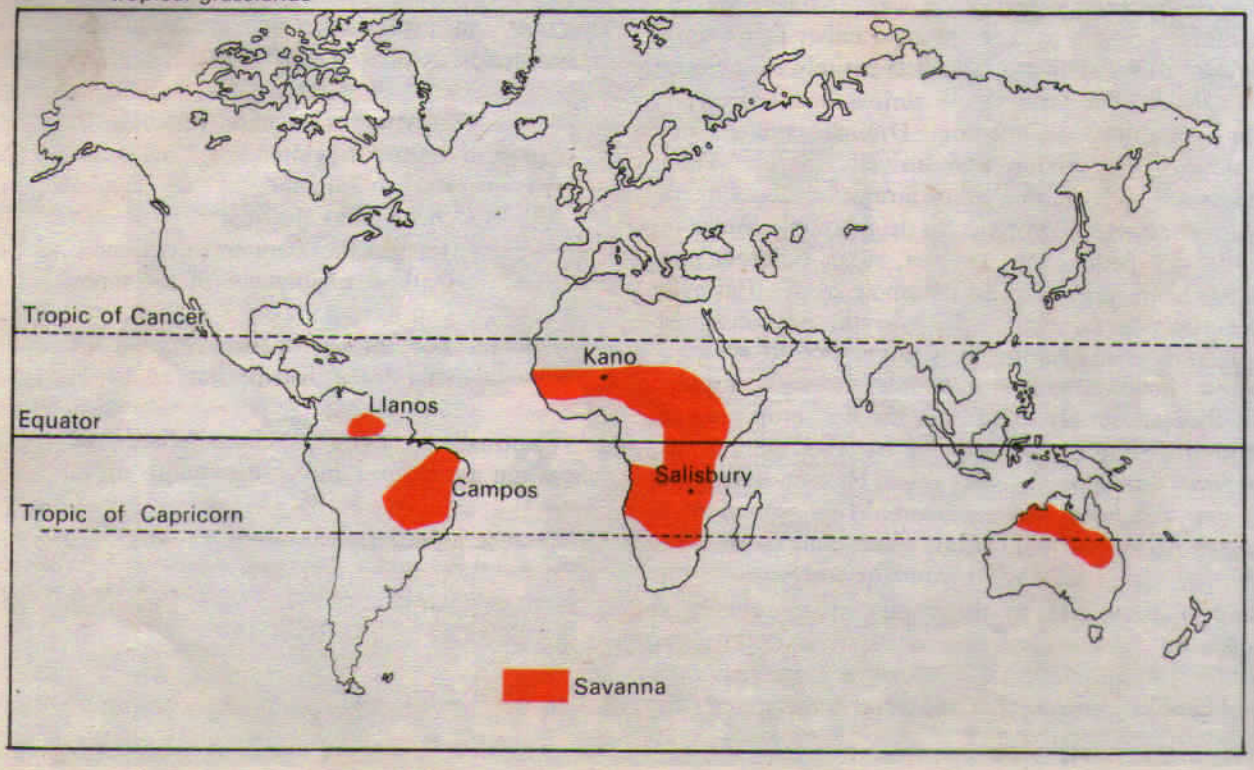
The Savanna or Sudan Climate is a transitional type of climate found between the equatorial forests and the trade wind hot deserts. It is confined within the tropics and is best developed in the Sudan where the dry and wet seasons are most distinct, hence its name the Sudan Climate. The belt includes West African Sudan, and then curves southwards into East Africa and southern Africa north of the Tropic of Capricorn as shown in Fig. 128. In South America, there are two distinct regions of savanna north and south of the equator, namely the *llanos* of the Orinoco basin and the *campos* of the Brazilian Highlands. The Australian savanna is located south of the monsoon strip running from west to east north of the Tropic of Capricorn.

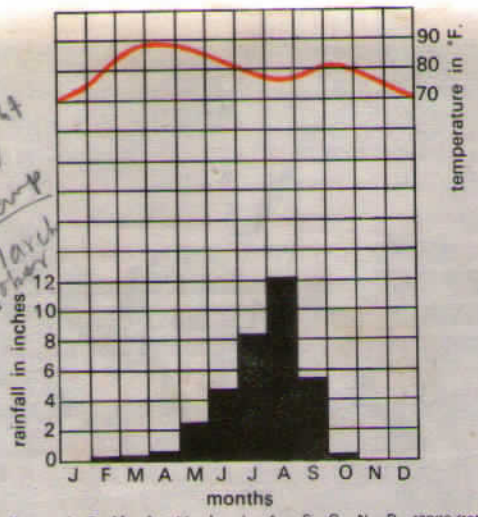
Climate of the Sudan Type

Rainfall. The Sudan type of climate is characterized by an alternate hot, rainy season and cool, dry season, as illustrated in Fig. 129 (a). In the northern hemisphere, the hot, rainy season normally begins in May and lasts until September, as in Kano, Nigeria. The rest of the year is cool and dry. The annual rainfall for Kano, which is located at a height of 1,539 feet above sea level, is 34 inches and is almost entirely concentrated in the summer. But the amount varies from 48 inches at Bathurst, in Gambia on the coast to only 5 inches at Khartoum, in Sudan in the interior. Both the length of the rainy season and the annual total rainfall decrease appreciably from the equatorial region polewards towards the desert fringes. On the whole, the annual precipitation is less than that of the Tropical Monsoon Climate and the length of the wet and dry seasons differs with the locality. In the southern hemisphere, the rainy season is from October to March (the southern summer) as shown in Fig. 129(b) of Salisbury, in Rhodesia. Its annual precipitation of 32 inches also varies much from year to year.

Temperature. The monthly temperature hovers between 70°F. and 90°F. for lowland stations. An annual temperature range of 20°F. is typical, but the range increases as one moves further away from the equator. It is, however, interesting to note that the

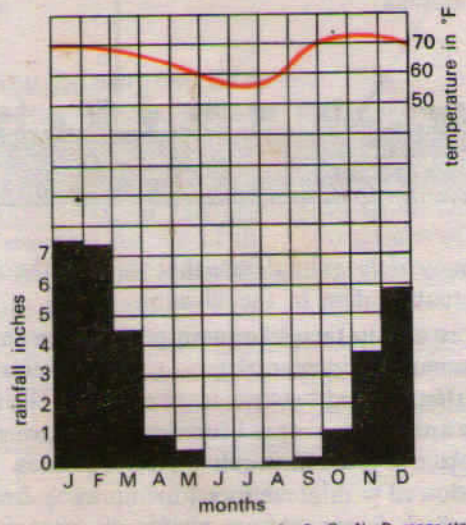
Fig. 128 Regions of Sudan Climate with savanna or tropical grasslands





Kano	J	F	M	A	M	J	J	A	S	O	N	D	range/total
Temp.	72	77	85	89	88	83	80	78	80	81	78	73	17°F.
Precip.	0	0.1	0.1	0.5	2.5	4.8	8.2	12.1	5.5	0.5	0	0	34"

Fig. 129 (a) The Savanna or Sudan Climate in the northern hemisphere
Place: Kano, Nigeria (11° 58'N., 8° 20' E.)
Altitude: 1,539 feet
Annual precipitation: 34 inches
Annual temperature range: 17°F. (89–72°F.)



Salisbury	J	F	M	A	M	J	J	A	S	O	N	D	range/total
Temperature	70	69	68	66	61	57	56	60	66	71	71	70	15°
Precipitation	7.5	7.4	4.5	1.0	0.5	0	0	0.1	0.3	1.1	3.7	5.8	32"

(b) The Savanna or Sudan Climate in the southern hemisphere
Place: Salisbury, Rhodesia (17°45'S., 31°E.)
Altitude: 4,435 feet
Annual precipitation: 32 inches
Annual temperature range: 15°F (71 – 56°)

highest temperatures do not coincide with the period of the highest sun (e.g. June in the northern hemisphere) but occur just before the onset of the rainy season, i.e. April in Kano and October in Salisbury. There is also a distinct drop in temperature in the rainy period, due to the overcast sky and the cooler atmosphere.

Days are hot, and during the hot season, noon temperatures of over 100°F. are quite frequent. When night falls the clear sky which promotes intense heating during the day also causes rapid radiation in the night. Temperatures drop to well below 50°F. and night frosts are not uncommon at this time of the year. This extreme diurnal range of temperature is another characteristic feature of the Sudan type of climate.

Winds. The prevailing winds of the region are the Trade Winds, which bring rain to the coastal districts. They are strongest in the summer but are relatively dry by the time they reach the continental interiors or the western coasts of the continents, so that grass and scattered short trees predominate. In West Africa, the North-East Trades, in fact, blow off-shore from the Sahara Desert and reach the Guinea coast as a dry, dust-laden wind, called locally the Harmattan, meaning 'the doctor'. It is so dry that its relative humidity seldom exceeds 30 per cent. 'The doctor' provides a welcome relief from the damp air of the Guinea lands by increasing the rate of evaporation with resultant cooling effects, but it is such a dry dusty wind that, besides ruining the crops, it also stirs up a thick dusty haze and impedes inland river navigation.

Natural Vegetation

The savanna landscape is typified by tall grass and short trees. It is rather misleading to call the savanna 'tropical grassland', because trees are always present with the luxuriant tall grass. The terms *'parkland'* or *'bush-veld'* perhaps describe the landscape better. Trees grow best towards the equatorial humid latitudes or along river banks but decrease in height and density away from the equator (Fig. 130). They occur in clumps or as scattered individuals. The trees are deciduous, shedding their leaves in the cool, dry season to prevent excessive loss of water through transpiration, e.g. *acacias*. Others have broad trunks, with water-storing devices to survive through the prolonged drought such as *baobabs and bottle trees*. Trees are mostly hard, gnarled and thorny and may exude gum like *gum arabic*. Many trees are umbrella shaped, exposing only a narrow edge to the strong winds. Palms which cannot withstand the drought are confined to the wettest areas or along rivers. Vegetative luxuriance reaches its peak in the rainy season, when trees renew their foilage and flower.

In true savanna lands, the grass is tall and coarse, growing 6 to 12 feet high. The elephant grass may attain a height of even 15 feet! The grass tends to

Giraffes in the savanna. The vegetation is of grass and scattered trees *J. Allen Cash*

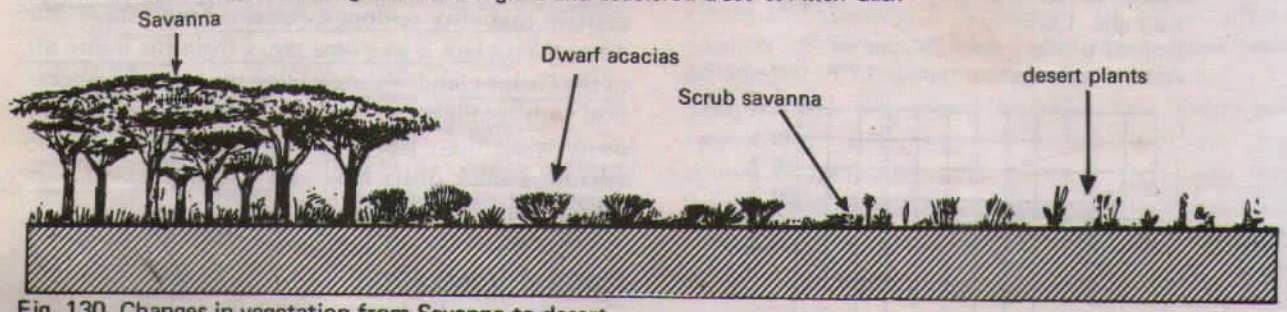


Fig. 130 Changes in vegetation from Savanna to desert

grow in compact *tufts* and has long roots which reach down in search of water. It appears greenish and well nourished in the rainy season but turns yellow and dies down in the dry season that follows. The grass lies dormant throughout the long, rainless period and springs up again in the next rainy season. In between the tall grass are scattered short trees and low bushes. As the rainfall diminishes towards the deserts the savanna merges into thorny scrub. In Australia, this scrubland is particularly well represented by a number of species: *mallee, mulga, spinifex grass* and other bushes.

Animal Life of the Savanna

The savanna, particularly in Africa, is the home of wild animals. It is known as the 'big game country' and thousands of animals are trapped or killed each year by people from all over the world. Some of the animals are tracked down for their skins, horns, tusks, bones or hair, others are captured alive and sent out of Africa as zoo animals, laboratory specimens or pets. There is such a wealth of animal life in Africa that many of the animal films that we see at the cinema are actually taken in the savanna.

There are, in fact, two main groups of animals in the savanna, the grass-eating herbivorous animals and the fleshing-eating carnivorous animals. The herbivorous animals are often very alert and move swiftly from place to place in search of green pastures. They are endowed with great speed to run away from the savage flesh-eaters that are always after them. The leaf and grass-eating animals include the zebra, antelope, giraffe, deer, gazelle, elephant and okapi. Many are well camouflaged species and their presence amongst the tall greenish-brown grass cannot be easily detected. The giraffe with such a long neck can locate its enemies a great distance away, while the elephant is so huge and strong that few animals will venture to come near it. It is well equipped with tusks and trunk for defence.

The carnivorous animals like the lion, tiger, leopard, hyaena, panther, jaguar, jackal, lynx and puma have powerful jaws and teeth for attacking other animals. Their natural colourings of light

yellowish-brown, often with stripes like the tiger or spots like the leopard, match perfectly with the tawny background of the savanna. They often hide themselves in shady spots up in the branches or amidst the tall bushes, and many wild animals, as well as hunters themselves, are caught unawares in this manner. Along rivers and in marshy lakes are numerous species of reptiles and mammals including crocodiles, alligators, monitors and giant lizards together with the larger rhinoceros and hippopotamus. In such an *animal paradise* there are many diverse species of birds, snakes, butterflies, moths and insects.

In many parts of East and South Africa, national parks have been set up which control the killing of animals. This is a necessity, if many of the rare species of animals are to be preserved and protected from wanton shooting. In Kenya there are large hotels and viewing-towers, built in the heart of the savanna, with special transport arrangements to bring tourists in to see the animals in their natural settings. This is a progressive step made in conserving animal life of the savanna and should be encouraged.

Human Life in the Savanna

Within the savanna lands of the tropics live many different tribes who are either cattle pastoralists like the Masai of the East African plateau or settled cultivators like the Hausa of northern Nigeria. We shall examine the life of these two groups of people more closely, and see how they adapt themselves to the savanna environment

The Masai, cattle pastoralists. The Masai are a nomadic tribe who once wandered with their herds of cattle in the central highlands of East Africa – in Kenya, Tanzania and Uganda. At the height of their power, in the mid-nineteenth century they numbered about 50,000. But today after a century's tribal clashes, epidemics and natural deaths, their numbers have been greatly reduced. They are now mainly confined to the 15,000 square miles of Masai reserves in Kenya and Tanzania. Their old grazing grounds in the Kenyan Highlands were taken over first by the immigrant white settlers for plantation agriculture (coffee, tea, cotton) and dairy farming and later, after independence, by African farmers. They now occupy the less favoured areas of savanna in which are grazed something like a million cattle and perhaps twice as many sheep and goats. On the lower slopes of the East African plateau, where rainfall is as low as 20 inches and there are long periods of drought, the grass seldom reaches a foot high and is not nutritious. When there is a drought the Masai move upwards to the higher and cooler plateau regions in which their herds can graze on the better pastures. They build circular huts with sticks, bushes and mud for temporary shelter. The cattle are kept in a special enclosure at night and are protected from attack by wild animals by a strong fence.

The cattle kept by the Masai are the zebu cattle with humps and long horns. They are treated with great respect and affection and are never slaughtered for food or for sale. The beef is only consumed when they die a natural death from old age or disease. They are never used as draught animals and are kept entirely for the supply of milk and blood. Milking is done by women before day-break and at dusk. The yield is extremely low by any standard and usually not more than two pints are obtained at a single milking. The milk is drunk either fresh or sour. Cheese-making is still not known to the Masai. Blood from both bulls and cows is drunk. This is obtained by tying a leather cord around the neck of an animal until the veins swell. A vein is then punctured by a special arrow-head and the blood gushes out and is collected and drunk fresh or clotted.

Cattle are kept by every Masai family. They are considered far more valuable than anything else, and are symbols of wealth. The richest man has the largest herds of cattle, leaving aside the sheep and goats which, to the Masai tribes, are of little significance. Cattle are used in payment for wives, and when the father of a family dies, the mother divides the livestock among the sons. The Masai will not slaughter the cattle for food, so from the agricultural

The Masai tribesmen drink the blood as well as the milk of their animals but do not kill them for meat *Camera Press*

tribes such as the Kikuyu of Kenya, they obtain a small amount of millet, bananas, groundnuts and vegetables.

Because the number of cattle is more important to the Masai than their quality, the Masai will not willingly sell their cattle. So the large area of land which they occupy in East Africa is not used profitably. Great efforts are being made to get the Masai to care for their animals properly and raise them for sale, keeping only as many animals as the pasture can support. Many Masai are responding to modern techniques but the majority stubbornly continue in their old ways. Amongst most of the other African tribes, pastoralism exists side by side with agriculture.

The Hausa, settled cultivators. The Hausa are a tribe of settled cultivators who inhabit the savanna-lands of the Bauchi Plateau of northern Nigeria. They number almost six million and have been organized in settled agricultural communities for hundreds of years. They are more advanced in their civilization and ways of life than many of the other African negroes.

The Hausa live in towns or villages. The ancient Hausa city of Kano, with a population of 135,000 has long been a focus of routes and trade. They do not practise shifting cultivation as many tribes do. Instead, they clear a piece of land and use it for several years, growing a wide range of crops like maize, millet, Guinea corn, groundnuts, bananas and beans. Some Hausa also cultivate non-food crops e.g. cotton and tobacco. When the fertility of the plot declines, they plant a new field and allow the old one to lie *fallow*. This enables natural forces to act on it until fertility is restored. New crops are then sown in the old plot again and the harvests are good. In this manner, the Hausa rotate their crops between different fields at different parts of the year, which is a technique employed in advanced agricultural societies.

Besides cultivation, the Hausa also make use of domesticated animals. Herds of cattle and goats are kept for both milk and meat, but they are only subsidiary to crop cultivation. Though they do not contribute much to the income of the Hausa, because of their small numbers, their manure is used to fertilize the fields. Poultry are raised by the villagers and both eggs and chicken are consumed.

The farming year is very closely related to the season of rainfall. In Nigeria, the rainy season begins in May and lasts till September. The annual precipitation is about 40 inches, falling entirely in summer. The Hausa sow the seeds in late April when sufficient rain has fallen. The seedlings sprout with the heavy rain and grow rapidly throughout the rainy season. Weeding with traditional hoes is done at regular intervals till the crops are ripened and harvested in September, the beginning of the cool, dry season. The tall brown bushes are burnt down by the farmers in preparation for new fields for the following year. Sometimes fires may be caused by the dry, dusty Harmattan.

Problems, Prospects and Development of the Savanna

There is little doubt that in years to come, world population pressure and the need for greater food production will necessitate greater economic development of the savanna. The deserts or the freezing tundra form climatic barriers too formidable for large scale human intervention to take place. But the savanna lands with an annual rainfall of over 30 inches and without any severe cold, should be able to support a wide range of tropical crops. ***Pioneer settlements*** in central Africa, northern Australia and eastern Brazil have shown that the savannas have immense agricultural potential for plantation agriculture of cotton, cane sugar, coffee, oil palm, groundnuts and even tropical fruits. Tropical Queensland, despite its scarcity of labour force has been very successful in its attempts to develop its huge empty land. The newly independent states of Kenya, Uganda, Tanzania and Malawi have already taken to large-scale production of cotton and sisal hemp. Both crops thrive well in savanna conditions. In West Africa, the commercial cultivation of groundnuts, oil palm and cocoa have been gradually extended into the savanna lands. New drought-resistant varieties will have to be introduced into these newly emergent countries to increase their foreign earnings in such tropical raw materials. In the cooler highlands, temperate crops have been successfully raised.

But farming in the savanna land is not without natural hazards. *Droughts* may be long and trying, as rainfall is often unreliable. Unless countermeasures can be taken in the form of adequate provision for irrigation, improved crop varieties and scientific farming techniques suitable for the tropical grasslands, crop failures can be disastrous for the people, who have very little to fall back on. The Sudan Climate, with distinct wet-and-dry periods is also responsible for the rapid deterioration of soil fertility. During the rainy season, torrential down-

pours of heavy rain cause leaching, in which most of the plant nutrients such as nitrates, phosphates and potash are dissolved and washed away. During the dry season, intense heating and evaporation dry up most of the water. Many savanna areas therefore have poor lateritic soils which are incapable of supporting good crops. Unless the soil is properly conserved through regular manuring, weeding and careful maintenance, crop yields are bound to decline.

The savanna is said to be the natural cattle country and many of the native people are, in fact, herdsmen or pastoralists. Cattle are kept in large numbers and fed on the tall grass or the bushes. They provide the people with milk, blood and meat. Unfortunately, the native zebu cattle are bony and yield little meat or milk. They often fall victim to tropical diseases, e.g. the ngana or sleeping sickness carried by the tsetse fly in Africa. The export of either beef or milk from the tropical grasslands is so far not important.

It seems necessary to introduce temperate cattle such as the English Shorthorn, Friesian or Guernsey to *cross* with the tropical *zebu*, if cattle rearing is to be successful in the savanna. In fact, a start has already been made in tropical Queensland which has become Australia's largest cattle producing state. Both meat and milk are exported. In other regions such as the *campos and llanos* of South America, though cattle ranching has been carried out for centuries, little progress has been made so far. The quality of the grass needs to be improved and a better network of communications is essential. Above all cattle breeding and disease control must be carried out on a scientific basis. In the African savanna, the attitude of such native herdsmen as the Masai who treat cattle as prestige animals, not for slaughtering, will pose many difficulties towards the commercialization of the cattle industry. But as an agricultural region, the savanna holds great promise for the future.

QUESTIONS AND EXERCISES

1. The following are brief descriptions of *three* different types of climate.
   (a) A very large temperature range, with summer rain.
   (b) Distinct wet and dry seasons with concentrated summer rain.
   (c) High uniform temperature with well distributed heavy rainfall.
      i. Name the type of climate.
      ii. For any *two* of them, give a fuller description of the climate and the factors which give rise to it.

2. Explain why
   (a) The savanna lands have a parkland type of natural vegetation.
   (b) The savanna is the natural home of cattle.
   (c) The savanna grass decreases in height and luxuriance further away from the equator.
   (d) Rainfall in the Sudan Climate is concentrated in the summer.

3. Write a descriptive account of
   Either: The Masai, pastoralists of East Africa.
   Or: The Hausa, food growers of northern Nigeria.
   You should bear in mind the environmental influence on their mode of living

4. It is said that the savanna land holds great promise for the future. Do you think so? Why? Outline some of the probable difficulties that may be encountered in their development.

5. Write brief notes on the following.
   (a) The effects of Harmattan in West Africa.
   (b) The savanna is the 'Big Game Country.'
   (c) Tropical grasslands have great potential for the cultivation of tropical hot, crops, e.g. cotton, coffee, fruits.
   (d) The savanna is a transitional zone between the equatorial forests and the hot deserts.