

**Livestock production**

**and Sahelian rangelands potential**

**- SUDAN -**





**TECHNICAL CENTRE  
FOR  
AGRICULTURAL AND RURAL  
COOPERATION**

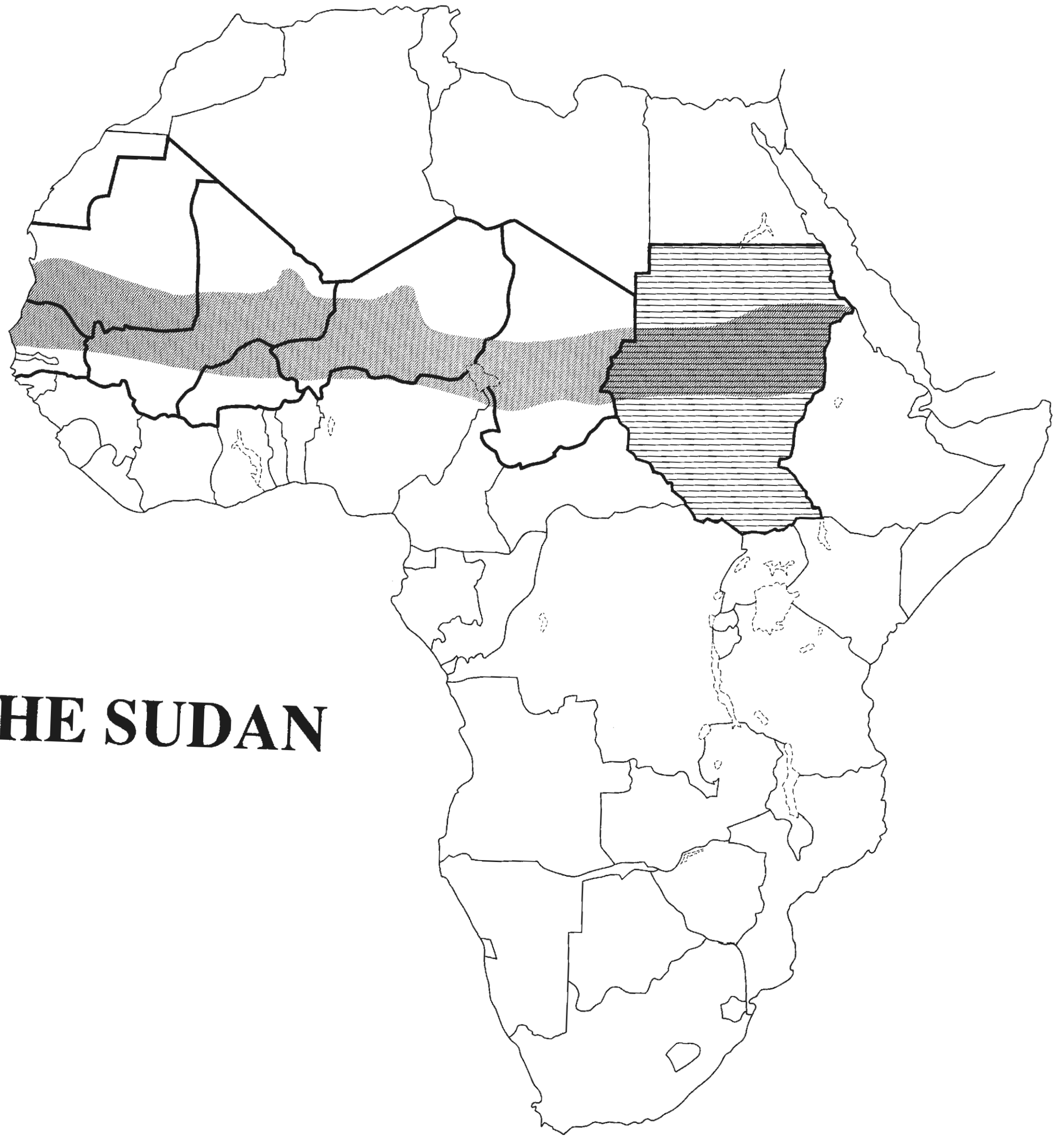
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**SCIENCE AND COOPERATION  
FOR RURAL DEVELOPMENT  
(CIRAD)**

**DEPARTMENT OF  
LIVESTOCK PRODUCTION  
AND VETERINARY MEDICINE  
(CIRAD - EMVT)**





**REPUBLIC OF THE SUDAN**

# FOREWORD

On behalf of my Ministry I should like to thank **CTA** for sponsoring the production of this useful series of Atlases on the rangelands of the Sahelian zone of Africa, and especially for this volume covering Sudan. Our thanks are also extended to **CIRAD/ EMVT**. The Atlas will be a great help to land-use planners, specialists, and all those who are involved in rangelands and livestock development.

Agriculture, including livestock, accounts for about one third of Sudan's GDP and over 90% of its exports. It provides employment for about 70% of the labour force. Stock-rearing plays an important role in the economy of Sudan. It accounts for about 35% of agriculture's GDP and is the second most important foreign exchange earner after cotton, accounting for about 10% of total export value.

According to 1988/89 figures, the total livestock population was estimated at **20.17 million cattle**, **19.67 million sheep**, **14.48 million goats**, and **2.73 million camels**.

Livestock production depends entirely upon the rangelands, and livestock derive about 85% of their feed from natural range resources, 10% from crop residues and by-products and 5% from irrigated forages and concentrates.

Livestock production can be classified into six systems: nomadic pastoral, transhumant pastoral, semi-sedentary and sedentary traditional, integrated intensive livestock/crop production, commercial fattening and poultry production, and intra-urban backyard production.

Due to different environmental conditions resulting from the actions and interactions of climate, soils, topography and the predominant land uses, some 30 years ago range resources were classified as desert, semi-desert, low rainfall savanna, high rainfall savanna, flood regions and mountain vegetation.

Rangeland is used as common property and consequently this open use has led to range degradation, particularly around permanent water supply centres. Uncontrolled fires and overgrazing are among several factors that caused range deterioration and desertification.

The Government's policy is now oriented towards the creation of the High Council for Natural Resources and Environment. The Council is expected to establish a clear and well-defined land use policy and to create strong cooperation between different government bodies involved in natural resources utilization, conservation, rehabilitation and development. The Council will assist in the establishment of a Grazing Act that will define the role and functions of the Range and Pasture Administration.

Dr. Abu El Gasim Ahmed Shommo  
**State Minister for  
Agriculture, Natural and Animal Resources**

A handwritten signature in black ink, appearing to be 'AGASIM', written in a cursive style.

# INTRODUCTION

The **CTA** (Technical Centre for Agricultural and Rural Cooperation) was created in 1983 under provisions of the Second Lomé Convention. Its mandate is to ensure efficient exchange of information among the member states of the **ACP** (Africa, Caribbean, Pacific) with a view to encouraging agricultural and rural development.

Among the principal objectives and priorities with which the Centre is charged, is the preparation of syntheses, in an accessible and readily available form, of information that has already been gathered but which is often widely dispersed and difficult to obtain.

The question then to be asked was: which information would be the most useful?

In 1983 the prolonged drought was still exacting its heavy toll on Africa, in particular in the **Sahel countries**. Desertification continued its inexorable march to the south, vast areas of land were degraded, and whole vegetation communities were being wiped out. It was thought necessary, then, to gather together information that would be of assistance in the design of new development strategies. The preparation and publication of a simple but complete document that would synthesize all that was known of the rangelands of the Sahel was considered a key aspect in the formulation of such a strategy.

In the face of these facts, would an atlas summarizing all the data available be useful; and why would it be so?

Many factors lay behind the decision to proceed with the production of such an atlas. The first was that the Sahel is not totally damned and that the drought, although it would need certainly to be taken into account in any strategy and any rational management plan for the rangelands, would not last for ever. Wet and dry periods would succeed each other, as they have always done, and rangeland productivity would likewise fluctuate from high in good years to low or even very low in bad years. The second was that there was a real need for all the information accumulated over years of work to be brought together and consolidated, for any new strategy would obviously need to take account of acquired experience.

Certainly, there were many gaps in what was known. Filling these gaps and bringing everything up-to-date would have caused many problems and been a long-term exercise. It was decided that the search for perfection would have to be put aside for the time being as it would have been a major impediment to the timely publication of what was already known and to the information distribution process. In any case, it is in the nature of things that all up-to-date publications become very quickly out-of-date. Graphs and maps often depict unstable situations but have the advantage that they highlight what has not been done and can lead to what needs to be done then being done in the continued striving for a perfect product. So, in spite of changes which are known to have occurred to the ecology of the area, the justification for this atlas is the use which will be made of it by planners and developers.

Within the context of a pastoral atlas it was apparent that other subjects closely related to the management of the rangelands would need to be included. This is in order that the range can truly be regarded as a component of livestock production and as a tool, or a resource, that livestock owners use to gain their livelihood.

The series of atlases that has already been published covers all the French-speaking countries of the Sahel. It is therefore logical that the major English-speaking “**Sahel**” country should be the subject of an additional volume and that this volume should be presented in the same format as all the others. This atlas on the Sudan has been the subject of special effort, not only because the area that is covered is a vast expanse of **800,000 km<sup>2</sup>**, but also because of the great ecological and environmental diversity that are features of this area. The pastoral systems of the Sudan are also diverse, stemming as they do from a variety of historical and ethnic situations. Finally, while there is a great deal of information on the Sudan’s pastoral areas, much of it is relatively old, incomplete or preliminary, often contradictory, and has rarely been up-dated.

The **climatic range** in the Sudan, as in the other Sahelian countries, covers the whole gamut from hyper-arid desert to humid savanna: further variety is added by the variations due to altitude. There are differences between the rocky and sandy areas of the uplands and the clay plains of the Nile basin, the one or two volcanic areas again adding another dimension.

There should be no surprise, therefore, that the map at a scale of 1: 500,000 describes **80 distinct range types**, even though a special effort was made to reduce these to a manageable and “user-friendly” number. The ecological typology that has been adopted, and which is derived from the information that has been gathered previously, is an essential prerequisite to the detailed study of the rangelands on which the animals survive and produce. The **nutritional values** of the pastures are presented in quantitative terms but these are complemented by some qualitative information, especially in view of the fact that it is the limits imposed by protein availability - or the lack of it - that largely govern improvements in animal productivity.

It is clear that the current stocking rate is very close to the **carrying capacity** of the pastoral areas. This is particularly so as rangeland production is, at least temporarily, not at its potential due to the sequence of drought years and the impact of large animal numbers. One of the features of the atlas resulting from this is a map showing the degree of degradation in various areas.

**Cultivated areas** are expanding very rapidly in the area that is covered by this atlas. This obviously has major implications for livestock production. The situation in the Sudan is somewhat different from that found over much of the rest of the Sahel because, in addition to traditional agricultural systems, there are large areas of irrigated and mechanized agriculture. **Underground and surface water resources** have also been extensively tapped and harnessed by the construction and equipping of hundreds of boreholes, wells and dams.



**Livestock owners** comprise 40% of the population of the zone. Many are specialists in different forms of livestock, from the **camel nomads** in the north to **cattle herders** in the more-favoured southerly zones. Most, however, maintain a mixed species herd. The social systems of these **different groups** have often developed to take account of the **composition and productivity** of their herds.

**Seasonal movements** from the "*dar*" - the tribal homeland - are still a basic feature of northern Sudan's pastoral systems and are indeed essential to the productivity and even the survival of the herds and of the pastoral way of life. Recent developments have, however, created major problems for the **transhumant system**, not only in the use of the rangelands but also in the very social fabric of the communities that use them.

Sudan has several important breeds of livestock that are productive and well adapted and resistant to the rigorous conditions under which they are raised. These include, among the cattle, the Kenana, Butana and Western Baqqara types. The various subtypes and tribal varieties of the Sudan Desert sheep and the Sudan Desert and Nubian goats are also justly appreciated for their hardiness and productivity. Livestock production in the Sudan is not only owners and animals, however. It is intimately related to and influenced by the well-organized and efficient **veterinary services**. These services have a network of posts and stations, in particular placed along the major stock routes and in the main pastoral areas. The Sudan also has a diagnostic veterinary laboratory and a vaccine production unit. It is appropriate, therefore, that the final section in this atlas is devoted to the constraints to livestock production that are imposed by the **animal health** situation.

This atlas and work of reference results from international cooperation among specialists from the Sudan, from France and from the United Kingdom of Great Britain and Northern Ireland. Several organizations and universities in the United Kingdom have contributed over the years to the enormous data base on which this atlas is based, a contribution that is only partially apparent from the reference lists which accompany the various chapters. Most of the chapters themselves have been written by Sudanese scientists who have been able to benefit from the opportunity provided to them through the technical assistance of **CTA** and **CIRAD-EMVT**.

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*The frontiers and boundaries marked on the maps in this atlas do not imply the expression of any opinion what so ever by the publishers on their legal standing.*

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# GENERAL PRESENTATION

## A. DARAG

Sudan, with an area of more than **2.5 million km<sup>2</sup>**, is Africa's largest country. It extends from 4°N — almost on the equator — at its southernmost extremity, to 22°N — almost to the Tropic of Cancer — in the north. This area encompasses a range of widely diverse climatic conditions. With the exception of a 900 km stretch of coastline along the Red Sea to the north-east, the country is land-locked. The Ethiopian highlands lie to the east, the land rising sharply to high elevations; Kenya and Uganda are to the south, with access through the Upper Nile valley; the border with Zaire and the Central African Republic follows the Nile-Congo watershed to the south-west. To the north and north-west, the boundaries with Chad, Libya and Egypt through the Nubian and Libyan deserts are mainly drawn along lines of latitude and longitude. Lying at the contact between tropical black Africa and Arab and Mediterranean northern Africa, the country naturally has a very heterogeneous population.

### Physical features

Sudan is a generally flat or gently sloping and featureless plain reflecting the underlying ancient continental **Basement complex rocks**. The Basement series is overlain by the Nubian sandstones in the north, and by the Umm Ruwaba formations in the south. Elevations are mostly below 1 000 m in central Sudan, except for the Nuba mountains which reach 1 457 m. Higher lands are found around the periphery of the country. Jebel Marra, close to Chad in the west, is an extinct volcano culminating at 3 042 m and surrounded by lava plateaux. The bare and rocky Red Sea hills rise some 2 000 m above narrow and inhospitable coastal plains, and there are a few higher ranges scattered along the Ethiopian foothills. The highest point in Sudan is Mount Kinyeti (3 198 m) in the Imatong mountains on the Uganda border.

The major differentiation of **soils** within the country is the sharp contrast between the clay plains along the Nile and its tributaries, and the surrounding lands. The clays, often dark-coloured and cracking, cover part of the central region and Kassala Province and extend over most of the southern regions where the rivers meander across vast areas of swamps and papyrus marshes. The southern swamps are referred to as the **Sud** (Arabic = dam), the name being derived from the accumulations of vegetation which block the rivers after the rains. The Bahr el Ghazal basin is flooded from August to November, then dries out into tall grasslands. The Bahr el Jebel, south of Lake No, and the Sobat basins have many permanent swamps. The land above the plains is a wooded or forested lateritic plateau in the south, whereas the northern areas are sandy or rocky tablelands. Southern Kordofan and Darfur and the southerly parts of Northern Kordofan and Darfur are mainly of Qoz, once mobile but now low, fixed sand dunes of short grass savanna.

The flat nature of the whole country is emphasized by the very small fall of the Niles from south to north. The Blue Nile crosses the Ethiopian border at 500 m above sea level, then flows 2 000 km through the country to reach Lake Nubia and the border with Egypt at an elevation of 180 m: the White Nile falls only 17 m over its 1 700 km course from the Uganda/Sudan border to Khartoum. The White Nile is navigable throughout the year from Lake No to Khartoum. Farther downstream the lower course is interrupted by cataracts where the wide valley is reduced to narrow gorges.

### The Nile system

The Nile is an international river system and Sudan controls only its middle sections. The Nile, however, dictates the present and future land use of the country, and provides 96 per cent of an average annual surface run-off estimated at 136.5 km<sup>3</sup>. The White Nile rises from, and its flow is regulated by, Lake Victoria: some 23 km<sup>3</sup> of water cross the Uganda border annually. The water slowly spreads in the southern swamps which also collect water from the western tributaries, the whole contributing to the delivery of a steady discharge throughout the year. The Sobat, a perennial river flowing out of southern Ethiopia, brings an additional 13.5 km<sup>3</sup> per year. The total annual flow at Malakal is 27.5 km<sup>3</sup>, of which 2.5 km<sup>3</sup> evaporate before reaching the regulating dam of Jebel Aulia.

The Blue Nile is sustained by the monsoon rains over the Ethiopian highlands. It provides an average 60 per cent of the total flow at Khartoum, where its level rises by 7 m in August, and it supports 40 per cent of the currently irrigated area. Its regime is extremely variable, however, with the annual discharge ranging from 40 to 150 km<sup>3</sup>. The heavy rains cause the river to start flooding in July. Flow is at a maximum by the end of August and remains high until mid-October.

The other east bank affluents, mainly the Atbara, Rahad and Dinder rivers, are seasonal. Taken together they add 16 km<sup>3</sup> to the system, so that an annual average of 86.5 km<sup>3</sup> flows past Atbara, of which 84 km<sup>3</sup> eventually reach Lake Nubia. These data are summarized in Table 1.

The Nile system thus makes an enormous amount of water available for human needs. Efforts are constantly being made to reduce water losses by seepage and evaporation even though Sudan does not yet use all of the annual 18.5 km<sup>3</sup> which are its share of the Nile waters, as determined by the 1959 agreement with Egypt. The Jonglei canal, when completed, will conserve 33 km<sup>3</sup> of water otherwise lost in the Sudd, and the Machar swamps could also yield about 4 km<sup>3</sup> every year.

**Table 1 : Average annual discharge of the Nile system (values represent 10<sup>9</sup> m<sup>3</sup> water)**

Location	River	Value	Location	River	Value
Uganda border	White Nile	23.0	Juba	White Nile	26.5
Fangak	Bahr ez Zeraf	5.0	Sudd	Bahr el Jebel	8.5
Bentiu	Bahr el Ghazal	0.5	Abwong	Sobat	13.5
Malakal	White Nile	27.5	Er Roseires	Blue Nile	49.5
Dinder	Dinder	3.0	El Hawata	Rahad	1.0
Khartoum	White Nile	25.0	Khartoum	Blue Nile	51.5
Atbara	Main Nile	74.5	Atbara	Atbara	12.0
Shendi	Main Nile	76.5	Wadi Halfa	Main Nile	84.0

Source: Rural Water Corporation

A major problem is that of providing an adequate and timely water supply during winter and early summer, when it does not rain, and when irrigation is a necessity for crops. Longer term storage is also required to counterbalance the variability of the Blue Nile, additional to that provided by the reservoirs that have been constructed at Sennar, Er Roseires, Khasm el Girba and Jebel Aulia to contain high floods for use during poorer years. With more water, the capability for Sudan to irrigate larger areas of clay land by gravity in the new irrigation schemes that are currently under development would be increased.

In addition to gravity feed, pump irrigation enables cultivation all along the Niles, including the Guneid sugar-cane operation near Wad Medani. Traditional irrigation methods that use counter-weighted hand-scoops (Arabic = *shaduf*) and animal-powered water-wheels (Arabic = *saqqiya*) are still extensively employed by small scale producers but both the area watered and the length of the irrigation period are reduced by the increased lift imposed as the river level goes down. Flood irrigation is possible in some areas where the Gash (north of Kassala) and Baraka (in the Tokar area) rivers form flood plains: similarly, part of the flood water of Khor Abu Habi flowing from the Nuba mountains is diverted for crops. Many other smaller and larger valleys are cultivated along the river beds and the major seasonal streams ('*wadi*') often provide sites for falling flood irrigation, especially of sorghum and vegetables.

Away from the Nile system, water is scarce except for a short period when rainfall exceeds infiltration into the ground, and when temporary drainage lines ('*khor*' and '*wadi*') are converted into wild torrents. The water table is often close to the surface along the wadi beds and their terraces, even in the northern areas, and shallow wells can be dug to provide permanent water to villages. Soil structure and texture influence the availability of water: on sands and gravels seepage is intense, the Qoz sands providing a good example of such a situation and having no clear drainage



pattern. Clays become totally impermeable after the first rains have filled the deep cracks. Waterlogging is common in depressions in the clay areas although the deeper layers of soil still suffer water deficiency which limits tree growth. Consequent on these characteristics, rainfall in northern Sudan is considered 50 per cent more effective on sands than on clays. Water is sometimes collected in shallow artificial ponds (Arabic = 'hafir') when the soil characteristics are favourable and stored through much of the dry season. Many such ponds have been excavated but water losses are considerable and useful life is reduced by rapid infilling through siltation.

## A long history

Sudan's early history is closely linked to Egypt: ancient Sudan, or Punt as the pharaonic people called it, was part of the Egyptian kingdom during the IV<sup>th</sup> Dynasty, some 4 600 years ago. Egyptian control reached upstream on the Nile to Abu Hamad and records describe exploration and trading parties as far south as the Bahr el Ghazal.

Sudan provided **gold, ebony, ivory** and various game products to its neighbours. The Sudanese people, the Nubians, were employed in Egypt as civil servants or soldiers and there was constant and intimate contact between the Lower Nile populations and their southern allies. The Kingdom of Kush became independent almost 3 000 years ago, with its first capital at Napata. One powerful ruler, Piankhi, conquered Egypt and established the XXV<sup>th</sup> Dynasty but his successors were defeated by the Assyrians in Palestine and pushed out of Egypt.

Kush extended from Dongola to Sennar, possibly even to Malakal and Er Roseires. Its capital was destroyed about 2 600 years ago and moved to Meröe which was already an important **iron-smelting** centre. Trade links between Africa and the Mediterranean world were enhanced as a result of this move. The Kuskites used hieroglyphs like the Egyptians and their funerary rites, including the construction of pyramids, were similar. When the Romans occupied part of the country, Kush broke up into several smaller states, including Alwash, Nobatia and Murrarah. The area was converted to coptic Christianity, with rites similar to those prevailing today in Ethiopia and Egypt, in 548 A.D., and the new kingdoms of Soba and Dongola were born. A century or so later, the Arabs extended their influence into this region of Africa and all the local states embraced Islam following their defeat and fall in 1 340 A.D. At about the same time the West African Bornu Empire reached Darfur and the Fung monarchs created the kingdom of Sennar about 1 500 A.D.

This geopolitical situation prevailed until 1 821 A.D., when Mohamed Ali, the Ottoman Viceroy of Egypt, conquered the Sudan. The Islamic faith became more developed and the Turkish Ottomans created the embryonic Khartoum. Resentment against the invaders gradually grew among the whole population until, in 1 881 A.D., the Sudanese led by Mohamed Ahmed al-Mahdi, started a holy war against the Egyptians who appealed to the British for military assistance. The resulting coalition finally defeated the Mahdi and established an Anglo-Egyptian Condominium in 1889, with the administration of Sudan effectively under the control of a British Governor. The country gradually acquired its **present boundaries**, **railways and roads** were built, educational and health services were promoted, irrigation was initiated and the Sudanese were gradually encouraged to become involved in the management of their own land. The passage of time and natural evolution resulted in political independence for Sudan on 1st January 1956.

## The population

The population of Sudan has increased rapidly during the last 20 years. From 15 million inhabitants in 1970, it grew to 18.2 million in 1976, and to 20.5 million in 1983. The current estimate is 27.3 million. A rate of growth of about 3 per cent per annum is being maintained. The birth rate is very high (446 per 1000 during 1985-1990) and the average number of children per woman is 6.4. At these rates the population is expected to double every 25 years. About 45 per cent of the population is under 15 years and only 14 per cent is over 45 years. Urban areas account for 29.4 per cent of the population.

Many ethnic groups are represented in the Sudanese population and more than 100 languages are spoken. Arabs are the major element, comprising 49 per cent of the total. They live mainly in the northern part of the country, where there are also Nilo-Saharan and Kordofanian minorities.

In the south, **Nilotes** are dominant and these can be easily recognized from their tall and slender stature. The southerners live in isolated settlements in the clay plains, above flood level. They have developed mixed farming systems which are perfectly adapted to their land. The largest groups are the **Dinka** (11.5 per cent) and **Nuer** (4.9 per cent). Several minor tribes are scattered in southern Sudan, including the **Zande** (2.7. per cent) along the Zaire boundary and the **Bari** (2.5. per cent). In the far west, the **Fur** (2.1. per cent) are an important indigenous tribe and others in this region include the **Berti** and the **Daju**.

The population is very unevenly distributed (Table 2). The northern provinces are desert or semi-desert with a human population density of only **3.4/km<sup>2</sup>**. The three southern regions of Equatoria, Upper Nile and Bahr el Ghazal have less than 26 per cent of the total population at an average density of **11/km<sup>2</sup>**. Population pressure is comparable in Darfur and Kordofan where **30 per cent** of the population live.

In contrast, one-third of the population lives in the central clay plains, which correspond to only 10 per cent of the area of the country. The major cities are located here. These include the "three towns" of Khartoum (480 000 inhabitants in 1983), Omdurman (530 000) and Khartoum North (340 000), as well as Wad Medani (180 000) and Kassala (160 000). Other important towns are Port Sudan, Atbara, El Obeid and Juba.

**Table 2: Regions, provinces, areas and population in Sudan**

Region	Province	Area km <sup>2</sup>	Population* (' 000)
Northern Eastern		476 040	1 436
	Red Sea	219 920	923
	Kassala	114 154	2 005
Darfur	Northern Darfur	346 155	1 761
	Southern Darfur	162 529	2 341
Kordofan	Northern Kordofan	221 900	2 394
	Southern Kordofan	158 355	1 707
Central	Khartoum	28 165	2 390
	El Gezirah	35 057	2 683
	White Nile	41 825	1 237
	Blue Nile	62 135	1 401
Bahr el Ghazal		200 894	3 004
Upper Nile		238 312	2 121
Equatoria		197 969	1 865
Total		2 503 410	27 268

Note : \* 1989 estimate

## Economy

Sudan's economy is based primarily on **agriculture** and **pastoralism**. These together contribute **35 per cent** of GNP and employ **70 per cent** of the labour force. Most of the livestock is raised under nomadic or semi-nomadic conditions but these are gradually becoming sedentarized and turning increasingly to cultivation. Fish are an additional important resource with a production of **24 000 tonnes** in 1987. Forests occupy **19 per cent** of the land and produce **21 million m<sup>3</sup>** of timber per year. Rangelands occupy **24 per cent** and desert **51 per cent** of the total land area. Cropped land accounts, according to one source, for only 6 per cent of the national land area, although other sources quote much larger cultivated areas. The **6 per cent** figure is almost

certainly an underestimate. since large areas have recently been cleared for cultivation with machinery provided by the Arab Fund for Economic and Social Development and traditionally cropped areas have expanded greatly in response to recent droughts.

The mainstay of agriculture is **cotton**, a crop that was introduced into Sudan during the Meroitic period. Long staple varieties of Sudanese cotton are world-renowned. Total cotton production was 400 000 tonnes in 1988. Other major crops include **sorghum**, known locally as 'dura' (4.6 million tonnes), **sugar cane** (4.5. million tonnes), **millet** (550 000 tonnes), **groundnuts** (530 000 tonnes) and **cassava** (65 000 tonnes), **wheat**, **rice**, **dates**, **kenaf** and **vegetables**. **Gum arabic** is still an important commodity, the production of which rises in drought years as more is gathered to provide supplementary income. Processing of these primary products is a major, if not the essential, industrial activity: 472 000 tonnes of **sugar**, 340 000 tonnes of **flour** and 1.7 thousand million **cigarettes** were produced in 1987.

Sudan also manufactures 200 000 tonnes of **cement**, 12 000 tonnes of **plastic** ware and 2 500 tonnes of **perfumes** every year. The **oil** refinery at Port Sudan processes 7.4 million barrels per annum and there is the capacity to produce **1 billion kw** of electricity. The main products of mining are **salt** (40 000 tonnes), chromite (20 000 tonnes), gypsum (7 000 tonnes); **gold**, **mica**, **manganese** and **asbestos**. The main exports are **cotton**, gum **arabic** and **sesame**.

The **road** network remains inadequate and, with only 10 500 km of maintained roads, represents a major handicap to development: even this limited capacity is often damaged and impassable during the rainy season. The **railways**, in spite of their limitations, remain the best means of transportation: they radiate from a hub at Khartoum to Wadi Halfa, Port Sudan, Er Roseires and Nyala. **Steamer services** run from Kosti to Juba on the southern stretches of the Nile, and from Karima to Dongola in the north, but both are affected by water levels. **Sudan Airways**, the national **airline**, has domestic flights to all provinces in addition to its international lines but has continuing difficulty in meeting its schedules.



**Tourism** is a potential but largely undeveloped asset. All tastes, from scuba diving on coral reefs in the Red Sea, big game hunting and viewing, and the archaeological sites along the Nile, could be accommodated. Many areas, such as the Jebel Marra plateau, have outstanding natural scenery. The several National Parks and Reserves include Tokar, Rahad and Dinder along the Ethiopian border; Mbarinzunga, Nimule and the Southern National Park in Equatoria; and Sabaluka close to the sixth cataract and only a half-day trip from Khartoum. New facilities are under construction, especially at Shendi and at several resorts, including Suakin, El Geig, Arousa and Sanganeb on the coast, in an effort to capitalize on the tourist potential.

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