DISSERTATION

WILDLIFE VALUES AND MANAGEMENT IN NORTHERN SUDAN

Submitted by

Mutasim Bashir Nimir

Department of Fishery and Wildlife Biology

In partial fulfillment of the requirements

for the Degree of Doctor of Philosophy

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WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY MUTASIM BASHIR NIMIR

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Department Head

ABSTRACT OF DISSERTATION

WILDLIFE VALUES AND MANAGEMENT IN NORTHERN SUDAN

An overview of wildlife resources and wildlife values and management are presented in this study. Information on history of wildlife distribution, wildlife values and management practices have been obtained from writings of early travellers and explorers and government archives. Information on present status of wildlife has come from surveys conducted by the author and other workers during the last 15 years. The Wildlife Administration records were reviewed for information on laws, policies, and records of game license sales and export of wildlife products. The province of Southern Darfur was chosen to develop a case study and to make conclusions which could be applied elsewhere in Northern Sudan.

Wildlife has been more abundant in Northern Sudan in the past than it is today. Information on present distribution and abundance of wildlife is very limited. The conservation status in national parks, game reserves and sanctuaries is rated as unsatisfactory. Factors causing losses of wildlife resources are inadequate laws, loss of habitats, lack of qualified personnel, lack of public awareness about wildlife conservation and conflicts in landuse planning.

Economic values of wildlife are of central importance to the future of wildlife conservation in Northern Sudan. The present economic values of wildlife are related to hunting, trade in wildlife products and wildlife damage to agriculture and livestock. Legal hunting is of

limited significance as possession of firearms is restricted by law and wildlife areas are remote from where the majority of the population live. Ivory and reptile skin trade provide considerable revenue. As most of the wildlife products are collected through illegal hunting and traded illegally the economic benefit from wildlife is not appreciated by the government. Wildlife damage to agriculture and livestock is most serious in Southern Darfur where it is mostly caused by baboons and hyaenas.

Recommendations include that surveys should be conducted to present realistic estimates of wildlife distribution and abundance. Realistic conservation goals should be adopted based on surveys' results. Wildlife conservation should be incorporated in national landuse plans.

The Wildlife Administration should recruit biologists and relocate its personnel and vehicles closer to wildlife areas. Wildlife programs should be coordinated in Northern and Southern Sudan. New laws should be adopted. The trade in ivory and other wildlife products should be controlled. The Wildlife Administration should monopolize all ivory export and taxes should be increased in export of wildlife products. The Wildlife Administration should be more involved in controlling wildlife damage. Laws should be changed to allow the Wildlife Administration to direct revenue generated from wildlife towards wildlife conservation projects. It is recommended that education in wildlife conservation should be included in school programs and in the Sudanese media.

Mutasim Bashir Nimir
Department of Fishery and Wildlife Biology
Colorado State University
Fort Collins, Colorado 80523
Summer, 1983

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TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF FIGURES

INTRODUCTION

Objectives of Study

The wildlife of Northern Sudan has been destroyed at an alarming rate. The Sudanese Government's efforts to protect wildlife have not been subjected to periodical evaluations and the outcome of efforts is often questionable and not well understood. The Sudanese Government has its attention on serious problems of population increase and the urgent need to increase food production. Development of the country has been directed towards increasing cultivated areas and agricultural production. Other resources such as pastures, forestry, fishery and wildlife have not been seriously addressed. Basic questions concerning wildlife resources of Northern Sudan such as present distribution, abundance and benefits it provides to the population of the country has not been subjected to any investigation. Likewise the economic potential of wildlife in Northern Sudan has never been evaluated or studied.

Objectives of this study are to present an overview of wildlife resources of Northern Sudan and to discuss wildlife values and management practices in Northern Sudan. Documentation of wildlife losses, since the beginning of the century, will be presented along with information on present distribution of wildlife, conservation status and management practices. Wildlife values (mainly economic) will be assessed. Based on the above findings recommendations for future conservation will be discussed.

Northern Sudan

Area and Location: The Sudan, the largest country in Africa, covers about 2.5 million km^2 representing 8.3% of the area of Africa. It extends over 18^o of latitude between 3^o 53'N and 21^o 55'N, and between 21^o 54'E and 38^o 30'E. The Nile runs through its entire length from south to north, covering a distance of 2,258 km. The Sudan is located in northeastern Africa and has common boundaries with 8 countries (Figure 1).

This study is limited to Northern Sudan (Figure 1) including the provinces of Northern and Southern Kordofan, Northern and Southern Darfur, the Blue Nile, the White Nile, the Gezira, Khartoum, Kassala, the Red Sea, the Nile and the Northern province. Northern Sudan constitutes about two thirds of the area of the country.

Climate: The climate of Northern Sudan is wholly tropical, for there is no part of the country where the sun does not pass directly overhead at some time of the year. Conditions vary from hot desert in the north, where there is rarely any rainfall, to a belt of summer rainfall of varying intensity and duration (Figure 2). Because of the absence of any mountain barriers obstructing the flow of air streams between north and south, there is a gradual change of conditions with latitude (Barbour 1961).

Barbour (1961) divided Northern Sudan into three climatic regions. The Northern or Desert Climatic region where rainfall is negligible, and the course of the seasons depends on the direction and speed of the wind and on the temperature. In winter, from late November to the

Figure 1. Map of the Democratic Republic of the Sudan showing the provinces of the Northern Region.

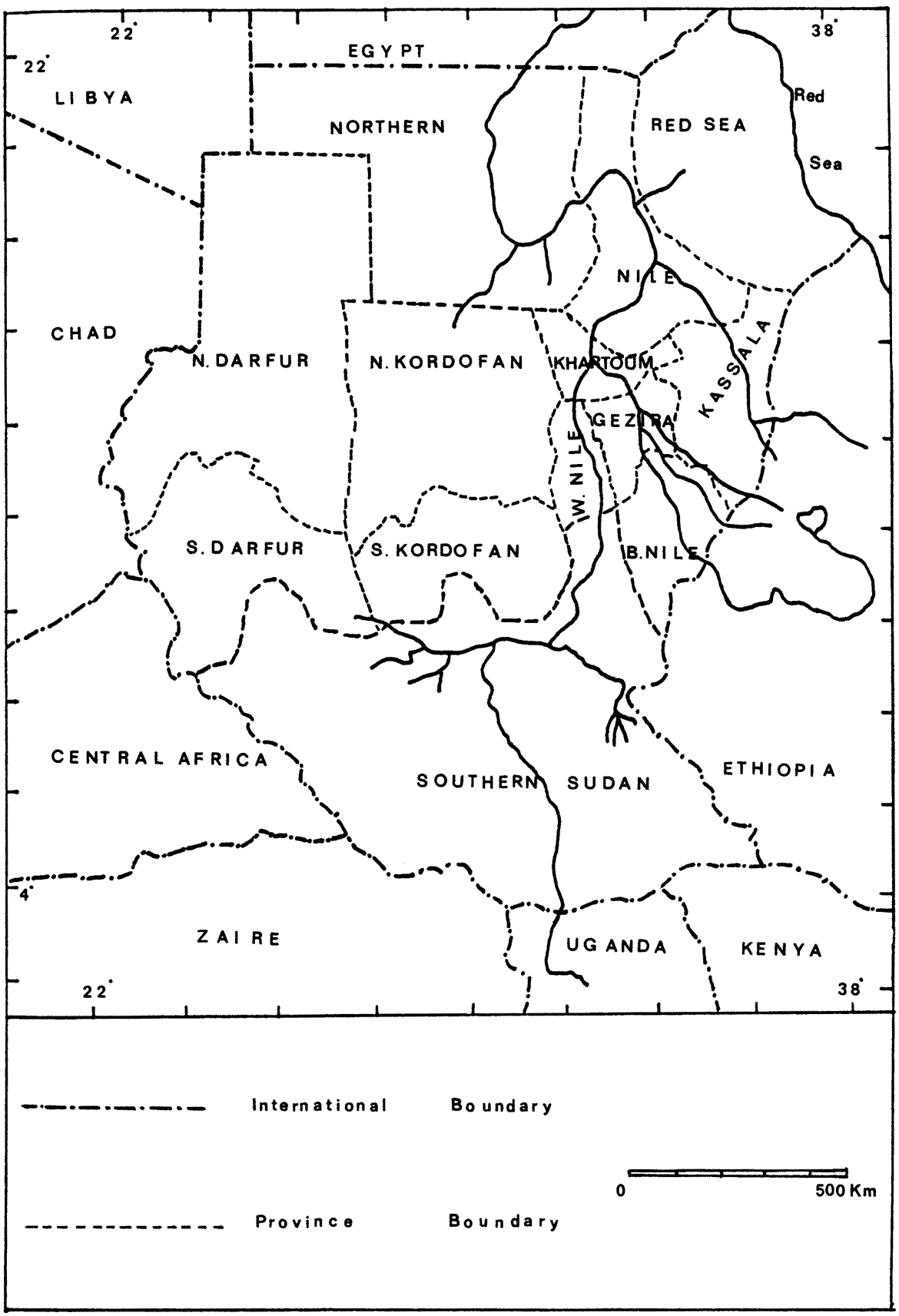
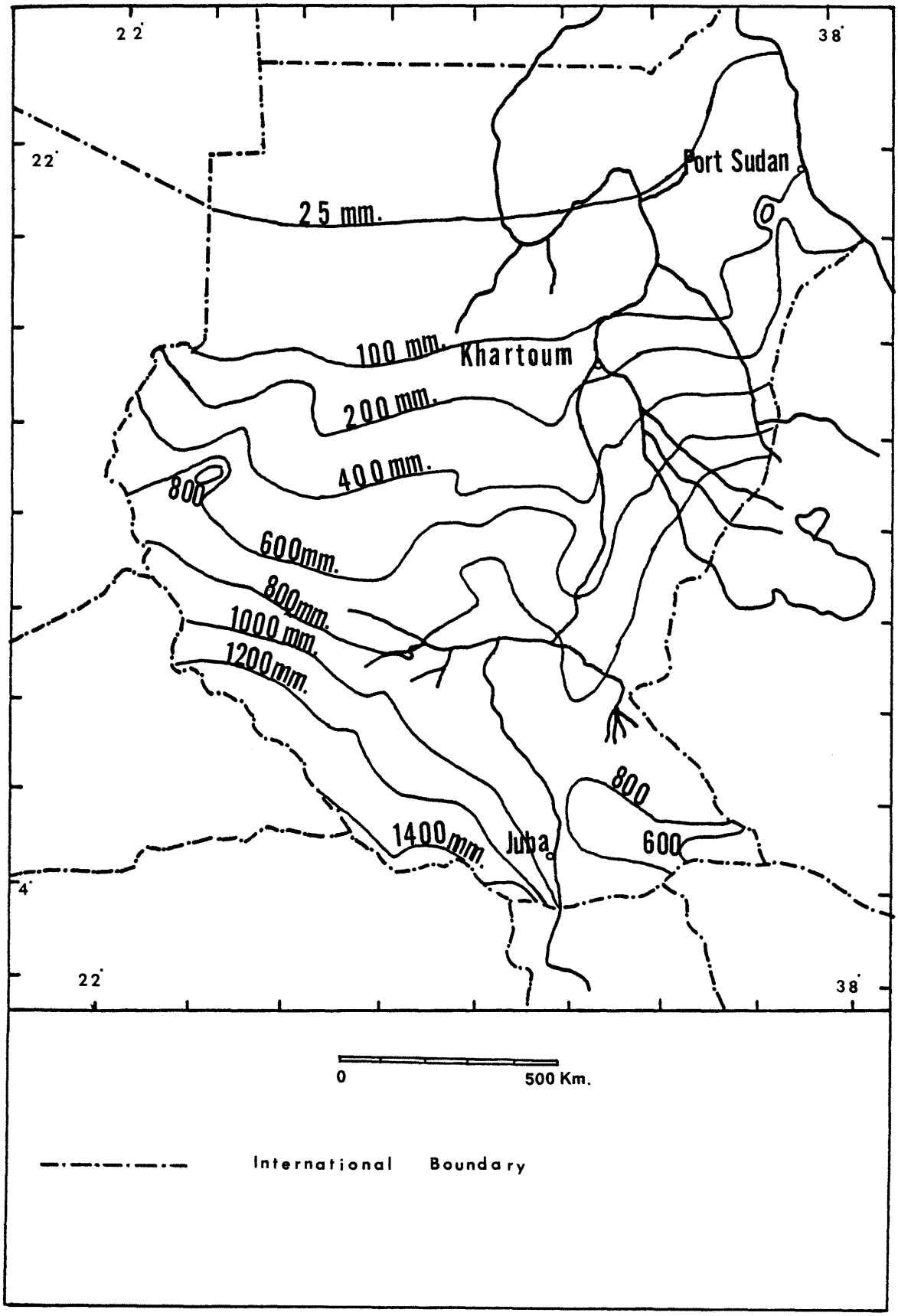

22°
22°
38°
EGYPT
LIBYA
NORTHERN
RED SEA
Red
Sea
NILE
CHAD
N. DARFUR
N. KORDOFAN
KHARTOUM
KASSALA
GEZIRA
W. NILE
S. DARFUR
S. KORDOFAN
B. NILE
CENTRAL AFRICA
SOUTHERN SUDAN
ETHIOPIA
4°
ZAIRE
UGANDA
KENYA
22°
38°
International Boundary
0
500 Km
Province Boundary

Figure 2. Map of the Democratic Republic of the Sudan showing the mean annual rainfall. From Sudan Survey Topo. No. S912-54.


22°
38°
22°
Port Sudan
25 mm.
100 mm.
Khartoum
200 mm.
400 mm.
800
600mm.
800mm.
1000 mm.
1200mm.
800
1400mm.
Juba
600
4°
22°
38°
0
500 Km.
International Boundary

middle of March with mean daily temperatures of 20°C (68°F), the humidity is low (about 20% at midday), there is very little cloud cover and no rain. The wind blows from the north with a mean speed of about 15-20 km/hr, occasionally attaining sufficient speed to cause rising dust and sand, but usually decreasing at night. During cold spells, early morning temperatures may be little over 0°C (32°F). Summer is long and very hot, and from the beginning of May until the end of September the mean daily temperature persists above 30°C (86°F). The humidity at midday rises from about 10% in May and June to nearly 15% in August, but in normal years no rain falls; there is little cloud, and the mean wind speed is about 13 km/hr.

The Northeast Climatic region is influenced by the hills on the Red Sea coast. Winter begins in the northeast with the onset of the north wind, and occasional rain may be expected until the end of January. The average yearly rainfall at Port Sudan amounts to less than 80 mm. Winter temperature varies between 19°C (66.2°F) and 29°C (84.2°F), humidity is high (60 - 70% at midday). The summer is very hot with a mean daily maximum of 41°C (105.8°F) and mean daily minimum of 29.2°C (84.5°F). Summer winds blow from the southeast, and frequent and prolonged dust storms occur. The mean summer rainfall at Port Sudan is about 20 mm.

In the Centre Climatic region the temperature and humidity of the wind are of major importance in determining the season of the year. The winter resembles that of the north, but begins later and is not as cold as in the north, the average temperature during January (the coolest month) is 23.7°C (74.7°F) at Khartoum and 27.2°C (81.0°F) in the southern parts of the region. Grass-fires are common during the

winter in the southern parts. In the summer, the north wind becomes very hot and dry as it blows across the Sahara and the mean daily temperature reaches 34.1°C (93.4°F) in Khartoum in June. In the northern half of the region dust-storms are frequent towards the end of the summer, but farther south the denser vegetation reduces their severity. In Khartoum the relative humidity in April at midday is 14%. The rainy season lasts from three to seven months according to latitude. The southwest wind blows during the rainy season and reduces the average temperatures to 30.4°C (86.9°F) in Khartoum in August.

Soils: Smith (1949) classified the soils of Northern Sudan into the following:

(a) Various desert soils: In the northern desert and semi-desert regions of the Sudan with less than 200 mm mean annual rainfall, soils produced under conditions of desert erosion are found. These include skeletal soils of eroded desert mountains, gravel "pavement" where the top-soil has been blown away, leaving a layer of flat, polished gravel; hard non-cracking clay flat, and wind blown sands.

(b) Stabilized sand dune or "Qoz"[1/]: Large areas of the west and central Sudan are covered by stabilized sand dunes, which were formed in periods of drier climate during the Quarternary Era. These dunes were stabilized by vegetation when moister conditions returned, and are still stable except where over-grazing and over-cultivation has destroyed the vegetation cover. The coarse and fine sand fractions of these soils usually total over 90%, while the pH of these soils varies from 5 to 9. Their mineral and organic matter content is naturally low, but they have a high water permeability and a relatively

[1/] Arabic.

high availability of water during the dry season. Thus the vegetation, especially perennials, is usually of a better type than that found on soils with a higher clay content.

(c) Dark cracking clays, including flood-plain region: These soils, often referred to as "cotton soil," occur in wide monotonous uniform flat plains in the eastern Sudan. Most of them appear to be alluvial in origin from soils transported by the Blue and White Nile, but some may have been formed *in situ* from basalt rocks.

These soils have clay content ranging from 60 percent upwards, and are alkaline with a pH of about 9. Gypsum and calcium carbonate are found particularly in the lower horizons. On drying out these soils shrink considerably, and a net-work of wide and deep cracks is formed. At the onset of the rains water penetrates the soil through these cracks, which then close up so that the soil when moist is practically impermeable. Thus under higher rainfall the clay cannot absorb all the rain that falls on it and on level areas flooding occurs. In the dry season the water available to plains in the upper layers of the soil is soon exhausted and these soils become very dry.

(d) Non-cracking clays: These occur in many localities as smooth clay flats, but their total area is small. They are often characterized by a hard, impermeable, non-cracking surface. Moisture penetration is low, and much of the water is lost in surface run-off. The vegetation thus tends to be very sparse.

(f) Various hill soils: This group includes all the very different and variable soils that owe their origin to hill and mountain topography.

Vegetations: Harrison and Jackson (1958) divided the vegetation of Northern Sudan into the following belts: Desert, semi-desert, low rainfall savannah, few areas of high rainfall savannah, and montane vegetation in the Red Sea Hills in eastern Sudan and Jebel Marra in western Sudan (Figure 3).

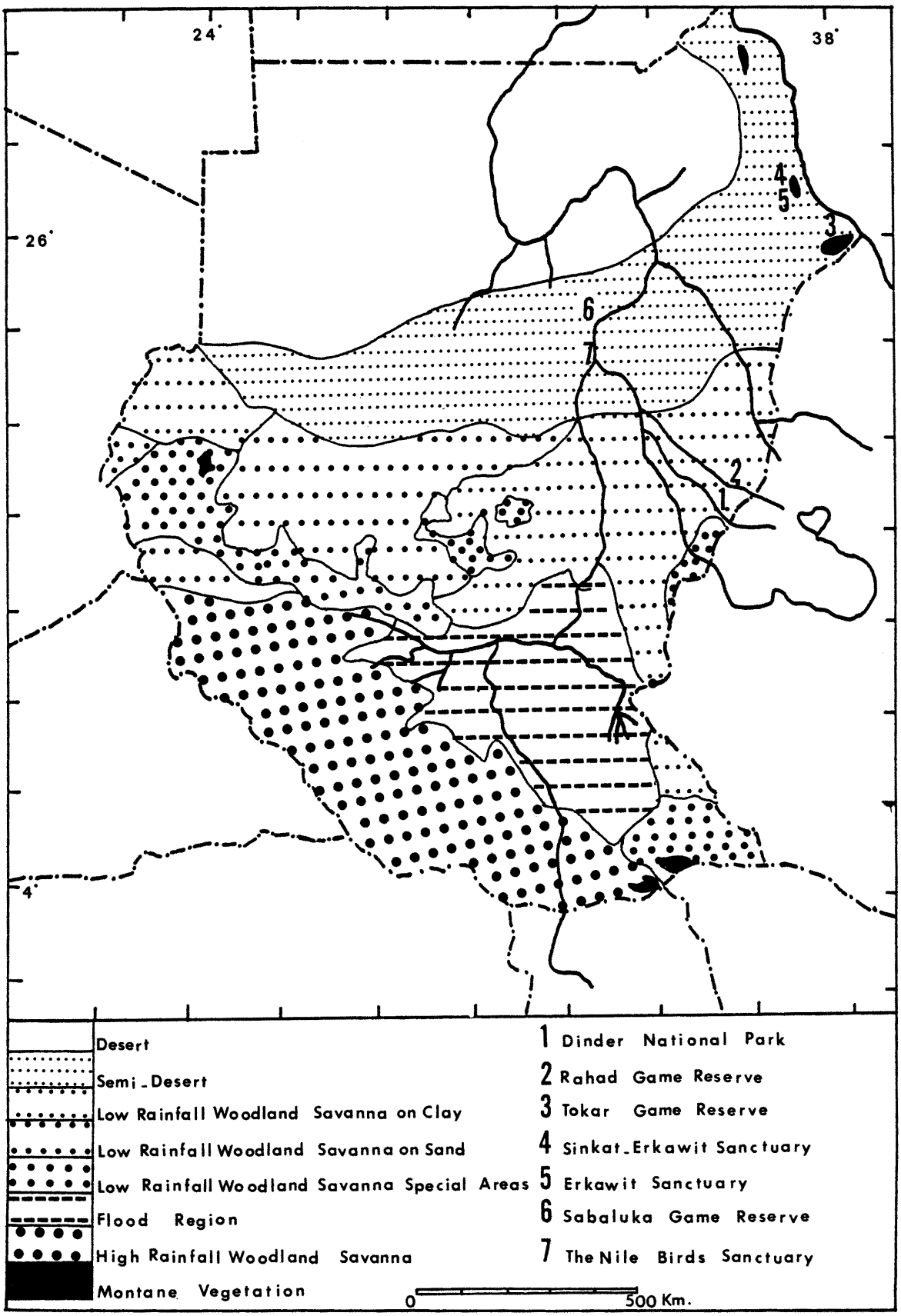
The desert: The southern limit of the desert, whose area is estimated to be 700,000 km^2 or more than one quarter of the whole country, corresponds approximately with 80 to 90 mm (3.5") mean annual isohyet. The Red Sea hills, covering a width of 100 to 150 km from the sea, are not included in the desert as many watercourses concentrate the drainage and support a desert-scrub type of vegetation along the stream beds. Within the desert, vegetation is confined to the Nile and to such great watercourses as Wadi Howar in Darfur and Wadi el Milk in Kordofan and the Northern province. In these stream beds coarse tussocky grasses and Acacias, especially *A. tortilis*, may be found. Ephemeral herbs and grasses springing up after rare rain showers give rise to the valuable "gizzu"[2/] vegetation every 5 to 10 years.

The semi-desert: In the sandy country of the west the southern limit of the semi-desert corresponds roughly with the 300 mm (12") isohyte at Lat. 14°N, but east of the Nile, where clay soils predominate, it runs nearer to the 400 mm (16") isohyte.

Harrison and Jackson (1958) gave the following subdivision of semi-desert vegetation, with rough estimates of areas:

2/ Arabic.

Figure 3. Map of the Sudan showing the main vegetation associations and protected wildlife areas of Northern Sudan.


24°
38°
26°
4°
1
2
3
4
5
6
7
Desert
Semi-Desert
Low Rainfall Woodland Savanna on Clay
Low Rainfall Woodland Savanna on Sand
Low Rainfall Woodland Savanna Special Areas
Flood Region
High Rainfall Woodland Savanna
Montane Vegetation
1 Dinder National Park
2 Rahad Game Reserve
3 Tokar Game Reserve
4 Sinkat-Erkawit Sanctuary
5 Erkawit Sanctuary
6 Sabaluka Game Reserve
7 The Nile Birds Sanctuary
0
500 Km.

	Area
a. *Acacia tortilis - Maerua crassifolia*	
Desert scrub	180,000 km^2
b. Semi-desert grassland on clay	100,000 km^2
c. Semi-desert grassland on sand	84,000 km^2
d. *Acacia millifera - Commiphora* desert scrub	84,000 km^2
Acacia glaucophylla - Acacia etbaica scrub	30,000 km^2
Total area of semi-desert vegetation	478,000 km^2

Low rainfall savannah: Rainfall within this belt varies from 300 mm to 800 mm. In the drier parts the trees of this sub-division are nearly all thorny and of low stature, with species of Acacia predominating. There are also thorny bushes and shrubs, including thickets of *Acacia mellifera*. Broad-leaved deciduous trees become predominant in the wetter parts, but there is not as great a variety of species as in high rainfall woodland savannah, and a proportion of thorn trees is usually present.

There are more annual grasses than perennials. Perennials seldom attain the height and coarseness of those of high rainfall woodland savannah. A variable porportion of forbs is always found. Low rainfall woodland savannah covers most of the central Sudan, a region which is peculiar in that it has virtually no soils formed *in situ* from the underlying rocks except for localized hill soils, subject to rapid erosion. It is sharply divided into two extreme soil types, dark cracking clays in the east, and stabilized sand-dunes in the west. Thus two contrasting types of vegetation are

found on the two soil types, which have been distinguished as low rainfall woodland savannah on clay and on sand, respectively. Each of these is further divided into three different rainfall belts as follows:

		Area
A.	Low rainfall savannah on clay	
1)	*Acacia mellifera* thornland, also in	92,000 km^2
	hill soils formed *in situ* in western Darfur	50,000 km^2
2)	*Acacia seyal* - *Balanites* savannah	115,000 km^2
3)	*Anogeissus* - *Combretum hartmannianum*	
	Savannah woodland	48,000 km^2
	Total area low rainfall woodland savannah	
	on clays	304,000 km^2
B.	Low rainfall savannah on sand	
1)	*Acacia senegal* savannah	62,000 km^2
2)	*Combretum cordofanum* - *Dalbergia* -	
	Albizzia sericocephala	82,000 km^2
3)	*Terminalia* - *Sclerocarya* - *Anogeissus*	
	Prosopis savannah woodland	62,000 km^2
	Total area low rainfall woodland savannah on	
	sands	206,000 km^2

There are also special areas of low rainfall woodland savannah covering total area of 155,000 km^2. The special areas include: Hill Catenas, frequently alternating small patches of contrasting soil types that lie along the southern edge of stabilized sand dunes in some parts of western Sudan, and areas of seasonal flooding in Southern Kardofan and Southern Darfur.

High rainfall woodland savannah: This type of vegetation occurs mostly in Southern Sudan with limited representation in Northern Sudan at the Radoam area of Southern Darfur. The trees are mostly broad-leaved and thorny trees are relatively infrequent. This vegetation type is known as *Anogeissus - Khaya-Isoberlinia* woodland and occurs between 900 and 1300 mm rainfall.

Montane vegetation: The different areas of vegetation classified together as montane vegetation have little in common other than the fact that they differ from vegetation of the surrounding plains because of the effect of altitude and sometimes of higher rainfall. The four main mountain areas in the Sudan are the Imatong and Dongotona, the Didinga in Southern Sudan, the Red Sea Hills in eastern Sudan and Jebel Marra in Darfur. Only the last two areas will be briefly described as they occur within the study area.

The Red Sea Hills: The wettest part of the Red Sea on the Eriterean border has forest of almost pure *Juniperus procera* with *Olea chrysophylla, Pittosporum viridifolium,* and *Maba abyssinica* around the edges. In grassy areas among the forest *Harpachne schimperi* is common.

Further north towards Erkawit only *Olea chrysophylla* remains of the above listed species and it is mixed with trees of not markedly montane character as *Maytenus senegalensis* and *Euclea divinorum.* In drier areas *Euphorbia abyssinica* and *Dracena ombet* are found. *Olea chrysophylla* is also found on Jebels Elba and Asoteriba on the Egyptian frontier.

Jebel Marra: The lowest zone of Jebel Marra up to 2,000 meters has the following trees: *Cordia abyssinica, Thespesia garkeana, Ficus*

gnaphalocarpa and other species of *Ficus*. Dominant grasses are *Cymbopogon* sp., *Hyparrhenia* spp., *Andropoyon gayanus* and *Heteropogon contortus*.

In the middle zone between 2,000 and 2,500 meters *Olea laperrini* is the most common tree on older soils, with *Acacia albida* is the most common tree on older soils, with *Acacia albida* on immature volcanic tuffs. *Ficus palmata* is common especially in valleys and in sheltered places and *Salix safsaf* occurs near streams. The trees are very sparse, however, and most of the zone is open grassland in which *Cymbapogon* sp., *Andropogon linearis* and *Themeda triandra* are dominant.

Much of the upper zone above 2,500 meters is covered with short grass of the dwarf *Hyparrhenia multiplex* with very scattered *Olea* trees. On eroded areas and tuffs *Blaeria spicata* and *Lavandula stricta* are common.

Woodlands recently derived from rain forest and the flood region are not described here as they are both not represented in northern Sudan.

Wildlife: The wide variety of vegetation types in the Sudan is reflected in its fauna. Setzer (1956) reported that 91 genera and 224 species and sub-species of mammals other than bats have been described in the Sudan. It is worth mentioning that out of the thirteen mammalian orders in Africa, twelve occur in the Sudan. Cave (1958) stated that 871 species of birds were recorded in the Sudan. In Table 1 a list of important game species of Northern Sudan is presented. There are only a few references on current distribution of wildlife in Northern Sudan. The disappearnace of wildlife from many areas during

Table 1. Important game animals of Northern Sudan and their current distribution.[1/]

Scientific Name	English Name	Arabic Name	Distribution
Desert and Semi-desert Animals			
Aegoryx algazel algazel ken	White oryx	Bagar Al Wahsh	N. darfur[2/]
Addax nasomachulatus (Blainville)	Addax	Um Kabetuchu	N. Darfur[2/]
Gazella dorcus littoralis Blaine	Dorcas gazelle	Gazal	N. Darfur, N. Kordofan, White Nile Province, Khartoum, Nile Province, the Red Sea coast and Kassala
Gazella dama ruficollis (H. Smith)	Dama or addra gazelle	El Ril	N. Kordofan, N. Darfur
Capra ibex nubiana (F. Cuvier)	Nubian ibex	El Aio[3/]	Red Sea Hills
Ammotragus lervia	Wild sheep	Kebsh Mai	N. Darfur and Red Sea Hills
Oreotragus oreotragus	Klipspringer	Abu natat	Red Sea Hills
Struthio camelus Linnaeus	Ostrich	Niaam	Darfur, Kordofan, Red Sea Coast, Kassala and Blue Nile Province
Pterocles senegalensis (Linnaeus)	Sandgrouse	Gata	Central Sudan
Animals of the Low Rainfall Woodland Savannah			
Gazella soemmeringii sibyllae Matschie	Sommering gazelle	Aryal	Kassala Province, W. Sudan, Blue Nile, Kassala
Gazella rufifrons laevipes (Sundevall)	Red-fronted gazelle	Gazal Singa	W. Sudan, Blue Nile, Kassala

Table 1 (continued). Important game animals of Northern Sudan and their current distribution.[1/]

Scientific Name	English Name	Arabic Name	Distribution
Animals of the Low Rainfall Woodland Savannah (continued)			
Damaliscus korrigum tiang (Henglin)	Tiang	Taital	Blue Nile Province, S. Kordofan and S. Darfur
Hippotragus equinus bakeri (Henglin)	Roan antelope	Abu aurrf	Blue Nile, S. Kordofan, S. Darfur
Redunca bohor cottoni (W. Rothchild)	Reedbuck	Bashimat	Blue Nile, S. Kordofan, S. Darfur
Kobus defassa harnieri (Murie)	Waterbuck	Katambour	Blue Nile, S. Kordofan, S. Darfur
Tragelaphus scriptus bor Henglin	Bushbuck	Abu Nabah	Blue Nile, S. Kordofan, S. Darfur
Syncerus caffer aequinoctialis (Blyth)	Buffalo	Gamoos	Blue Nile, S. Kordofan, S. Darfur
Giraffa camelopardalis Linnaeus	Giraffe	Zerraf	Blue Nile, S. Kordofan, S. Darfur
Ourebia ourebia montana (Cretzschmar)	Oribi	Mour	Blue Nile, S. Kordofan, S. Darfur
Phacochoerus aethiopicus aelinani (Cretzschmar)	Warthog	Hellouf	Blue Nile, S. Kordofan, S. Darfur
Tragelaphus strepsiceros chora (Cretzschmar)	Greater kudu	Njalat	Blue Nile, S. Kordofan, S. Darfur
Madagna saltiana (Desmarest)	Dik dik	Um digdig or Um Tegdim	Blue Nile, S. Kordofan, S. Darfur
Struthio camelus Linnaeus	Ostrich	Niaam	Blue Nile Province, S. Kordofan, S. Darfur
Ardeotis arabs (Linnaeus)	Arabian bustard	El Hubbar	Blue Nile Province, S. Kordofan, S. Darfur

Table 1 (continued). Important game animals of Northern Sudan and their current distribution.[1/]

Scientific Name	English Name	Arabic Name	Distribution
Animals of the Low Rainfall Woodland Savannah (continued)			
Eupodotis senegalensis (Vieillot)	Lesser bustard	El Hubbar	Blue Nile Province, S. Kordofan, S. Darfur
Alopochen aegyptiocus (Linnaeus)	Egyptian goose	Wiz musri	Blue Nile Province, S. Kordofan, S. Darfur
Numida meleagris (Linnaeus)	Tufted guinea-fowl	Gidad el Wadi	Blue Nile Province, S. Kordofan, S. Darfur
Francolinus clappertoni Children	Clapperton's francolin	Kiwera	Blue Nile Province, S. Kordofan, S. Darfur
Crocodilus niloticus Laweriti	Crocodile	Tumsah	S. Darfur, Blue Nile, White Nile and Nile River
Animals of the High Rainfall Woodland Savannah			
Hippopotamus amphibus amphibus Linnaeus	Hippopotamus	Grinti	S. Darfur
Taurotragus debrianus gigas (Henglin)	Giant eland	El Bugga el Akber	S. Darfur
Adenota kob vaughni	Kob	Hamraia	S. Darfur and S. Kordofan
Loxodonta africana F. Cuvier	Elephant	Feel	S. Darfur, S. Kordofan, and Dinder
Hystrix cristata Linnaeus	Porcupine	Abu Shoak	S. Darfur, S. Kordofan, and Dinder
Python sebae (Gmelin)	Python	Aasla	S. Darfur, S. Kordofan, and Dinder
Hippopotamus amphibius Linnaeus	Hippopotamus	Grinti	S. Darfur, the White Nile

Table 1 (continued). Important game animals of Northern Sudan and their current distribution.[1/]

Scientific Name	English Name	Arabic Name	Distribution
Animals of the High Rainfall Woodland Savannah (continued)			
Panthera leo leo (Linnaeus)	Lion	Assad	S. Kordofan, S. Darfur, Kassala and Blue Nile Province
Panthera pardus chui (Heller)	Leopard	Nimr	S. Kordofan, S. Darfur, Kassala and Blue Nile Province
Acinonyx jubatus soemmeringii (Fitzinger)	Cheetah	Fahd	S. Kordofan, S. Darfur, Kassala and Blue Nile Province
Felis serval phillipsi G. M. Allen	Serval cat	Git Serba	S. Kordofan, S. Darfur, Kassala and Blue Nile Province
Hyaena hyaena dubbah Meyer	Striped hyaena	Dubbah Mukhatat	S. Kordofan, S. Darfur, Kassala and Blue Nile Province
Crocuta crocuta fortis J. A. Uen	Spotted hyaena	Dubbah Mungat	S. Kordofan, S. Darfur, Kassala and Blue Nile Province
Vivera civeta (Schreber)	Civet cat	Git zabad	S. Kordofan, S. Darfur, Kassala and Blue Nile Province
Mellivora capensis Storr.	Honey badger	Abu Elkieib	S. Kordofan, S. Darfur, Kassala and Blue Nile Province
Vulpes pallida (Cretzschmar)	Sand or Pale fox	Thaalab	S. Kordofan, S. Darfur, Kassala and Blue Nile Province

Table 1 (continued). Important game animals of Northern Sudan and their current distribution.[1/]

Scientific Name	English Name	Arabic Name	Distribution
Animals of the High Rainfall Woodland Savannah (continued)			
Herpestres ichneuman (Linnaeus)	Grey mongoose	Nims	S. Kordofan, S. Darfur, Kassala and Blue Nile Province
Canis mesomelas (Schreber)	Black-backed jackal	Baashoom	S. Kordofan, S. Darfur, Kassala and Blue Nile Province
Lycaon pictus (Temminck)	Wild dog	Kelb Simei	S. Kordofan, S. Darfur, Kassala and Blue Nile Province
Cercopithecus aethiops (Linnaeus)	Grivet monkey	Nasnas akhder	S. Kordofan, S. Darfur, Kassala and Blue Nile Province
Erythrocebus patas (Schreber)	Red hussar monkey	Nasnas ahmer	S. Kordofan, S. Darfur, Kassala and Blue Nile Province
Papio anubis (J. P. Fisher)	Baboon	Gird beladi	S. Kordofan, S. Darfur, Kassala and Blue Nile Province

[1/] Table adopted (with modifications) from Hassab Allah (1968).

[2/] Species' presence was not reported during the 1970's. Few addax were reported in 1983 (Awad 1983).

[3/] El Aio is in the language of Hedendua tribe of Eastern Sudan.

the last few decades has not been documented or evaluated, and current changes in wildlife abundance and distribution are not known or appreciated. The status of wildlife conservation in Northern Sudan is unsatisfactory. Deterioration of wildlife habitats is occurring at an alarming rate. Competition with other land-uses is affecting many of the wildlife habitats. Several species such as oryx, addax, addra gazelle, sommering gazelle, leopard and cheetah are threatened with extinction.

Almost all the animals listed to occur within the low and high rainfall savannah in Northern Sudan occur in greater abundance and wider distribution in Southern Sudan. There are also several species occurring in Southern Sudan which are not represented in the north such as: giant forest hog (*Hylocoerus meinertzrageni*), Mrs. Gray's Nile lechwe (*Onotragus megaceros*), oryx beisa (*Oryx beisa*), Bongo (*Boocerus eurycerus*), sitatunga (*Limnotragus spekii*), white rhinoceros (*Ceratotherium simum*), black rhinoceros (*Diceros bicarnis*), and zebra (*Equus burchellii*). Southern Sudan is also rich with a very wide variety of birds. The flood region (Sudd) does not only have its rare resident species such as the Bog bird or shoe-bill stork (*Balaenicep rex*), but it represents important winter habitats for migratory waterfowl from Europe. The wildlife populations in Southern Sudan represent the largest single wildlife concentration left in Africa (Watson *et al.*, 1977). The status of wildlife conservation in Southern Sudan is unsatisfactory. Poaching is widely practiced and very little is done to stop poaching.

Scientific names of wildlife species discussed in the text and not listed in Tables 1, 2, and 3, are included in Appendix, pages 204-206.

The Economy: The population of the Sudan is about 18.7 million growing at a rate of 3% per year. About 70% of the population live in Northern Sudan. Per capita GNP for 1980 averaged U.S. $410 (World Bank 1982). The agricultural sector provides the livelihood for around 80% of the population; it contributes 40% of GNP, 95% of exports and over 50% of Government revenues. The major export commodities are cotton (about 50%), groundnuts (about 20%), sesame (about 9%), and gum arabic (about 6%). Exports of livestock and livestock products range between 6% and 10% of total export between years.

Because of the availability of rain and river water, the Sudan has the basic ingredients for agricultural expansion and intensification. It also has abundant agricultural land, probably more than can be serviced by existing water supplies. There has been a tendency both within and without the Sudan to exaggerate available cultivable acreage. The figure most often quoted is 81 million hectares, of which only 6 million are actually farmed. However, while in a technical sense much of the remaining 75 million hectares *could* be farmed, this is not practically feasible due to poor soils, an inadequate water supply, the absence of roads, and the existence of the tsetse fly in some areas. The 1973 FAO survey of Sudanese agriculture provided a suitably cautious view of Sudanese land resources (Waterbury 1979). The FAO estimated that arable land in 1970 amounted to 10.5 million hectares, and that, at the expense of forest and pasturage, it could be increased to 16.4 million hectares by 1985. Irrigated and nonirrigated acreage could be increased by 40 and 70 percent over the same period. Since this survey was completed, nonirrigated acreage grew to 4.9 million hectares and harvested irrigated land increased 0.7 million hectares.

Although the total production has increased, due mainly to expanded acreage, per-hectare yields for several crops have stagnated over the past fifteen years (National Planning Commission 1975).

Lack of water or in some areas, the presence of tsetse flies prevents utilization of grazing areas, but much of the range is heavily used by the large livestock population: 15 million cattle, 16 million sheep, 11 million goats and 2 million camels; in nomadic or sedentary livestock farming systems (World Bank 1982).

Much of the industrial development is related to the processing of agricultural products. Textile development has been the largest, but oil expressing, sugar processing, milling, and tanning are all being expanded. Agriculture is likely to remain the base on which industrial expansion will rely.

Through the 1970's the Sudan has been experiencing sluggish economic growth, poor export performance, and growing capital needs. The above factors have led to a serious balance of payments crisis and growing foreign indebtedness.

The Desert Encroachment: Desert encroachment is affecting an area of 650,000 km^2 lying between Lat. 12^oN and 18^oN and along the Nile strip northwards up to the border with Egypt and between Long. 22^oE and 34^oE. Ecologically the area covers three main zones:

a. The desert area along the Nile where the special problem of loss of good agricultural soil through sand dune encroachment is evident;

b. The semi-desert region where the problem of desertification is experienced and the region is gradually being changed into desert;

c. The low rainfall savannah belt where serious destruction to the flora is taking place through the pressure exerted by man and his animals.

The problem of desert encroachment has been attributed to man-induced factors and climatic changes. The landuse system in areas affected with desert encroachment is a multipurpose one with various conflicting interests. There is generally no regional integration between pastural and arable activities. Another important point is that because of the backwardness of agriculture in many areas and low incomes of the farmers, the main channel for saving and investment is livestock ownership. It follows that overstocking with rather poor offtake, coupled with increasing human population has led to tremendous pressures on the land. The land in many areas has been overworked, depleted and abandoned and new areas are subjected to a similar pattern of use.

Methodology: Information for this study has been collected from several sources. History of wildlife distribution, values and management practices has been obtained from works of early travellers and explorers. Intelligence Reports of the Governor General from 1892 to 1944 has provided much useful information. Of comparable usefulness were several articles published in the *Journal of Philosophical Society of the Sudan*, *Sudan Notes* and *Records* which contain many references to and notes about wildlife from 1918 onwards. The first attempt to provide a comprehensive discussion of Sudan's game, by a former Chief Game Warden (Brocklehurst 1931) has also been a very useful reference.

Information on present status of wildlife has come from surveys conducted by the author and others during the last ten years. The

Wildlife Administration archives have been reviewed for information on laws, policies, budgets, game license records, export of wild animal parts and other relevant information. Information about people's attitudes toward wildlife were studied by analysis of writing about wildlife in Sudanese newspapers during the period from 1978 to 1982.

The province of Southern Darfur has been chosen to develop a case study from which conclusions could be applied elsewhere. In the Radoam area field surveys were conducted and observations on conflicts in land-use were investigated. Questionnaires were used to collect information on wildlife values. The Wildlife Administration archives were reviewed for records of game licenses, captured wild animals parts and wildlife damage. The archives of Southern Darfur courts were reviewed for trials of poachers and traders selling illegally obtained wild animal parts.

Information on economic values of wildlife in Northern Sudan have been obtained from the Wildlife Administration records. Records of game licenses, export of wild animal parts and live animals and ivory exports have also been studied.

HISTORY OF WILDLIFE IN NORTHERN SUDAN

It is generally accepted that wildlife has been more abundant in Northern Sudan in historic times than it is today. The extent of destruction which occurred to wildlife in recent times is only recognized in very general terms. In this chapter historic information is reviewed concerning wildlife distribution, hunting and wildlife values. This will provide some reference points and will make it possible to compare the present status of wildlife with its past.

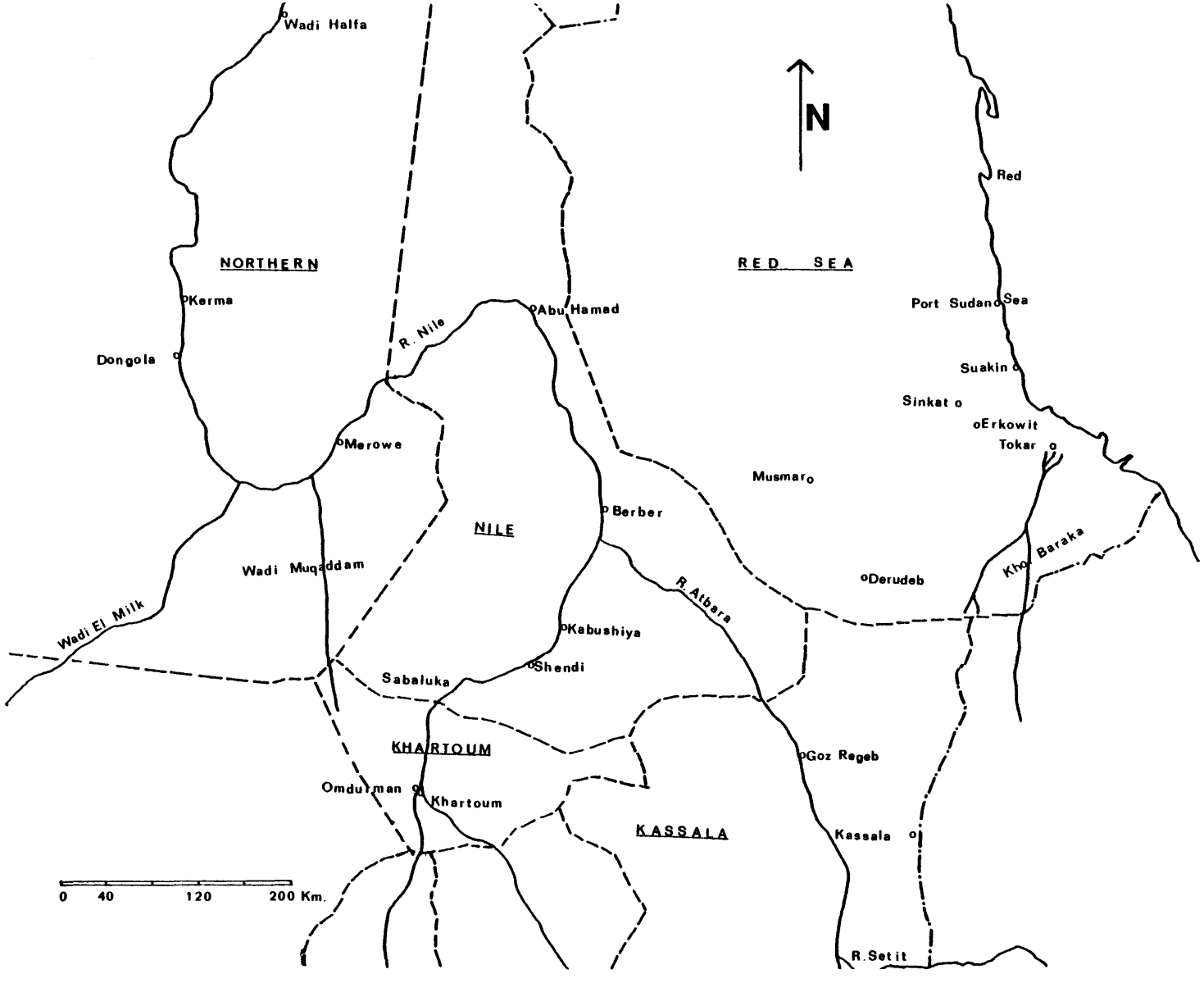
Past Wildlife Distribution

The Nile and Northern Provinces: It was learned from excavations at Kerma (Figure 4) that ivory and ostrich feathers were abundant there 2,000 to 4,000 years B.C. (Reisner 1918). Reports of existence of rhino and elephant near Marawi in A.D. 66 were included in the records of Nero's journey to discover the origin of the Nile (Owen 1953).

Burckhardt (1819) reported that the hippopotamus was very common in Dongala, a few appeared as far as Wadi Halfa, and one was seen beyond the cataract at Aswan. He observed that hippopotamus was not common at Shendi, but occasionally appeared there and caused a lot of damage to cultivated crops. He also reported that crocodiles were abundant in the Northern province and upper Egypt.

Abundance of dorcas gazelle in Bayunda desert was observed by Krump in 1701 (Jackson 1957). Burkhardt (1819) reported that dorcas gazelle was very common in the Northern and Nile provinces. He

Figure 4. Map of the Northern, Red Sea, Kassala and Khartoum provinces.


Wadi Halfa
N
Red
NORTHERN
RED SEA
Kerma
Abu Hamad
Port Sudan
Sea
R. Nile
Dongola
Suakin
Sinkat
Erkowit
Tokar
Merowe
Musmar
Berber
NILE
Wadi Muqaddam
Derudeb
Khor Baraka
R. Atbara
Wadi El Milk
Kabushiya
Shendi
Sabaluka
KHARTOUM
Goz Regeb
Omdurman
Khartoum
KASSALA
Kassala
0 40 120 200 Km.
R. Setit

mentioned that several herds which inhabited the western hills north of Dongala used to descend to the river banks at nights and caused extensive damage to agricultural crops. He noticed that the natives guarded their fields with figures of hyaenas formed of straw and mounted upon wooden legs. Several dorcas gazelles were found between Halfa and Abu Hamad and east of the Nile along Atbara River (Baker 1867). Sommering gazelle was reported near Shendi (Burkhardt 1819).

Burkhardt (1819) stated that "mountain goat" and mountain sheep existed in the eastern mountains of upper Egypt and the Northern province. Brocklehurst (1931) reported the presence of wild sheep in the hilly districts of Dongala and Berber. He also mentioned that mountain sheep existed in considerable numbers as far south as Sabaluka hills within 100 km from Khartoum and were almost destroyed by the troops of Mahmoud Wad Ahmed during the Mahdist Revolution in 1898. Forbes (1949) reported that 7 sheep were reintroduced to Sabaluka around 1920 and estimated their numbers in 1949 to reach 100.

The wild ass was reported by Burkhardt (1819) in Wadi el Homar near Berber. The existence of the wild ass in the vicinity of Atbara River and Berber was confirmed by Baker (1867), and Brocklehurst (1931). Robbie and Khalil (1950) reported seeing 18 donkeys between Marawi and Damar; however they were not certain whether they were wild asses or ferral donkeys.

Brocklehurst (1931) reported the presence of the oryx, addax, and addra gazelle in the desert west of Dongala. He remarked that the oryx at one time was common in Egypt, as it is often depicted on old bas-relief and frescoes.

Hyaena existed around Dongala (Burkhardt 1819) and near Berber (Baker 1867). Leopards were frequently seen east of Shendi (Brockhardt 1819) and the presence of mongoose and fox in Dongala was reported by King (1921).

Ostrich was very numerous north of Abu Hamad and common near Shendi (Brockhardt 1819). Geese, partridge, pigeons, doves, and sandgrouse were abundant everywhere (Brockhardt 1819; Baker 1867; King 1921).

Kassala and the Red Sea Provinces: Werne in 1840 observed elephants drinking in the Gash River (Figure 4) near Kassala town (Owen 1953). In 1867 Baker reported the occurrence of elephant in the Setit River valley. He also mentioned the richness of wildlife in that area and counted giraffe herds of 76, 103, 154 and many more in another herd he was unable to count. Other species he mentioned to be abundant in the Setit valley were hippopotamus, crocodile, tiang, dik-dik, lion, hyaena, and guinea fowl.

Baker (1867) wrote that dorcas gazelles were very numerous on the plains of River Atbara. Dorcas gazelles were very common in the area from Berber to Suakin. Sudan Intelligence Report, SIR57 (1897) recorded the presence of gazelles at Disibil Well about 90 km from Suakin, Ariab Well about 210 km from Suakin, Makadia Well, 184 km from Suakin, and Tamanib Wells about 360 km from Berber. Parker (1901) reported that gazelles were found everywhere around Khor Durdeb, Khor Langeb, Tihamgas, and Khor Baraka. Dick (1951) recorded the presence of dorcas gazelle in Jebel Bilwauneb 112 km northwest of Musmar.

Sommering gazelles were widely distributed in the Red Sea and Kassala Provinces. They were abundant around Goz Rajab, along the

Atbara and Setit Plains, and a few kilometers from Kassala town (Baker 1867). Sommering gazelles were present at Tamanieb Well (SIR57 1897) and were numerous at Khor Langeb, Godamieb, and Durdeb Khor (Parker 1901). Burges (1902) stated that they were common from Darur south and Dick (1951) reported their occurrence at Jebel Bilwauneb.

In the perennial pools of the seasonal Atbara and Setit Rivers there were hippopotamus, crocodile, and water turtle (Baker 1867). Those pools were rich with geese and were visited by thousands of sandgrouse (Baker 1867). In Khor[1/] Gweb on the road between Berber and Suakin existed some pools with many teals, partridges and rock-grouse (SIR57 1897). Partridges, rock-grouse, and doves were very common in the Red Sea Province (SIR57 1897; SIR85 1901). Baker (1867) mentioned the richness of Atbara and Setit Valleys with guinea fowl and recorded the presence of the secretary bird in several localities.

Dick (1951) reported the presence of wild sheep in the Western Red Sea Hills and also to the north of Atbara-Port Sudan railways and west of Musmar up to the Egyptian border. He also recorded the presence of ibex and noticed that sheep occupied lower westerly hills where no ibex occurred. He observed no sheep from Ariab to Jebel Gurad where they were reported in 1934 (Owen 1934).

Burges (1902) stated that ibex were found on the high hills adjoining the Littoral region. Brocklehurst (1931) remarked that the ibex was confined to the Red Sea Hills, where it was comparatively common, especially in the Karora District along the Eritrean borders.

[1/] Khor = Arabic word means "stream."

Ionides (1953) stated that ibex was very abundant south of Tokar and Howell (1951) observed a herd of 30 females and 4 adult males a few kilometers from Erkawit.

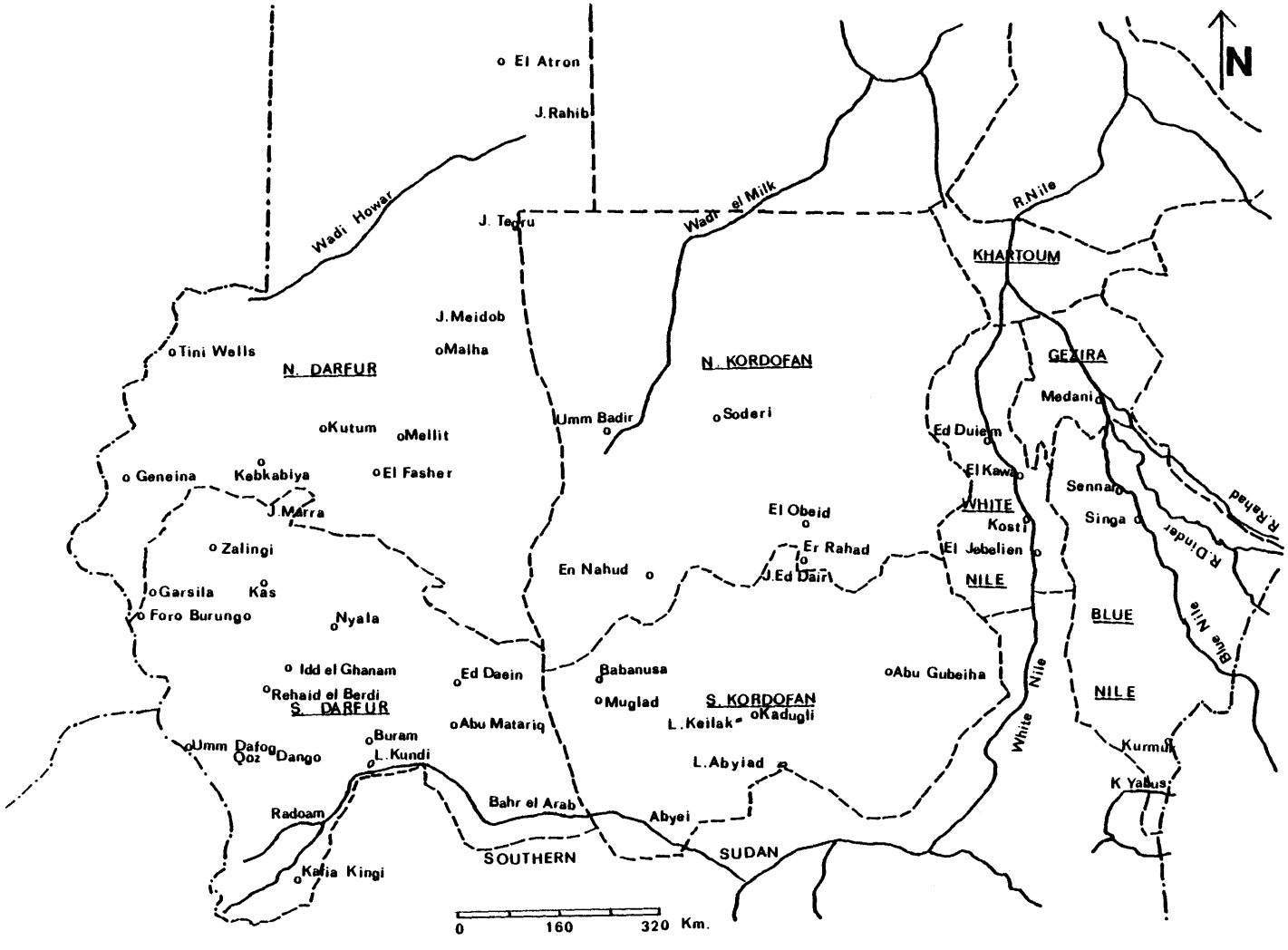
Several other animals occurred in the provinces of the Red Sea and Kassala. The wild ass occurred in the neighborhood of Atbara River in Kassala, and south of Suakin (Brocklehurst 1931). The wild ass was reported from Cnib to Dehib (Burges 1902). He also reported the klipspringer on the hills adjoining the littoral region. Brocklehurst (1931) stated that the klipspringer inhabited the Red Sea Hills and along the Eritrean borders. Dik-dik were reported to be numerous at Khor Langeb (Parker 1901) and on the hills adjoining the littoral region (Burges 1902). Baboon was reported in the Tokar Hills (Beaton 1949) and leopard and cheetah in Khor Langeb and on the hills adjoining the littoral region (Parker 1901).

Northern Kordofan and Northern Darfur: Wildlife in the desert and semi-desert regions of Kordofan and Darfur received considerable attention from explorers and travellers. The richness and variety of fauna has been well documented. Most attention was focused on addax, oryx, dama gazelle, and wild sheep. Other species were occasionally reported. Newbold (1924) recorded information about one solitary elephant at Lat. 15°N (Figure 5). Browne (1799) reported the elephant's presence in Darfur without specifying localities.

Giraffe presence in northern Darfur was reported by both Browne (1799) and Burckhardt (1819). The first mention of giraffe in the 20th century was in 1902 when the Sultan[2/], Ali Dinar, sent a live one

[2/] Sultan = Arabic means

Figure 5. Map of Northern Kordofan, Southern Kordofan, Northern Darfur, Southern Darfur, the White Nile and Blue Nile provinces.


N
o El Atron
J.Rahib
Wadi Howar
J. Tegru
Wadi el Milk
R.Nile
KHARTOUM
J.Meidob
oTini Wells
oMalha
N. DARFUR
N. KORDOFAN
GEZIRA
Medani
Umm Badir
oSoderi
Ed Duiem
oKutum
oMellit
oKebkabiya
oGeneina
oEl Fasher
El Kawa
Sennar
WHITE
NILE
J.Marra
El Obeid
Kosti
Singa
R.Rahad
R.Dinder
oZalingi
Er Rahad
El Jebelien
En Nahud
J.Ed Dair
oGarsila
oKas
oForo Burungo
oNyala
BLUE
NILE
Blue Nile
White Nile
oIdd el Ghanam
oEd Daein
Babanusa
oAbu Gubeiha
oRehaid el Berdi
S. DARFUR
oMuglad
S. KORDOFAN
oKadugli
L.Keilak
oAbu Matariq
oUmm Dafog
oBuram
Qoz
Dango
L.Kundi
L.Abyiad
Kurmuk
K Yabus
Bahr el Arab
Radoam
Abyei
SOUTHERN
SUDAN
oKalia Kingi
0
160
320 Km.

as part of his tribute to the British governor in Khartoum (Wilson 1980). There are few other records of giraffe although three were seen north of Wadi Howar in 1932 (Shaw 1936). Brocklehurst (1931) stated that giraffe move during the rainy season as far north as Wadi Howar around Lat. 16°N. Wilson (1980) concluded from material in the Sudan Government Archives that giraffe was fairly common in the Genina area during the post-Second World War period and also they have been regular visitors as far north as El Fashir after the rainy season. As late as 1950 they were recorded in the Kabkabiya area and from near Tini Wells. Ionides (1946) noted old giraffe spoor north of Ibra.

The west African korrigum (tiang) was described as scarce in arid scrub and acacia areas in northwest Darfur (Mackenzie 1954). In March 1919 the Governor of Kordofan shot a single korrigum in good condition in the waterless country to the northwest of Jebel Meidob (Brocklehurst 1931). Korrigum tiangs were reported in fair numbers around Geneina (Game Preservation Branch 1950).

Military reconnaissance of the Western Desert provided detailed information about wildlife (James 1902). The addax were described to be present in considerable numbers between Bagaria Wells and El Atrun and in fewer numbers between Jebel Gerinat and Jebel Audum together with large numbers of oryx. Wild sheep were fairly common in El Ain and Abu Tuwaiga. The military reconnaissance report also stated that there was a general migration of addax, oryx, addra gazelle, dorcas gazelle, ostrich, lion, and leopard into Wadi[3/]

[3/] Wadi = Arabic means "stream."

Melik during the rainy season. Animals were attracted by improved pastures and after the water dried up animals migrated southwest where grazing and water were available.

Newbold (1924) stated that "gizzu" vegetation types on the borders of Dongala, Kordofan and Darfur were very attractive to the oryx. Audas (1951) reviewed his observations which he made during 8 trips in Northern Darfur and Northern Kordofan over a period of 24 years. He concluded that large herds of oryx and addax which roamed the north desert in the early years of the century had dwindled considerably and that by 1937 their numbers were dangerously low. He reported that hundreds were killed every year by hunters during their migration south, and stated that the oryx had already disappeared from Kordofan by the 1930's. He also mentioned that in 1912 a herd of 40 oryx spent a few weeks about 40 km west of Bara and in 1919 he observed a herd on the desert of northeastern Kordofan. He stated that up to 1928 several herds came south of Nahud-Fasher road in Um Kedada District and in 1924 large numbers, driven by drought and hunger, came to the outskirts of villages and wells east and west of Melliet. Newbold noticed that El Atrun Oasis was littered by thousands of oryx and addax horns as the natives killed these animals and used the horn to dig the Atrun[4/] salts. Audas (1951) concluded that the reduction of desert wildlife could be attributed to increased possession of firearms acquired by nomads following the First World War.

Ionides (1953) wrote about the three hunting trips he made in Northern Darfur in 1936, 1946 and 1947. His records in 1936 included

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[4/] Atrun = Arabic means "sodium."

seeing oryx north of Jebel Meidob and many addax spoors, and at Jebel Rahib several spoors of addax and oryx without actually seeing any of them. At Wadi Howar he reported seeing 12 oryx. On the trip of 1946 one oryx was seen near Serief and another near Ibra where he also saw spoors of 4 addax. At Jebel Millet and Wadi Hassi many spoors of oryx were seen. On the trip of 1947 addax was seen east of Siref. Forbes (1949) stated that large numbers of addax were seen north of Wadi Howar. He recorded that 8 herds were seen with 60 addax in one of them and the average of 20 per herd for all 8 herds. He reported that only 2 oryx were seen during that trip.

Newbold (1924) observed a herd of addra gazelle at Wadi Um Afant (Lat. 15^{o} 30'N) and Newbold and Shaw (1928) observed addra at Jebel Tegru. Audas (1951) remarked that addra gazelle were found in all areas where oryx were found and that their range extended to the north of Lat. 13^{o}N. A few isolated herds were found near Jebel Schwi in eastern Kordofan, some 40 km west of the White Nile. Brocklehurst (1931) stated that the range of addra gazelle extended roughly from El Obeid in Kordofan northward in Dongala, and westward through southern Morocco. He observed that they were fairly common in all areas where oryx were found, and were frequently to be seen on the Fasher-El Obeid road, 70 to 110 km east of El Fasher, and also in the desert country between Kabkabia and Kereinik.

Ionides (1953) wrote that there were many addra gazelles north of Jabel Meidob in 1936, and several were seen in Wadi Howar in 1946. Forbes (1949) stated that small herds of addra gazelle were reported all over the area north of Wadi Howar.

James (1902) reported that wild sheep were fairly common in El Ain and Abu Twaiga. Maclaren (1925) stated that barbary sheep were found in the northern fringes of Kordofan at Galat Dowoir and Jebel Shatr el Umm, 50 km north from Soderi, and in areas to the north at El Ain towards the border of Darfur and in Jebel Tageru, where they were very numerous, and in Jebel Meidob in Darfur. Maclaren (1925) remarked that Arabs had a great dislike for hills and so the sheep were not heavily hunted. Audas (1951) stated that many areas of northern Darfur held sheep and in the more remote areas they were not often disturbed. Brocklehurst (1931) indicated that wild sheep existed in Jebel Teiga, Jebel Dereira, Jebel Rahib and as far west as Jebel Si. Ionides (1953) reported that a large herd of sheep was observed in Jebel Meidob.

The abundance and wide distribution of dorcas gazelle and red-fronted gazelle was only mentioned by a few explorers. Wilson (1980) speculated that the lack of specific records of gazelle, other than addra, in government sources may be taken as a token of their general distribution and prevalence. Similarly it could be explained that reports were more focused on other less abundant and "more interesting" species. The northern limit of the red-fronted gazelle is generally considered to be between 14^{o} and 15^{o}N (Brocklehurst 1931. Setzer 1956) but in 1923 along with dorcas they were said to be common at the north end of the Teiga Plateau, common in Wadi el Haraz at almost 16^{o}N and fairly common 30 km north of Wadi Howar (Maydon 1923). Wilson (1980) explained the northerly appearance as due to exceptionally good rainfall and "gizzu" vegetation in 1923. Newbold and Shaw (1928) reported dorcas gazelle around Jebel Tegaru and Ionides (1953)

wrote about seeing dorcas and red-fronted gazelles in large numbers when visiting Jebel Meidob in 1936.

One buffalo was observed in Wadi Golo 8 km south of El Fasher in 1945, but no other buffalo were reported to reach that far north (Wilson 1980). Lelwel hartebeest, korrigum, greater kudu, waterbuck and roan antelope occurred in fair numbers in Dar Masalit (Game Preservation Branch 1951). There are no references of abundance and distribution of bushbuck, warthog and oribi. The hippopotamus was known to exist in Nzili pools as recently as 1964 (Wilson 1980).

Lion, leopard, hyaena and jackal were reported to be common in the 19th century (Browne 1799, Nachtigal 1899). James (1902) reported that lion and leopard followed the ungulates on their migration during the rainy season to Wadi El Milk. He mentioned that 2 lions were permanent residents of Jebel Audum. Newbold (1924) stated that lion was not unknown in desert areas and Brocklehurst (1931) reported that lions were numerous on Jebel Abu Atshan in north-west Kordofan until the end of the 19th century. Some lions were present in Wadi Howar as late as the 1920's. The depredation by lions and hyaenas in Dar Masalit was widely reported in the 1940's and 1950's and poisons were used to reduce the "tremendous damage to stock" (Game Preservation Branch 1951). As late as 1955 lions were reported to have killed 113 cattle, 81 donkeys, 56 camels, 25 horses and large numbers of goats and sheep in one small area (Wilson 1980).

Browne (1799) stated that leopards were widely hunted and their skins exported to Egypt. He also reported the occasional sale of live young leopards and lions. Tracks of leopards were reported at Wad el Haraz in 1923 (Maydon 1923). African hunting dogs were found

at Jebel Atshan in 1926 (Brocklehurst 1931). Shaw (1936) saw 14 at Wadi Howar in 1934 and Ionides (1953) reported 7 at Jebel Rahib in 1936.

Baboons were very common in central Darfur and reports of their crop damage in 1938 were reviewed by Wilson (1980). Shaw (1936) found one red hussar monkey north of Wadi Howar 480 km from the nearest open water. He also reported the occurrence of arrdvark and porcupine in the same area. Ionides (1953) reported seeing one turtle at Wadi Ibra.

Bones of white rhinoceros and Nubian ass have recently been excavated in the Gilf el Kibir area of southern Egypt (23^{o}N, 26^{o}E) and dated by C^{14} they were found to be approximately 41,450 years old. Wilson (1980) suggested that probably the Nubian ass occurred in Darfur within recent times, but there are no records substanciating this hypothesis.

Browne (1799) noted that ostrich were common everywhere and early in the 1870's they were reported to be very common in eastern Darfur (Nachtigal 1879). Maydon (1923) reported ostrich to be very common in the vicinity of Um Gereinat (16^{o} 30'N, 26^{o} 45'E) in herds of 50 to 100. Ionides (1953) mentioned that ostrich were seen several times during each of his three hunting trips in 1936, 1946 and 1947. Guinea fowls were similarly very common but there were no specific reports about their abundance and distribution. Browne (1799) noted that guinea fowl were carried as a profitable commodity from El Fasher to Cairo.

Newbold and Shaw (1928) recorded the presence of garganey teal at Nekheila Oasis in the extreme northern part of Darfur desert. Burg

el Tiyur (20° 56'N, 27° 40'E), which means in Arabic the nest of birds, was so named because of the many traces of birds found there. Newbold and Shaw (1928) recorded seeing Abyssinian white eye (*Zestrops abyssinica*), European golden oriole (*Orioles galbulus*), Hoopoe (*Upupa epope*), red throated pipit (*Anthus cervinus*), and martin (*Ptyonopragne* spp.). They remarked that there were traces of other birds between Nukheila and Selima and several dead birds on Burg el Tiyur rocks and concluded that Burg el Tiyur was on the regular migratory route of birds from Europe across the desert.

Southern Kordofan and Southern Darfur: Browne (1799) reported that elephants were abundant around Bahr el Arab (Figure 5) and that herds of 400 to 500 existed. Elephants were reported at different parts of Southern Darfur during the first half of this century. They were reported around Zalingi in 1917 (SIR270 1917), in Qoz Dango during every rainy season (Lampen 1933), in the south-west in 1950, and around Tulus and Ragag in 1954 (Wilson 1979). Numerous reports of elephant crop damage were reported during the 1940's and 1950's at Dar Tebella and Zalingi. The Game Preservation Branch (1951) estimated that there were 100 elephants in western Darfur in addition to a small herd at Jebel Marra area.

Elephants were abundant in Southern Kordofan. They were reported in the Nuba Mountains near Rashad (SIR82 1901). Davies (1919) reported that they were abundant in southwest Kordofan and that 93 elephants of all ages and both sexes were massacred in one day by a large group of the Homr tribe using spears. Cunnison (1958) reported elephants to occur in the western parts of Southern Kordofan.

Giraffe was reported to be very common in Darfur (Browne 1799, Burckhardt 1819). Sparkes (1903) noted that they were very abundant at Kafia Kingi and they were also present in the northwest of the the Tebella area (SIR270 1917). Cunnison (1958) stated that the giraffe occurred in great numbers in southwest Kordofan and noted that their distribution was more confined than in the past. He noted that they no longer occurred in the Babnusa area where they used to be hunted and they occurred mainly in the south, outside the border of Kordofan in the northwest part of the Upper Nile Province. They used to enter Kordofan only during the rainy season.

The hippopotamus was reported to be present in Darfur by Browne (1799) and Burckhardt (1819). The hippopotamus was reported to occur in Bahr el Arab and Kundi areas during the rainy seasons. The last hippo in western Darfur was killed near Nzili Pools on the Chad border about 1964 (Wilson 1980). Hippopotamus and crocodile were reported in Southern Kordofan in Lake Kelik by three Dutch ladies traveling in Central Africa in 1867 (Toothill 1947). Boustead (1971) reported that there were considerable numbers of hippos at Bahr el Arab in Southern Kordofan in 1933 when he visited that area.

Rhinoceros were very common around Bahr el Arab (Browne 1799). Sparkes (1903) mentioned that they were very common in Kafia Kingi area. Audas (1951) reported seeing 7 rhinos about 65 km south of Lake Kelik in Southern Kordofan.

Buffalo were very common in large herds throughout Southern Darfur (Browne 1799). Sparkes (1903) described the buffalo as abundant in Kafia Kingi and Cunnison (1958) noted that they were found in south-west Kordofan and Bahr el Arab region. Several other species were

described to exist in Southern Kordofan and Southern Darfur. The greater kudu occurred in Jebel Marra in 1916 (Gillan 1918, Hobbs 1918). In 1958 the kudus were plentiful in Jebel Marra (Hunting Technical Services 1958). They were also in fair numbers in Zalingi District (Game Preservation Branch 1951). Brocklehurst (1931) stated that although kudus were comparatively common in Nuba Mountains, they were becoming very rare due to poaching.

The giant eland occurred in southwest Darfur (Brocklehurst 1819, Sparks 1913) and in Southern Kordofan (Cunnison 1958). The waterbuck was common in Kafia Kingi (Sparkes 1903) and the record head for the Sudan, with 97.8 cm horns, was shot in Southern Darfur in 1920 (Brocklehurst 1931). The Game Preservation Branch (1951) recorded them as well as hartebeest and korrigum (tiang) to occur in fair numbers in Zalingi District. The korrigum tiang and hartebeest were both reported in Kafia Kingi (Sparkes 1903) and Southern Kordofan (Brocklehurst 1931, Cunnison 1958) and the tiang record head for the Sudan, with 71 cm horns, was shot in Southern Kordofan (Bloss 1949). Red-fronted gazelle, dorcas gazelle, Abyssinian Duiker, and dik-dik occurred over the northern and central parts of Southern Darfur and Southern Kordofan (Brocklehurst 1931, Mackenzie 1954, Setzer 1956).

Browne (1799) noted the occurrence of the baboon and the patas in Darfur and Lynes (1921) in addition to these two recorded the presence of grivet monkey in Jebel Marra. Beaton (1949) discussed depredation by baboon during the period from 1936 to 1939 in the southern slopes of Jebel Marra. The three species of monkeys occurred in Southern Kordofan (Setzer 1956).

Browne (1799) reported the presence of lion, leopard, hyaena and jackal in Southern Darfur. Boyce (1926) noted that lions were more numerous in the cattle country north of Bahr el Arab. Lynes (1921) noted that lions occurred in Jebel Marra. In the mid-1930's both lions and leopards were abundant in Southern Darfur (Henriques 1938). In 1949 14 lions were poisoned and 5 shot during a period of one month in Wadi Bulbul, near Tumbusko in central Darfur; but there were reports of approximately 28 more lions in the same area. A pride of 4 lions held up traffic for several days on the main Nyala-El Fasher road in 1954 (Wilson 1980).

Both striped and spotted hyaena occurred in Southern Kordofan and Southern Darfur. More striped hyaenas occurred than spotted (Sweeny 1973, Wilson 1980). Hyaenas and other predators were considered serious threats to livestock and they were regularly shot or poisoned. Wilson (1980) reported that in the period from 1947 to 1952 the following animals were legally shot or poisoned by the Veterinary Department: 76 lions, 20 leopards, 688 hyaenas, 656 jackals and foxes. Wild dogs occurred in Jebel Marra (Lynes 1921) and in southeast Darfur (Sweeny 1973). Browne (1799) noted that the civet cat was common in Darfur.

The ostrich was reported to be common everywhere (Browne 1799). Sparkes (1903) noted that ostriches were numerous in Kafia Kingi area. Madden (1934) reported the ostrich as common resident throughout Southern Darfur and were especially numerous around Lake Kundi. He further recorded 240 species of birds occurring in Southern Darfur. He reported on the seasonal ranges of different species and mentioned that thousands of European ducks and geese visited the area during the

winter. He noted that the most common of them were garganey, common teal, white-eyed pochard and pintail; fairly common were the tufted duck; rather scarce visitors were the shoveler, widgeon, and gadwell, and rare was the mallard. Resident species were spurwinged and knob-billed which were very common, Egyptian goose was less common; the pygmy goose occurred in limited areas in good numbers and the white-faced tree duck was abundant everywhere.

Clapperton francolin and guinea fowl were common everywhere. Arabian bustard was common throughout the region, the larger bustard was rare, visiting the region during the rainy season. The Senegal bustard was very common resident throughout the region. The four-banded sandgrouse was common along rivers and the secretary bird was also found everywhere.

Khartoum Province: Khartoum Province used to have abundance of dorcas gazelles on the western bank of the Nile and west of Omdurman (Figure 1). It is also known that the sommering gazelle used to enter the Province and spent the rainy season in the Butana Plains east of Khartoum (The Wildlife Preservation Department 1960). European explorers and sportsmen were always attracted to other places in the country with more variety and abundance of wildlife and hence very little was written about the Khartoum wildlife.

Arkell (1949) wrote about excavation of Neolithic site at El Shaheinab, about 40 km north of Khartoum, dated 3,000 B.C. The inhabitants of the site were largely hunters and fishermen. The fragments of bones and teeth from the site proved that the following animals were abundant: elephant, hippo, rhino, giraffe, buffalo, roan

antelope, warthog, grivet monkey, several carnivores, hyaena, python, crocodile, monitor lizard, river turtle, and ostrich. The excavation of an ancient site, 2,000 years old, in Khartoum east of the civil hospital in 1944 provided the remains of gerenuk.

Crocodiles were common around Khartoum. Stanton (1952) reported a crocodile on the Nile bank and in 1967 a large crocodile was shot on Tuti Island (The Wildlife Preservation Department 1968). One hippo was reported in the Blue Nile opposite the Governor's Palace at Khartoum (SIR106 1903). The presence of jackal, mongoose, and genet cat on the Nile bank at Khartoum was also reported (Stanton 1952).

Birds of Khartoum received better attention and the establishment of the only Sudanese bird sanctuary in Khartoum reflected that. Witherby (1902) provided a partial list of Khartoum birds based upon observations made during a short visit. Several studies and publications covered the birds of Khartoum in detail (Bowen 1926, 1931, Rintoul 1952, Cave 1955, Macleay 1960). Bird species which occurred in Khartoum included: little greebe, cormorants, pelicans, tufted duck, white-eyed pochard, European pochard, garganey, European teal, widgeon, shoveler, pintail, gadwall, mallard, knob-billed duck, spur-wing goose, ruddy sheld duck, vultures, falcons, eagles, hawks, European quail, tufted guinea fowl, moorhen, coot, crowned crane, European crane, Arabian bustard, Nubian bustard, plovers, sand-grouses, doves and pigeons.

The White Nile Province: Witherby (1902) wrote a book describing his 2 months travel along the banks of the White Nile from Khartoum to El Kawa (240 km) (Figure 5). He noted that hippos were rarely seen

but crocodiles were common. He remarked that mammals of any kind were scarce and occasionally a gazelle or antelope was seen. He reported that hares were common and grivet monkeys were numerous between Duiem and Kawa. His published list of mammals included also 8 bats, sand fox, jackal, striped pole cat, hedge hog, mice, rats, and gerbil. He collected and indentified 141 species of birds.

Morant (1902) wrote about the wildlife from Jebelein southwards. He reported that the following animals were present: elephant, giraffe, roan antelope, waterbuck, tiang, kob, reedbuck, gazelle, oribi, ostrich and lion. He remarked that most of the animals occurred to the south of Renk in the Upper Nile Province. Audas (1951) noted the presence of several herds of sommering gazelles in 1914 on the west bank of the White Nile near Shat south of El Duiem.

The Gezira and Blue Nile Provinces: Burckhardt (1819) reported that the range of elephants and rhinos extended to Abu Haraz north of Sennar (Figure 5). He also mentioned that the hippo was very common in Sennar. Owen (1954) reported that elephants had been seen in recent years in Launi forest south of Singa and that such names as Gezira el Fil[5/] near Medani suggest their occurrence one time in Gezira Province.

The Dinder area being the closest African big game area to Europe was frequently visited by sportsmen. George Harrison, an American from Philadelphia, wrote an account of his hunting trip to Dinder in 1905 (Harrison 1953). He reported seeing a large hyaena just after Abu Hashim about 150 km from the Dinder park. In El

[5/] Gezira el Fil - Arabic means the "elephant Island."

Abyiad, within the present boundaries of the Dinder National Park, he noted the abundance of reedbuck, sommering gazelle, warthog, roan antelope, waterbuck, tora hartebeest, giraffe, buffalo, crocodile, hippo, guinea fowl and francolin. He saw 2 black rhinos near El Abyiad and elephant, kudu, and hippo towards the Abyssinian border. Forbes (1950) reviewed information on a hunting trip made to the Dinder by Lord Kitchner in 1911. He noted that the following animals were very common at that time: elephant, hippo, lion, leopard, giraffe, kudu, tiang, waterbuck, tora hartebeest, reedbuck, bushbuck, sommering gazelle, oribi, warthog, and bustard. Kitchner evidently enjoyed his hutning trip in the Dinder as he later wrote to the Governor of the Sudan, Sir Wingate, asking about the possibility of leasing an area of approximately 6,000 km^2 of the Dinder region for his private hunting.

Mason (1924) reported elephant, dik-dik and oribi occurred near Khamisa, 60 km from the Dinder park. Around Erief el Dik -- 30 km from the park -- he observed dozens of sommering gazelles, reedbucks, and one roan antelope. He shot one hippo in Erief el Dik. He reported several crocodiles in Erief el Dik and Galegu pools. He described Khor Galegu area as "crawling" with game, and recorded the occurrence of reedbuck, roan antelope, waterbuck, sommering gazelle, oribi and lion. Near El Abyiad he reported buffalo, giraffe and tiang and he also observed rhinoceros tracks near the Abyssinian border. He shot elephants near Menofeli, 50 km from the park.

Brocklehurst (1931) stated that the record tora hartebeest for the Sudan, with 57 cm horns, was shot at Dinder and noted that tora hartebeests were fairly common in Dinder occurring in herds of 10 to 15.

Wildlife Values

Ancient drawings in historical sites in the extreme north and central Sudan are lasting evidence that the country's wildlife was more abundant and had more importance to the people at those time than today. The early predynastic graves in Egypt contained considerable amounts of ivory and figures of elephants, giraffes and ostriches appear in drawings on pottery. Travel routes into the south already existed in that period. Accounts of expeditions by Harkhûf, 2,570 B.C. included: "I came down with 300 asses laden with incense, ebony, castor oil, leopard skins and ivory" (Resiner 1918).

Newbold (1924) described ancient drawings at Zolat el Hammad in Wadi Howar. The rock figures showed elephants, giraffes, ostriches, oryx, cattle, and several other animals which were difficult to identify and probably included monkeys, insects, rock rabbits and lions. Ancient Meroitic remains at Jebel Geili in central Sudan, Jebel Tegru and El Atrun in Northern Kordofan and Northern Darfur, Qalaat el Wahish[6/] in Northern Kordofan and Musawarat of the Nile Province all show pictures of lions, monkeys, giraffes, elephants, warthogs and ostriches (Whitehead and Addison 1926).

Ancient Egyptians, Arabs or Turks have been drawn southward to gain control of the resources of the Sudan. Ostrich feathers, ivory, animal skins, captive wild animals and black slaves were greatly desired by the ancient world (Resiner 1918).

Trading was active in wildlife products during the 18th and early 19th centuries. Browne (1799) and Burckhardt both visited the

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[6/] Qalaat el Wahish: Arabic means the "Fort of Wild Animals."

Sudan with trader's caravans and they noted that exports of the Sudan to Egypt included: ivory, rhino horns, teeth of hippos, ostrich feathers, whips of hippos' hide, leopard skins, and live monkeys, guinea fowl and young leopards and lions.

During the Turkish rule of the Sudan much emphasis was put on ivory and ostrich feathers' trade. Both Mohammed Ali Pasha and Ismail Pasha had a monopoly in ivory trade. Burckhardt (1819) reported that the Pasha of Egypt had lately included ostrich feathers among articles monopolized by him. Many thousands of elephants had been butchered and there were still more fields to exploit. The inexplicable craving of the outside world to have billiard balls, piano keys, and statuettes of ivory was as strong as ever, and nobody cared how many elephants were destroyed. The ivory trade of Khartoum in the 1860's was worth £ 40,000 or 90,744 lb (200,000 kg) of ivory per year (Moorehead 1960).

Burckhardt (1819) observed that bundles of ostrich feathers were traded in Shendi market. The ostriches were captured around Shendi and feathers were traded for sorghum. He further noted that ostrich feathers collected around Shendi were considered of inferior quality compared to those from western Sudan. He remarked that the trade in ostrich feathers was controlled by the Jewish traders in Cairo who alone understood that trade well. Feathers were sorted into several different qualities and parcels were made containing portions of every kind. Each parcel of 10 lbs. contained 1 lb. of the finest and whitest sort, 1 lb. of the second quality which also contained white feathers, but of smaller sizes and 8 lbs. of sorts called Bojoca, Coda and Spadone which were different grades of black feathers. The

market value of white sorted feathers at Cairo in 1816 was LE 2.8 (about U.S. $8.00) per lb. while prices paid by traders at Shendi were only one tenth of that.

Whips made from hippo skins were also sold in local markets and exported. The skin was cut into narrow strips about 1.5 to 2 meters in length. Each strip was then rolled up, so the edges unite and form a pipe in which state it was tied fast, left to dry in the sun and rubbed with grease. Whips were produced at Sennar in thousands and sent to Egypt where the Turkish were famous for using them to control the peasants and servants (Burkhardt 1819). Baker (1861) reported that two Germans living in Sofi village on the Setit River had as their principal occupation, whip making. He noted that there was extensive demand for camel-whips, "Coorbatches."

Burkhardt (1819) noted that rhino horns were exported from Sennar to Cairo where they were worked into very expensive ornaments for handles of swords and poniards. He also reported that musk from civet cats was exported from Shendi to Jedah via Suakin.

The importance of trade in ivory, ostrich feathers and other wildlife products persisted through the Khalifa rule during the Mahdist Revolution. Ivory and ostrich feathers were "Beit et Mal" -- Khalifa's treasury -- monopoly and were sold to traders who exported via Suakin, Aswan and to Mussawa via Kassala. Several shipments of ivory were reported arriving to Omdurman during the 1890's mostly from the south. In 1892 Zaki Tamal, one of the Khalifa leaders, sent a considerable quantity of ivory from the south. In 1893 about 700 Kontar[7/] were sent to Omdurman from Equatoria. During that period

[7/] One Kontar = 100 lbs.

from 1890 to 1893, considerable amounts of ivory reached Khalifa from Rejaf and Fashoda in Upper Nile (SIR18 1893). In 1896, 400 tusks were collected by Khalifa men in the south from a deserted Belgian camp (SIR50 1896).

Sudan Intelligence Reports during the 1890's included detailed information about ivory, ostrich feathers and other wildlife products exported. Wildlife products and gum arabic constituted most of the Sudan export at that time (SIR21 1892).

Sultan Ali Dinar, the independent ruler of Darfur, had full monopoly on ivory and ostrich feathers trade (SIR93 1902). It was noted that ivory trade was considerable in El Fasher and the Sultan had a large ivory and feathers "zeriba" -- store -- near his palace. Most of the ivory was reported to come from Kafia Kingi and further south from Dar Fertit and Dar Jange in Bahr el Ghazal Province. Ali Dinar used to sell his ivory to the traders and collected an additional 20% royalties on all ivory and feathers leaving Darfur (Mahon 1903).

Trade was described to be improving in Kordofan with a lot of ivory from Kafia Kingi and other areas in the south reaching the markets at Nahud and El Obeid (Mahon 1903, Sparkes 1903). Macmichael (1912) remarked the trade in ostrich feathers, which was already considerable, would provide more profits if adequately organized and controlled under expert management.

Ivory, feathers and other wildlife products were exchanged between the rulers of different parts of the country as gifts, taxes and tributes. The following items were sent from Sultan Tama to the Sultan of Kabkabia in central Darfur: 25 Kontar of ivory, 200 rhino horns, 100 swords and 100 shields (SIR74 1900). Ali Dinar was

reported to send several presents and tributes to the British Governor in Khartoum after the defeat of the Khalifa. His first present was composed of: 60 cows, 7 bundles of ostrich feathers, 30 leopard skins, office cups made of rhino horns, rhino horns and spears (SIR75, 1900). Ali Dinar continued to pay part of his tributes in ivory: 42 lbs. (18 kg) in 1903 and 600 lbs. (272 kg) in 1904 (SIR122 1904; SIR124 1904). He even sent a live giraffe as part of his tribute in 1902 (SIR96 1902). In 1913 he sent 1,320 lbs. (599 kg) of ivory to the Sharif of Mecca as part of his annual pilgrimage donation (SIR231 1913). In 1901 a group from Nuba Mountains arrived to Omdurman with 2 tusks from Mek Gideit, Mek of Tajoli, as a present to the British Governor (SIR82 1901).

Local trade and consumption of wildlife meat and other products was less documented. Burckhardt (1819) noted that several species of animals were important sources of meat in different parts of the country: elephant in Sennar, sommering gazelle in Shendi, crocodile in Sennar, northern Sudan and Atbara and Setit valleys. Audas (1919) reported that oryx was killed by the hundreds in Northern Kordofan and that there was an active trade in their dried meat (biltong or "sharmoot") and hides. He stated that oryx skins used to make loading ropes and a good bull hide made as much as 5 ropes with an average length of about 3.5 meters while female hides were used to make grain bags. Newbold (1924) noted that the nomads in Northern Kordofan depended greatly on gazelles, desert cats, hares or rock rabbits to vary their menu which consisted of sorghum and milk.

Browne (1799) noted that leopards and lions were hunted in Darfur mainly for their skins, however their flesh was eaten by the Arabs as

they conceived that this generated courage. Skins of giraffes were highly prized as they made the strongest shields. The Shaygiea tribe of Northern Sudan used hippo skins for making shields which they used in their frequent wars and they also sold them to other tribes (Burckhardt 1819). Baker (1861) noted that the Homran tribe used shields made from hippo and elephant skins.

Burckhardt (1819) reported that the only musical instrument he saw in Nubia was a kind of Egyptian tamboura with 5 strings covered with a gazelle skin. He also reported a special use for civet cat in Darfur where they were held in cages in the houses of the rich and "women apply the odour extracted from them to add to their perfumal allurement."

Negative values of wildlife were mentioned by several authors. The damage caused by gazelles to cultivation in Dongala was reported by Burckhardt (1819). Hippo damage to cultivation in Dongala, Shendi and Setit was reported (Burckhardt 1819, Baker 1861). Lion and hyaena depredation on livestock in Darfur was reported by the Game Preservation Branch (1951). Elephant damage on cultivation in Setit Valley was reported by Baker (1861) and baboon crop damage in western Sudan by Beaton (1949).

Aesthetic wildlife values were the least documented inspite of their richness and varieties. Names of people and places derived from names of animals are very common in the Sudan. A convincing example is the name of Khartoum, the capital of the Sudan. Khartoum means in Arabic the "trunk of an elephant" and so named because the Blue Nile and the White Nile junction at Khartoum resembles the trunk of the elephant. Folk tales centered around animals were very common

and shared by almost all Sudanese tribes. Examples for folk tales are the Nuban stories: the procupine and the hare, and the girl and the leopard (Macdiarmid 1920); and Beni Amer tales: the lion, hyaena and the fox, the kite and the hare, and the house rat and the field rat (Beaton 1947). In all these folk tales knowledge about wild animals that were present in different areas were mixed with myths and tribal beliefs and the tales were passed from generation to generation. Hillelson (1949) wrote about the Baggara tribes' songs and their women poets "hakkāma". Most of the Baggara songs were centered around dangerous hunting experiences.

Wildlife as part of native religions were reported by Corkill (1939) who described the festival of the dik-dik -- Sibr el daboia -- of Kadugli Nuba. The dik-dik was a very common species in the Nuba Mountains' area. Sibr el daboia was also held by the Nuba of Buram and El Tir Al Akhdar. The festival was usually held before the rainy season.

The men of the village participating in the festival armed themselves with sticks as the use of firearms, cutting or stabbing weapons were not allowed. The Nuba men with the aid of their dogs secured a live uninjured daboia. When captured it was placed across the back of the neck and shoulders of a special "kugur" -- priest -- who was the lord of the festival. He carried it to the village and placed it beneath a *Balanites* tree which was traditionally associated with the festival. Four women of the kugur household brought four gourds of fleshy prepared millet beer. The kugur's assistant held open the daboia's jawas and beer was poured into its mouth. Then the kugur split open the belly of the daboia with his knife and sprinkled the

assembled people (all men and four women) with the ingested beer. Sprinkled men went and washed in front of their granaries. The flesh of the daboia was divided between elder males.

After that the village community started to dance and the kugur, carrying a multi-barbed short spear in his right hand and a giraffe tail in his left, called: "Allah brings the rain, send it down on the people in thier plots...sufficient for the government taxes and to buy cows and guns." The daboia thus appeared as the corn-spirit (Corkill 1939).

Hunting: Different Sudanese tribes adopted different hunting methods and several of these methods have been recorded. Baker (1867) had so much respect for the Homran hunters that he included them in the title of his book which was supposed to be about the discovery of the sources of the Nile. The title of the book is: *The Nile Tributaries of Abyssinia and the Sword Hunters of the Homran Arabs.*

The Homran inhabited the area south of Kassala. They hunted all wild animals from antelope to elephant, giraffe or rhino using swords. Those who could not afford to buy horses hunted on foot. Their method in hunting elephants was that elephants were tracked so as to reach them between 10 and 12 A.M. The animals, when reached, would be asleep or extremely listless and easy to approach. If the elephant was asleep, one of the hunters would approach carefully, cut the trunk with one blow and escape. The wounded elephant would die within an hour due to severe bleeding.

Should the animal be awake, they would creep from behind and give a tremendous cut at the back sinew of the hind leg about a foot above

the heel. Such a blow would disable the animal at once, and would render it comparatively easy to administer a second cut to the remaining leg. The animal would quickly bleed to death.

When hunting on horseback, a party of up to four hunters would start tracking elephants before daybreak. When they reached the elephants, they singled out a bull with the largest tusks. After a short hunt the elephant would turn upon his pursuers who scattered and fled from his long charge until he gave up the pursuit. Then again, the hunters charged. It was the duty of one man to ride up close to the head of the elephant and direct its attention completely to himself. The greatest coolness and dexterity were required of this hunter who had to adapt the speed of the horse to the pace of the elephant. In the meantime, two hunters galloped behind the elephant unseen by the animal, whose attention would be completely directed to the horse within its grasp. With extreme agility, when close to the heels of the elephant, one of the hunters sprang to the ground with his drawn sword as his companion seized the bridle and with dexterity delivered a two handed blow which severed the back sinew. Then he immediately jumped out of the way and rode back. If the blow was successful, the elephant would be completely disabled by the first pressure of its foot upon the ground, the enormous weight dislocated the joint and it would be rendered completely helpless. The hunter who had hitherto led the animal, immediately turned and induced the animal to attempt another charge. That was clumsily made and afforded an easy opportunity for the other "aggager" (sword hunter) behind to slash the sinew of the remaining leg and the animal would be forced to stand still and would die of loss of blood in a short time. Baker

(1867) reported that hunters frequently got killed or seriously injured.

The Baggara in Southern Kordofan and Southern Darfur hunted giraffes on horseback driving them until the animals got exhausted. The hunters would dismount and stab the giraffe with long spears. Elephant hunting was usually done in larger parties than giraffe hunting and it took more time. Sometimes several weeks were spent in the hunt. The Baggara's method of hunting elephants was that one rider would induce the chosen bull to chase him and lead the animal to the ambush of the other hunters who would try to stab the elephant with spears as near the anus as possible. The meat and ivory would be divided according to the part taken during the attack (Lampen 1933). Cunnison (1958) described giraffe and elephant hunting among the Humr of southwest Kordofan. He noted that they were skillful hunters with gun and with horse and spear. He noticed that those who possessed rifles -- French and English relics of the 19th century -- preferred using them, but most hunting was done with horse and spear. Antelope and hartebeest were speared on foot when the animals rested during the heat of the afternoons. It was said the grandfather's of the Humr speared giraffes on foot in mud during the rainy season. Generally they regarded it as unworthy to tire a horse for a roan antelope and there was risk the horse could be stabbed by the horns of the roan. Buffalo were speared from horseback. If a number of horsemen came across a herd of buffalo with young, they would charge uttering loud cries. The adult animals would run faster than the calves, which, being harmless, would be speared.

The main objects of hunting on horseback were elephants and giraffes. Elephant hunting was similar to that described for the rest of Baggara tribes. The Baggara had long been hunting giraffe (Tunsi 1845). Success of the hunt depended on the nature of the ground. When a horseman stalked a giraffe on suitable ground, he lowered his spear from his left shoulder to a galloping position in his left hand. The horse raced with the giraffe neck to neck, the rider carrying the 3 meter's long spear "chelkaya." The rider kept his eye on the giraffe, passed his spear to the right hand and with both hands at the butt of the spear and the left still holding the reigns, he would stab the giraffe's back leg. One powerful stab was usually sufficient. The giraffe would spill blood and come to a stop. The rider would dismount, take his spear, and with the ritual: "In the name of Allah, Allah the great" would kill it by spearing on the throat. Cunnison (1958) noted that the chance of success in giraffe hunting was approximately 50%. The main motive for hunting was the meat and money obtained from selling meat. Sport aspects were not important.

Morant (1902) wrote on the hunting methods of Selim Baggara who used to hunt elephants, buffalo and antelope with spears. Their hunting ground was the area between Kaka and Renk in the Upper Nile Province. Less spectacular but efficient methods of hunting were adopted by Nuba tribes. Sagar (1922) reported that they used their old Remington rifles to shoot all sorts of game animals and birds. They also hunted with spears, knives and clubs usually in large parties forming a crescent and driving over large tracts of the country. They killed leopards, hares, gazelles, oribis, dik-diks, guinea fowl and

occasionally big game. The young Nuba trained their dogs to kill hares and a party could bag 5 to 6 hares in a few hours.

Beaton (1948) reported that the Fur tribe also used to hunt in groups using spears and throwing sticks. Sometimes large areas were encircled by hunters, the grass was burned and all animals trying to escape from the fire would be killed. Dogs were also used in hunting. They also adopted rope-net trap around animal's drinking places. The whole village would cooperate to trap lions and leopards which attacked their livestock. Throwing sticks ("trombash") were adopted by several tribes in Darfur, Kordofan and the Ingessana Hills. A type of throwing knife was also used in the Ingessana area (Nadler 1935).

Hunting in desert and semi-desert areas was also popular. Audas (1919) described oryx hunting by camel graziers of Northern Kordofan. He mentioned that the hunting took place during the south migration of the oryx, late winter and early summer. Large hunting parties went out when a herd was seen and the herd was rounded up and driven in the direction of their "ferigs" (camps). Exhausted oryx were killed by spears. It was the task of the women to skin the animals. Sometimes as many as 50 animals were destroyed in one drive. Audas (1951) described more organized hunting parties usually consisting of 3 to 4 hunters. The hunting party was accompanied by 6 to 8 camels and 1 or 2 horses. Permanent camps were not made until the first kill was made. One man with some of the camels would be sent back to get more water supplies. The party would only return home when they had obtained full loads of dried meat and hides. When a herd was sighted the horsemen would wait until the sun was well up and then in the

heat of the day, they would begin chasing the herd. After a mile or two the oryx would be exhausted and stop. The hunter would choose a bull, dismount and attack the animal with a spear, cut both hamstring, and pierce both eyes. With this method half a dozen or more oryx would be killed in one hunt. A camel man would follow the horse tracks and collect the killed animals. Such a hunting party would collect approximately 20 oryx during one trip. Usually 3 trips were made each year when the oryx migrated to their southern ranges.

The addax was hunted in a similar way like the oryx as it lived under similar conditions, but in more remote areas. Wild sheep were only hunted with rifle and dogs. The usual method with dogs was to drive the sheep from a hill and when they got down, the dogs would pursue them. More ewes and lambs were killed by dogs than rams (Audas 1951). Maclaren (1925) noted that the Arabs had a great dislike for hills and they did not like the sheep meat, but occasionally young men drove sheep down from the hills and shot a few. Dick (1952) noted that wild sheep were hunted in eastern Sudan with dogs, either running them down in the open or following them to their refuge hills. It was said that they could be chased on a camel's back and caught. Mahon (1903) reported that ostriches were trapped in Darfur. They were also hunted on horseback and on camel back. The Bedaiat tribe was famous for using camels in hunting ostriches and it was reported that they had camels especially trained for that purpose.

Parker (1901) noted that in eastern Sudan, dogs were used to hunt ibex and sommering gazelle. The sommering gazelle was easily run down with two well trained dogs. The sommering gazelle, hunted by dogs, was also observed at Goz Regab (Baker 1861). Molloy (1951) wrote

that ibex used to be driven downhill and pelted with stones. Howell (1951) described ibex hunting in eastern Sudan and he reported that an hour before dawn a large group of people would climb up the hills and clatter, making enough noise to force the ibex down to where the hunters would be waiting. Burckhardt (1819) reported that Jaalein tribe around Shendi used snares to catch sommering gazelles and ostriches. He also reported that people around Sennar hunted hippos by making trenches and covering them with reeds into which hippos would fall during their night excursions.

Molloy (1951) wrote about cruel hunting practices. He mentioned the practice in eastern Sudan of driving down ibex and sheep and pelting the ibex with stones and hunting the sheep with dogs. He remarked that in both cases, females and young were most likely to be killed. He also condemned the use of fire, pit-trip and wheel trap. Lindblom (1929) described the spiked wheel-trap which was widely used by several tribes in the Sudan. Owen (1952) wrote about the "unusually cruel trap" of the Fur tribe. That trap was made of several holes about 60 cm deep and just wide enough for the foot of the elephant to enter. A section of a tree trunk about 12 cm. in diamter was placed in the center of this hole. There was an iron spike of approximately 40 cm. long with sharp points secured in the middle of the wood. The holes were covered with mats of sticks, grass and dust. Elephants would be practically immobilized by being lamed in one leg.

Mavrogodarto (1949) noted that although falconry had been practiced in Arabia and to a slight extent in Egypt and Morocco, there was no trace of native falconry in the Sudan. He mentioned that it was probably known in the north in the last century before the

Mahadia Revolution. He also remarked that several of the Sudanese falcons were good for falconry.

Several Europeans hunted in the Sudan during the 18th and 19th centuries. After the British colonized the country, the numbers of European hunters visiting the Sudan increased. Maydon (1957) compiled notes from several hunters who visited the Sudan and included these in his book about big game shooting in Africa. He stated that large trophies could be obtained from the Sudan, e.g., giant eland, addax and Nubian ibex. He suggested four areas for European hunters to visit in the Sudan: The Libyan desert for addax, oryx, addra, dorcas and red-fronted gazelles; the Red Sea Hills for Nubian ibex, kudu and various smaller game, and the Blue Nile and White Nile for eland, Nile lechwe, white-eared Kob, buffalo, rhino, elephant, lion, leopard, bushbuck, reedbuck, tiang and several other species.

Forbes (1950) reported that Lord Kitchner hunted in the Dinder in 1911 and expressed his satisfaction with the experience. SIR68 (1900) reported about the hunting trip of Prince Henry of Lichtenstein in the White Nile area and remarked that game was plentiful. Harrison (1953) wrote about his hunting experience in the Dinder in 1905 and stated that some of the heads he collected were considered record collections. Mason (1924) wrote about his hunting trip in the Dinder and complained that animals were so crowded that it was difficult to select big heads.

Wildlife Management: Laws regarding restrictions on hunting were not established in the Sudan prior to the British rule. Tribal traditional "laws" were more concerned with organizing group hunting and

distribution of meat, ivory and skins among hunters (Cunnison 1958). No conflicts over hunting rights between the different tribes were reported. It seems that as wildlife was abundant and traditional hunting was limited there had been no major problems.

Ivory and ostrich feathers monopoly was in force during the Turkish rule, the Mahdist Revolution and was enforced by Sultan Ali Dinar in Darfur. During the Mahdist Revolution,the Khalifa ordered that no firearms be used and that all ammunition should be saved for warfare. As a result of that order, ostrich feathers became scarce and some merchants appealed to the Khalifa to allow their hunters to use firearms but the Khalifa refused (SIR1 1892). That was the only known restriction on hunting before the British rule.

During the early years of their rule the British were concerned with wide possession of firearms among the natives. The collection of rifles and ammuniation campaigns, which the British started, went on very slowly; the natives were reluctant to give up their rifles (SIR67 1900). The major concern at that time, of course, was not to control hunting but to control the possession of firearms. British administrators in the White Nile region reported that Arabs were hunting there using firearms, though they claimed to hunt with swords and spears, and they concluded their report stating that appropriate action was taken (SIR82 1901).

Concern about wildlife destruction was voiced at an early time during the British rule. James (1902) remarked that the native hunters in the Western Desert were causing extensive damage to wildlife. He noted that due to the high demand of dried gazelle meat, traps were set everywhere. He reported that on one occasion he was able to count

the horns of 8 gazelles trapped under one tree. He also observed that horns of oryx, killed by the natives, were frequently seen around El Ain. James (1902) further stated that it was not difficult to make game laws, but it would be very difficult to enforce them in the desert region. He suggested that the only solution would be to levy taxes on dried meat and hides, especially those of the oryx, addax and addra when brought in larger towns for sale. Audas (1951) agreed that any attempt aimed at the protection of wildlife in desert areas would have been very difficult and expensive to carry out. He stated that game reserves would not have worked without intertribal supervision and migratory habits of both the oryx and the addax would have added to the difficulty. He added that the trade in dried meat and hide ropes could not be controlled. In spite of his pessimistic views concerning the future of the addax and the oryx, he reported that the wild sheep received reasonable protection in the Meidob Hills through the cooperation of the Governor, Charles Dupuis, the chief tribal men and the appointment of a well-known hunter and his son as keepers.

In 1933 the British Government invited all African territories to a fauna and flora conference (The London Convention) to draw attention to the rapid extermination of certain species. The Sudan signed the London Convention papers and soon after that developed its first wildlife laws. Molloy (1951) commented that the laws were restrictive and that the native who hunted, to feed himself and his family, found those restrictions very irksome, particularly as they were of recent origin. Molloy (1951) explained that the Government's policy encouraged traditional hunting but not wasteful and indiscriminate

hunting practices. Permits were given to different tribes to kill elephants and giraffes primarily for meat. Each year the different tirbes were allowed to hunt a total of about 600 elephants and 150 giraffes. In addition, unlimited numbers of smaller and common game could be hunted without permit. Tribal hunting was restricted to use traditional weapons and no firearms were permitted.

Cunnison (1958) explained why giraffe poaching was very popular among Humr in south-western Kordofan. He stated that poachers averaged 10 giraffes per horseman per year. In case the poacher was arrested, he would be sent to serve 6 months in prison. That was no real concern to the Humr tribe since the prison became known as "beit er rugal" (the house of real men) and to be imprisoned carried its own kind of prestige.

The Game Preservation Branch was established in 1902 as a small office and was manned by British ex-officers. The objectives of the Game Preservation Branch were: protection of rare species (in accordance with international obligations), to organize the traditional hunting, to organize the hunting sport, and protect human lives, live-stock and crops from depredation by wild animals (Molloy 1951). Molloy (1951) remarked that the Game Preservation Branch lacked the man-power and could do little more than try to awaken a general consciousness of the urgent need in the national interest of conserving the remaining stocks of game.

National parks, game reserves and game sancuaries were established in the 1930's. A few Sudanese game-scouts were recruited. Patrolling the national parks and poaching control were done in coordinated efforts with the police force. The Game Preservation Branch directed

much of its attention and manpower to controlling wildlife damage problems. Molloy (1951) reported that the Game Control staff consisted of 2 game control officers and 30 game scouts whose duty was the protection of natives' crops against raids by elephants and buffalo, and protection of their livestock against lions, leopards and hyaenas.

The Game Preservation Branch tried to do some public relations work during the 1950's and created posts of honorary game wardens in 16 different towns. The honorary game wardens were expected to help the Game Preservation Branch in its duties and extended its activities to towns where it did not have regional offices. The Zoological Garden Advisory Committee was formed in the 1950's and its work was related to Khartoum Zoo development and administration. The Journal of Sudan Wildlife and Sport was started in 1949 and was published twice a year until it stopped publications in 1953. These efforts, good as they were, were not directed towards the Sudanese public but to the British and foreign community in the Sudan. Out of 20 members appointed as honorary game wardens only 2 were Sudanese. Other members were British and other Europeans working in the Sudan. The Wildlife and Sport Jounral was published in English and thus only a few Sudanese could read it. Owen (1952) noted that the Sudanese were not visiting the bird sanctuary in Khartoum and remarked that Sudanese were not yet ready to appreciate the value of that remarkable asset at the door step of their capital. He mentioned that this should not be discouraging and pointed out that 50 years ago bird watching in the United Kingdom was a hobby of a few eccentrics. Contrary to the acclaimed apathy of the Sudanese toward the conservation idea, a keen

sense of conservation could be read in the poetry of El Hardalu who lived in the 19th century. He was an illitrate and his poetry was memorized and well-known all over the Sudan. Recently, his poetry was published and it is still popular today. One of his famous poems described the mirgation of the sommering gazelle from the Dinder region to its rainy season habitats in the Butana Plains in Kassala Province. His poem included observations on possible reasons of migration, types of soils and vegetation in the wet season habitats, and herds' composition during the migration period. He also encouraged people not to hunt this beautiful gazelle and was known to be a non-hunter himself (El Hardalu 1978).

Habitat management was not practiced or discussed with the exception of the periodical distribution of salt in some game areas. Wildlife transplantation was practiced in the 1920's as 7 wild sheep were reintroduced to the Sabaluka Hills to replace the stocks which were exterminated during the Mahdia. Forbes (1949) reported that about 100 sheep were in Sabaluka Hills 28 years after the reintroduction. No research was conducted in wildlife and the Game Preservation Branch did not have any biologists among its staff.

PRESENT STATUS OF WILDLIFE

Wildlife has been disappearing from several areas in Northern Sudan. The human and livestock populations are increasing, creating more demand on natural resources. Natural pastures are destroyed and very little is done to keep human activities in harmony with the natural ecological balance. This chapter includes information about the present distribution of wildlife in Northern Sudan. The conservation status in the protected wildlife areas -- national parks, game reserves and game sanctuaries -- is evaluated. Information about the Wildlife Administration, the governmental agency responsible for wildlife conservation in Northern Sudan, is presented. Other factors affecting wildlife conservation such as wildlife laws and public attitudes toward wildlife are also discussed.

Present Distribution of Wildlife

The Nile and Northern Provinces: There are a few recent references about wildlife in the Nile and Northern provinces (Figure 4). Dorcas gazelles are still present, in few numbers, in the desert areas west of the Nile (The Wildlife Administration 1982). The Nile and Northern provinces are the only provinces in Northern Sudan where the Wildlife Administration had not established regional offices. Crocodiles, waterfowl, sandgrouse and bustards are still present in the two provinces, but there is no information on their distribution and abundance.

Kassala and the Red Sea Provinces: The wild ass, which is included in the 1969 International Union of Nature Conservation (IUCN) list of endangered species, was reported by El Bedawi (1975) to occur at Ellengaib and Hamashkorieb in Kassala Province (Figure 4). Other species which occur in Kassala Province are: sommering gazelle, red-fronted gazelle, dorcas gazelle, oribi, reedbuck, waterbuck, tiang, buffalo, giraffe, roan antelope, kudu, bushbuck, warthog, lion, spotted hyaena, serval cat, mongoose, baboon, grivet monkey, patas monkey, bustard, guinea fowl, and ostrich. The habitats of the above mentioned animals are reduced to a few areas and their numbers have been drastically reduced during the last decades (El Bedawi 1975).

The sommering gazelle is becoming a rare and endangered species. Outside of the Sudan the sommering gazelle is found only in Ethiopia and Somalia. Until the 1960's sommering gazelles migrated in thousands from the Rahad Game Reserve and Dinder National Park to their wet-season habitats in the Butana Plains of Kassala Province. With the introduction of mechanized rain-fed agriculture in the Butana the numbers of sommering gazelles started to decline until they completely disappeared from the Dinder and Rahad early inthe 1970's. The sommering gazelle exists now in limited ranges in northeastern Kassala at Togan and Mamman areas (The Wildlife Administration 1980).

The wide variety of animals which were admired by many explorers and hunters at the end of the last century and the beginning of this century in the Plains of Setit and Atbara are no longer found there. El Bedawi (1975) explained that the loss of wildlife in Setit and Atbara Plains was caused by destruction of habitats and poaching.

The Red Sea region has several areas with a good variety of wildlife. In the northern part of the region which includes Jebel Elba and Wadi Aamour the following animals exist: wild sheep, Nubian ibex, dorcas gazelle, red-fronted gazelle, dik-dik, cheetah, striped hyaena, ostrich, bustard, sandgrouse, and francolin (El Essali 1982). El Bedawi (1975) reported the presence of the Nubian ibex at Jebel Melgoieb (Lat. 20°-30'N, Long. 45°-36'E) and Jebel Erba Kerbab (Lat. 20°-45'N, Long. 50°-36'E) and Jebel Shallal (Lat. 23°N, Long. 30°-36'E). He noted that the Nubian ibex still exists in reasonable numbers on the higher hills where it is naturally protected from poaching.

The central part of the Red Sea region which includes the Erkawit area has the following animals: Nubian ibex, dorcas gazelle, dik-dik, striped hyaena, baboon, patas monkey, grivet monkey, hares, and foxes (El Essali 1982). El Bedawi (1975) reported the presence of the Nubian ibex at Jebel Gefawab Kamtieb (Lat. 18° 30'N, Long. 37°E) and Jebel Eirba (Lat. 19°N, Long. 36° 45'E). In the southwestern part of the region, which includes Wadi Aashar and Wadi Ram, the following animals exist: Nubian ibex, sommering gazelle, dorcas gazelle, leopard, striped hyaena, and black-backed fox. In the southern area which includes Tokar and extends to the Red Sea one can find warthog, dorcas gazelle, Nubian ibex, land tortoise, baboon, patas monkey, grivet monkey, and fox (El Essali 1982).

Northern Kordofan and Northern Darfur Provinces: The ranges of desert wildlife species in Northern Kordofan and Northern Darfur have been very much reduced due to increased domestic animal populations and by the increasing poaching on wildlife. Dorcas gazelles were reported

to occur in few numbers around Baggeria, Abu Sufian, and Gerieh el Sarha (Figure 5) (Lamprey 1976, The Wildlife Administration 1980). Other species reported at Gerieh el Sarha were red-fronted gazelle, striped hyaena, secretary bird, guinea fowl and bustard. Dorcas gazelle, dama gazelle, ostrich and oryx were reported around Jebel Tegru and Jebel El Muggassem (The Wildlife Administration 1967). Lamprey (1976) made an aerial survey of Jebel Tegru and confirmed the presence of all the species reported by the Wildlife Administration in 1967 except the oryx. He also reported the presence of the dorcas gazelle and ostrich at Wadi Howar and south of El Atrun but no addax, oryx or addra gazelle were seen. The latest reports about the addax were in 1967 when Lord Mcpherson shot 2 males out of a herd of 15 seen in Wadi Howar (The Wildlife Administration 1967). The wild sheep had been reported to occur in several hills in Northern Kordofan and Northern Darfur (DECARP 1976). The Meidob Hills of Northern Darfur still has a good population of dorcas gazelle. This area had been poached less than other areas as it is not traversed by truck routes.

Southern Kordofan Province: In central Kordofan, Nimir and Hashim (1978) reported the presence of the greater kudu, dik-dik, porcupine, turtle, python, guinea fowl and fan-tailed raven at Jebel Ed Dair (Figure 5). The greater kudu has also been reported at Jebel Karan east of the Abu Gibeiha (The Wildlife Administration 1981). Expansion of mechanized rain-fed agriculture, increased numbers of livestock, and increased possession of firearms have resulted in drastic decrease in the wildlife of Southern Kordofan. The Njama area southwest of El Muglad used to be occupied with large numbers of tiang, roan antelope,

red-fronted gazelle, and dik-dik. This area also represents an important part of the elephant's wet-season habitats. During the last four decades wildlife has been reduced very much in Njama area due to increased livestock and poaching. Oil prospecting activities which were started 5 years ago in Njama area are adding to the problems threatening wildlife. However the importance of this area as a wet season habitat for the elephant should be emphasized. Several other species also migrate to this area from the south during the rainy season. The nomads and their livestock use this area during the dry season and evacuate it to their wet season pastures in the north early in the rainy season.

The Abyei district in the extreme southwestern part of Southern Kordofan includes several important wildife areas: Abu Nafissa (24 kms south of the town of Abyei), Anagadil (27 kms east), Alleo (32 kms east), and Talhat el Messeri (120 kms west). Giraffe, roan antelope, tiang, red-fronted gazelle, dik-dik, reedbuck, kob and oribi occur in these areas. Abundance and distribution of wildlife in the Abyei district depends on the movement of the nomads and their livestock and what parts they occupy during the dry season. During the last 10 years wild animals decreased considerably due to drough conditions in Bahr el Arab river, increased cultivation and settlement at Abu Nafissa, and increased poaching (The Wildlife Research Unit 1977, The Wildlife Administration 1981). The Doleiba and El Arraish on the boundary between Southern Kordofan and the Upper Nile provinces are probably the only areas in Southern Kordofan where there is still a good variety of animals throughout the year. Animals found in these areas are: giraffe, hippopotamus, tiang, kob, lion and leopard. This area is also subjected to considerable poaching activities.

Splendid waterfowl habitats are found in Lake Abyiad, and to a lesser degree in Lake Keilk. The two lakes lie south of Kadugli in Southern Kordofan. Lake Keilk is very much used by the nomads and their livestock during the dry season while Lake Abyiad is subjected to less utilization by nomads. A list of resident and migratory birds observed by the author at both lakes are presented in Tables 2 and 3. A few numbers of big game were reported to occur around the lakes during the dry season (The Wildlife Administration 1981).

Southern Darfur Province: The present status of wildlife in Southern Darfur is presented in the next chapter. The wildlife of Southern Darfur is dealt with, in some details, in the next chapter and a case study is developed from which conclusions could be applied elsewhere in Northern Sudan. The present status of wildlife in Southern Darfur is presented with other relevant information about important wildlife areas, the role of the Wildlife Administration, wildlife values and wildlife damage.

Khartoum Province: Wildlife of Khartoum is restricted to scattered groups of dorcas gazelles west of the Nile and north of Omdurman (Figure 5). Several groups of gazelles were reported at Qoz Abu Dulleo and El Dehaima el Gharbi northwest of Omdurman (The Wildlife Administration 1982). Poaching is widely practiced by some of the affluent people of Khartoum. Waterfowl are present in some parts of the Nile in Khartoum province.

The White Nile Province: Wildlife in the White Nile province (Figure 5) has been considerably reduced during the last decades. A good

Table 2. Partial bird list of Lake Kelik based on observations from April 6 to April 8, 1981. [1/]

Scientific Name	English Name	Arabic or Local Name
Plectropterus gambensis (Linnaeus)	Spurwing goose	Shaga
Sarkidiornis melanotos (Pennant)	Comb duck	Umm kurr, Umm garn
Alopochen aegyptiaca (Linnaeus)	Egyptian goose	
Dendrocygna viduata (Linnaeus)	Whistling teal	Um Shelili
Plegadis falcinellus (Linnaeus)	Glossy ibis	Maiz el Bahr
Threskiornis aethiopicus (Latham)	Sacred ibis	Naeiga-Abu mungal
Hagedashia hagedash (Latham)	Hagedash ibis	Naeiga
Actophilornis africana (Gmelin)	African jacana or Lilly trotter	Tir el Soteib
Balearica pavonina	Crowned crane	Garnoug
Leptoptilos crumenifera	Marabou stork	Aub siain
Ciconia ciconia	White stork	Bagbar
Ephippiorhynchus senegalensis (Shaw)	Saddle-bill stork	Abu mairam
Pelecanus onocrotalus (Linnaeus)	White pelican	Baga
Ardea cinerea (Linnaeus)	Grey Heron	Habib
Ardea melanocephala (Vigors and Children)	Black-headed heron	-
Casmerodius alba (Linnaeus)	Great white egret	Tir el Bagar
Mesophoyx intermedia (Wagler)	Yellow-billed egret	Tir el Bagar
Tringa stagnatilis (Bechstein)	Marsh sand-piper	-
Cuncuma vocifer (Daudin)	Fish eagle	Bulli
Bucorvus abyssinicus (Boddaert)	Ground horn-bill	Abun duluk
Himantopus himantopus (Linnaeus)	Stilt	-
Streptopelia capicola (Sundervall)	Ring-necked dove	Gumri
Coracias abyssinica (Hermman	Abyssinian roller	El Tir el Khodari
Ptilostomus afer (Linnaeus)	Piapiac	-

[1/] Table based on observations by the author.

Table 3. Partial bird list of Lake Abyiad, based on observations made during the period from April 13 to April 15, 1981.[1/]

Scientific Name	English Name	Arabic or Local Name
Phalacrocorax africanus (Gmelin)	Reed cormorant	-
Anhinga rufus (Lacepede and Daudin)	Darter	-
Pelecanus onocrotalus (Linnaeus)	White pelican	Baga
Ardea cinerea (Linnaeus	Grey heron	Habib
Casmerodius alba (Linnaeus)	Great white egret	Tir el Bagar
Egretta garzetta (Linnaeus)	Litte egret	Tir el Bagar
Ephippiorhynchus senegalensis (Shaw)	Saddle-bill stork	Abu mairam
Leptoptilos crumenifera (Lesson)	Marabou stork	Abu siain
Anastomosus lamelligerus (Temminck)	Open-bill stork	-
Lbis ibis (Linnaeus)	Wood ibis	-
Plegadis falcinellus (Linnaeus)	Glossy ibis	Maizel Bahr
Hagedashia hagedash (Latham)	Hagedash ibis	Naeiga
Sarkidiornis melanotos (Pennat)	Comb duck	Ummkurr, Umm garn
Plectoropterus gambensis (Linnaeus)	Spurwing goose	Shaga
Cuncuma vicifer (Daudin)	Fish eagle	Bulli
Lophaetus occipitalis (Daudin)	Crested eagle	-
Miluus migrans (Boddaert)	Kite	Hidaya
Actophilornis africana (Gmelin)	African jacana or lily trotter	Tir el Soteib
Balearica pavonina	Crowned crane	Garnoug
Sarciophorus tectus	Blackheaded plover	-
Afribyx senegalla	Wattled plover	-
Himantopus himantopus (Linnaeus)	Stilt	-
Streptopelia capicola (Sundevall)	Ring-necked dove	Gumri
Streptopelia decipiens (Finsch and Hartlamb)	Mourning dove	Gumri
Coracias abyssinica (Hermman)	Abyssinian roller	El Tir el Khadari
Ceryle rudis (Linnaeus)	Pied king-fisher	Agib
Ptilostomum afer (Linnaeus)	Piapiac	-
Corvus albus (Muller)	Pied crow	Ghurab
Quelea quelea (Linnaeus)	Sudan dioch	Gadoum ahmr

[1/] Table based on observations by the author.

population of dorcas gazelles in El Baja area west of El Duiem almost disappeared during the last 5 years due to poaching (The Wildlife Administration 1982). Similarly the variety of animals which were found at El Meganis area south of Kosti had disappeared because of excessive poaching and loss of pastures to agriculture (The Wildlife Administration 1982).

The Gezira and the Blue Nile Provinces: Wildlife in the Gezira province has been drastically reduced following the establishment of the largest agricultural scheme in the country (the Gezira Scheme) early in this century (Figure 5). The Gezira Scheme had expanded to one of the largest irrigated agricultural enterprises in the world (total areas about 2,000,000 acres). Increased rat populations and their damage to cultivated crops is becoming a major concern in the Gezira Scheme.

Wildlife in the Blue Nile province is restricted now to the Dinder National Park and a few areas in the southeastern part of the province (Figure 5). The greater kudu is found in a few hills around the Kurmuk. In the Khor Yabous area buffalo, tiang, roan antelope, reedbuck and lion are found. Larger numbers of animals move into this area during the rainy season from the Upper Nile Province.

Protected Wildlife Areas

Part III of the 1935 Wild Animals Ordinance (The Democratic Republic of the Sudan 1962) -- as amended up to 1982 -- enables the Minister of Interior to establish national parks, game sanctuaries and game reserves. Entry into national parks is restricted to holders of entry

permits issued by the Minister of Interior or the Director of the Wildlife Administration. Hunting is prohibited in national parks and game sanctuaries and may be permitted in game reserves only under the authority of a special permit issued by the Director of the Wildlife Administration. A new paragraph introduced in 1969 prohibits residence, cultivation, and pasturing of domestic animals in game reserves without the permission of the director.

The 1939 national parks, sanctuaries and reserves regulations (The deomcratic Republic of the Sudan 1962) -- as ammended up to 1982 -- prohibits the use of firearms within national parks except in self defense, prohibits forestry, agriculture, mining and other activities involving the alteration or configuration of the soil or vegetation, except with the permission of the Minister of Interior, and prohibits the introduction of any wild or domestic animals in the park. The Minister is empowered to make rules for regulation of activities within each national park. With respect to game reserves, each reserve was established for the protection of certain species (Table 4), and other species could be hunted with appropriate hunting licenses.

There are three national parks in the Sudan, only one of them (Dinder National Park) exists in Northern Sudan; 15 game reserves, three of which exist in Northern Sudan; and three game sanctuaries all existing in Northern Sudan. Figure 3 shows the location of the Dinder National Park, game reserves and sanctuaries of Northern Sudan. Table 4 presents areas, locations, and the game of the above mentioned areas.

Table 4. National Parks, game reserves and sanctuaries of Northern Sudan.[1/]

Name	Area km^2	Province	Year established	Brief description
Dinder National Park	8,960	Blue Nile	1935	*Acacia seyal-Balanites aegyptiaca* Savannah in the north and *Combreteum hartmannianum* woodlands in the south, clayey flood plains of Dinder and Rahad rivers. Buffalo, giraffe, reedbuck, tiang, roan antelope, bushbuck, waterbuck, greater kudu, lion, ostrich and several other species.
Rahad Game Reserve	3,380	Kassala	1939	Similar to Dinder.
Sabaloka Game Reserve	290	Khartoum and Nile	1946	Rolling hilly country, desert scrub, valleys with scattered acacia bush. Wild sheep.
Tokar Game Reserve	7,252	The Red Sea	1939	Desert salt marsh, near the Red Sea, *Acacia tortils* scrub. Sommering and red-fronted gazelles.
The Nile Bird Sanctuary	Approx. 50	Khartoum	1939	The White Nile, flooded areas. *Acacia nilotica* forest. Small islands. Small areas of cultivated vegetables. Migratory and resident birds.
Sinkat/Erkawit Sanctuary	Approx. 230	The Red Sea	1939	Erkawit Plateau and surrounding hills, the highest hill is Jebel Sela (1,237 m). *Meytenus senegalensis* and *Olea chrysophylla*. Nubian ibex, klipspringer.
Erkawit Sanctuary	Approx. 813	The Red Sea	1939	Similar to Sinkat/Erkawit sanctuary.

[1/] Compiled from Happold (1966) and the Wildlife Administration (1970).

The Dinder National Park: Holthworth (1968) and Dasmann (1972) described the history, topography, soil, climate, flora and fauna of the park. The park is not a complete ecological unit because several of its animals migrate to wet season habitats outside its boundaries. Agricultural development had been started in the wet season habitats of the park's animals around 1967. An ever-increasing acreage of the wet season habitats is being licensed by the government for agricultural use. Unlicensed agricultural use on goverment land is also practiced with little governmental action to stop it. Not only are the wet season habitats destroyed, but the migrant animals are subject to increasing harassment and killing (Dasmann 1972, Hashim and Nimir 1977).

The areas surrounding the park were relatively uninhabited until the beginning of the 1960's when people from western Sudan and neighboring west African countries, affected by drought conditions in their areas, moved into the Dinder region. About 20 villages exist now along the boundaries of the park. Inhabitants of these villages grow rainfed crops such as sorghum and raise cattle, sheep and camels along the park boundaries and often trespass within the park. They are also active in felling trees for charcoal production which has become a very profitable product because it is in high demand in the cities of central and northern Sudan. Villagers are also responsible for most of the poaching problems in the park. Although one village was successfully moved in 1974 to a new location away from the park, there are no similar plans to relocate the rest of the villages (Nimir and Hashim 1975).

The Dinder National Park does not provide economic benefits for the people of the Dinder region. A few temporary jobs are usually created each year following the end of the rainy season. Workers are recruited to open the seasonal roads and build the camp (grass huts) in the park. People have been allowed to collect gum arabic from acacia trees in the park, but that practice was stopped since 1970. Table 5 presents the number of people arrested for illegal activities within the park and numbers of herds[1/] of domestic livestock found trespassing in the park during the period from 1958 to 1982. A large increase of 143% occurred in the numbers of people arrested for illegal activities (nomads with trespassing livestock not included) in the last 10 years compared with the decade before.

The increase of cultivated areas in the Dinder region is pushing the nomads from their traditional dry season ranges and forcing them to seek forage elsewhere. This has led to increasing invasion of the park by nomads and their livestock. Livestock trespassing has increased about 126-fold during the period 1970 to 1982 when compared to recorded livestock trespassing during the period from 1958 to 1970. Besides competing with wild animals for forage and water, domestic livestock could be a source of infectious diseases to wild animals. This has led to outbreaks resulting in losses of large numbers of animals usually at the end of the dry season when the wild animals gather around the few remaining water pools. Rinderpest outbreaks in 1970 and 1982 resulted in losses of hundreds of animals. The results of carcass

[1/] The average number of animals in one herd is 800, 200 and 50 for sheep, cattle and camels, respectively. Most of trespassing in the period from 1975 to 1982 has been attributed to sheep.

Table 5. Numbers of people arrested for illegal activities and numbers of herds of domestic livestock found trespassing in the Dinder National Park during the period from 1959 to 1982.[1/]

Years	Herds of trespassing livestock[2/]	Collectors of gum arabic	Poachers	Entering the park without permit	Collectors of dom palm leaves and wild honey	Fisher-men	Possession of unlicensed firearms	Total
1958-1959	-	-	15	-	-	-	-	15
1959-1960	9	59	2	-	-	17	-	87
1960-1961	-	144	2	-	6	-	-	152
1961-1962	2	82	3	-	-	-	-	87
1962-1963	-	-	18	-	-	6	-	24
1963-1964	-	-	-	-	-	-	-	-
1964-1965	-	-	-	-	-	-	-	-
1965-1966	-	6	9	30	-	-	-	45
1966-1967	-	15	24	-	-	-	-	39
1967-1968	9	150	-	48	5	-	-	212
1968-1969	-	-	7	-	-	-	-	7
1969-1970	-	-	5	-	85	-	-	90
Total 1957-1970	20	456	85	78	96	23	0	758
1970-1971	33	-	-	-	-	-	-	33
1971-1972	2	-	46	-	1	-	-	49
1972-1973	64	-	58	-	11	-	12	145
1973-1974	135	11	65	15	4	33	-	252
1974-1975	155	-	24	26	29	-	11	245
1975-1976	229	-	10	27	36	29	19	350
1976-1977	270	-	10	8	36	29	-	353
1977-1978	181	-	18	6	-	10	-	215
1978-1979	241	-	26	14	-	44	8	333
1979-1980	432	-	22	15	15	10	19	513

Table 5. (continued) Numbers of people arrested for illegal activities and number of herds of domestic livestock found trespassing in the Dinder National Park during the period from 1959 to 1982.[1/]

Years	Herds of trespassing livestock[2/]	Collectors of gum arabic	Poachers	Entering the park without permit	Collectors of dom palm leaves and wild honey	Fisher-men	Possession of unlicensed firearms	Total
1980-1981	422	-	55	96	-	27	25	625
1981-1982	365	8	33	28	18	4	16	472
Total 1970-1982	2529	19	367	235	150	175	110	3585

[1/] Table compiled from the Wildlife Administration records.

[2/] The average numbers of animals in one herd are 800, 200 and 50 for sheep, cattle and camels, respectively. There is no detailed information on trespassing by different domestic animals, however most of the trespassing in the period from 1975 to 1982 have been attributed to sheep.

counts in a limited area of the park between April 21st and May 31st during the 1980 rinderpest outbreak were as follows: 658 reedbucks, 33 buffalo, 15 bushbucks and 3 oribi (Mohammed 1980). Anthrax outbreak was reported in 1974 in wild animals with heavy losses occurring among reedbucks and buffalo. In all of the above cases outbreaks were reported among livestock in areas around the park before symptoms started appearing in wild animals.

Several species which were reported to occur in the park had already disappeared. The black rhino and the hippopotamus were last reported there at the beginning of the century (Harrison 1953). Crocodiles were abundant until in the 1940's, an organized campaign drastically reduced their numbers. The reported purpose of the crocodile cropping was to increase the Game Preservation Department's revenue. No crocodiles were reported in the park during the 1960's and 1970's (Mahna 1977). However in 1983 one crocodile has been reported in one of the pools of River Dinder (Awad 1983).

The Lelwell hartebeest was last reported in the 1950's (Mahna 1977). The sommering gazelle, which was abundant until the 1960's, was completely exterminated from the park by 1970 due to the vast expansion of agriculture in its wet season habitats. A serious decrease in the numbers of tiang and waterbuck amounting to 60% and 30%, respectively, during the period from 1970 to 1976 was also attributed to shrinkage of their wet season habitats and competition with trespassing livestock in their dry season habitats (Hashim and Nimir 1977).

The loss of the wet season habitats as well as increased livestock trespassing could be mainly related to the lack of any landuse policy in the Dinder region. Decision makers admit now that serious mistakes

were made by allowing large areas around the park to be cultivated. In 1982 the area of the park was increased by approximately 2,500 km^2. The increase in the area of the park has been planned to incorporate some of the wet season habitats. However, this decision was not enforced in 1982 and the farmers were allowed to cultivate for one last season within this newly incorporated area. Adding to the problems of the park is the lack of personnel, vehicles and funds to conduct patrolling, management and necessary research.

Although the Dinder National Park is the closest African park to Europe and the Middle East, tourists visiting the park averaged 375 per year for the period from 1973 to 1978 (Osman 1980). The low number of tourists visiting the park is mainly due to the poor infrastructure development in the country and lack of international publicity about the park. Currently there are plans to build a tourist lodge in the park and the recent construction of highways in the country will probably encourage more tourists to visit the area.

Game Reserves: Existing game reserves in Northern Sudan are Tokar, Rahad and Sabaloka. The first two are for protection of all protected species that occur within their boundaries and the third was established for the protection of the wild sheep and ibex. Darling (1961) noted that the reserve system as a whole, had been quite inadequately staffed. Hashim and Nimir (1978) remarked that the Wildlife Administration had done very little to enforce conservation in the game reserves and noticed that both Tokar and Rahad reserves had experienced drastic destruction of their habitats and wildlife. Dasmann (1972) stated that the most serious limitations of game reserves in the Sudan were that they were left open to human settlement, cultivation and heavy use by livestock. He

concluded that as a result, some of the game reserves -- including the Rahad -- are no longer suitable for their classified purpose. The situation in the Sabaloka reserve is not better than in Rahad and Tokar. There are no longer any of the wild sheep or ibex present at the Sabaloka (Nimir and Hakim 1978).

Game Sanctuaries: Two of the three sanctuaries in the Sudan were established in Erkawit area; the Red Sea Hills, to protect the Nubian ibex. The third game sanctuary was established on the Nile, south of Omdurman, to protect migratory waterfowl and many of the local northern Sudan birds (Happold 1966). Like the reserves, these sanctuaries are very seldom patrolled. Happold (1966) stated that he met several hunters within the Nile sanctuary who were not aware of its existence, and on several occasions he found used cartridges by the water in this area. Nimir and Hakim (1978) recommended that immediate action was needed to stop overgrazing and uprooting of shrubs in the Erkawit and Sinkat sanctuaries.

The Wildlife Administration

In Northern Sudan, the Wildlife Administration is the only governmental agency entrusted with enforcing wildlife laws and executing wildlife conservation policies. Several changes were made in the relationship of the Wildlife Administration to other governmental agencies and ministeries during the last 20 years. The Wildlife Administration -- the Game and Fisheries Department, at that time -- used to be under the under-secretary of the Ministry of Animal Resources until 1964. In 1965 the Department was transferred to

the direct supervision of the Minister of Animal Resources. At the beginning of the 1970's the Fisheries section was separated. The Wildlife Administration -- The Wildlife Preservation Department, at that time -- was part of the newly formed Natural Resources Agency in the Ministry of Food, Agriculture and Natural Resources. In 1974 the Wildlife Research Unit, which had been established in 1968, was separated from the Wildlife Administration and became part of the Agricultural Research Corporation. Another change was made in 1981 when the Wildlife Administration was separated from the Ministry of Agriculture and became part of the Ministry of Interior.

The Wildlife Administration offices in Southern Sudan were separated in 1972 following the establishment of the Regional Government of Southern Sudan and became part of the newly established regional Ministry of Wildlife and Tourism. There has been very little coordination between the Wildlife Administration and the regional Ministry of Wildlife and Tourism which became responsible for all wildlife related activities in Southern Sudan. Five other regional governments were established in 1980 in Northern Sudan for the Northern, Eastern, Central, Kordofan and Darfur regions. Regional wildlife offices in Northern Sudan work under the new regional governments. Although the regional offices are not separated from the Wildlife Administration headquarters at Khartoum the new relationship is not well defined or understood.

The Wildlife Administration is understaffed and lacks the qualified personnel. Awad and Farah (1978) show the levels of education and specialization among the staff of the Wildlife Administration in comparison with other administrations working in the field of natural resources (Table 6). Table 7 presents the distribution of the

Table 6. Education and specialization among the personnel of the Wildlife Administration and other Natural Resources Administrations.[1/]

	Natural Resources Administration				
Degrees	Wildlife	Pasture	Forestry	Soil Conservation	Total
Ph.D.	-	2	-	2	4
M.S.	1	19	4	14	38
B.S.	6	51	21	95	173
Technicans - with post-high school education	-	22	281	22	325
Technicans - with high-school education	27	26	-	51	104
Others	2	47	54	13	116
Total	36	167	360	197	760

[1/] Table from Awad and Farah (1978).

Table 7. Man-power distribution of the Wildlife Administration in the different provinces of Northern Sudan.[1/]

Region	Province	Senior Staff	Game Officers	Game Scouts	Workers	Total
Red Sea	Red Sea	2	5	13	2	22
	Kassala	2	5	25	1	33
Kordofan	N. Kordofan	2	4	12	5	23
	S. Kordofan	1	6	23	10	40
Darfur	N. Darfur	1	5	14	-	20
	S. Darfur	2	8	25	7	42
Khartoum	Khartoum	2	4	10	-	16
	The Wildlife Administration Headquarters	14	23	70	164	271
Central	White Nile	1	2	6	-	9
	Gezira	1	2	6	-	9
	Blue Nile	2	12	78	30	122
Total		30	76	270	219	607

[1/] Table compiled from the Annual Report of the Wildlife Administration (1982).

staff of the Wildlife Administration between the different regional offices of Northern Sudan.

Expenditure and revenue of the Wildlife Administration from 1970 to 1981 is presented in Table 8. Revenue of the Wildlife Administration comes from the sale of live animals, sale of ivory and other animal parts, sale of game licenses and ammunition cards and entry fees to national parks and the Khartoum Zoo. Table 9 presents the five-year development plan, 1970-1971 to 1974-1975 and the six-year development plan, 1978-1979 to 1983-1984 of the Wildlife Administration. It should be pointed out that the government was not able to provide all necessary funds for development of any year and actual expenditures were far less than original plans presented in the table. Nevertheless, the plans reflect the development objectives of the Wildlife Administration as accepted by the National Ministry of Planning.

The Wild Animals Ordinance

The 1935 Wild Animals Ordinance (Sudan Government 1962), as amended until 1982, is the basic legislation on wildlife and national parks under which the Wildlife Administration presently operates. The Ordinance provides for three classes of protected wild animals and birds (Table 10). Animals in Schedule I are not to be hunted, killed or captured and eggs of birds in Schedule I are not to be collected except by a special permission from the Minister of Interior which will only be given for important scientific purposes or essential administrative purposes. Animals in Schedule II are allowed to be hunted only by virtue of a special license by the Minister. Animals in Schedule III are allowed to be hunted under an ordinary license. The Minister

Table 8. Expenditures and revenues of the Wildlife Administration 1970[1/] to 1981.[2/]

Fiscal Year	Expenditures in L S			Revenues in L S	Revenue as % of Total
	Personnel	Supplies	Total		
1970-1971	173795	34904	208699	42470	20.3
1971-1972	181740	54003	235743	43112	18.3
1972-1973	222190	64661	286851	48502	16.9
1973-1974	267335	52366	319701	48173	15.1
1974-1975	127425	129650	257075	34236	13.3
1975-1976	247455	50645	198100	23821	12.0
1976-1977	147145	30000	177145	-	-
1977-1978	297110	49320	346430	-	-
1979-1980	203563	105465	309028	97419	31.5
1980-1981	196865	131000	327865	210000	64.1

[1/] Expenditures figures for 1970-1974 includes the Fisheries Section before it was separated into a separate department.

[2/] Data compiled from the records of the Wildlife Administration and Awad and Farah (1978). Figures are in Sudanese pounds (LS).

[3/] Revenues for 1976-1977, 1977-1978 and expenditures and revenues for 1978-1979 could not be located in the Wildlife Administration records.

Table 9. The five-year and six-year development plans 1970-1975 and 1978-1984 of the Wildlife Administration.[1/]

Items	The five-year plan 1970-1975 L S	The six-year plan 1978-1984 L S
Capture of wild animals	23,850	250,000
Cropping of wild animals	21,750	-
Development of Dinder National Park and Darfur Conservation area	66,850	1,400,000
Wildlife research	34,350	-
Wildlife census	-	250,000
Wildlife conservation (law enforcement)	-	479,220
Public relations	-	100,000
Khartoum new zoo establishment	-	30,000,000
Total	146,800	32,479,220

[1/] Data compiled from the records of the Wildlife Administration.

[2/] LS = Sudanese pound.

Table 10. Schedules of protected animals.

SCHEDULE I	SCHEDULE II	SCHEDULE III
Aard wolf	Addax	Bushbuck (all species except giant)
Ass, wild	Addra gazelle	Bush pig
Elephant of which the tusks do not exceed 5 kilograms in weight	Bongo	Dik dik (all species
	Bushbuck, giant	Duiker (all species except yellow-backed)
Ibis (bald headed)	Cheetah	Eland, lesser
Rhinoceros (all species)	Chimpanzee	Gazelle (all species)
Shoe bill stork *Balaenicep rex*	Duiker, yellow-backed	Hartebeest (all species except Tora)
	Egret (all species)	Hippopotamus
	Eland, Giant	Hyrax
	Elepnant of which the tusks exceed 5 kilograms in weight	Ibex
		Klipspringer
	Flamingo, greater	Kob (all species)
	Flamingo, lesser	Kudu (all species)
	Giant forest hog	Leopard
	Giraffe	Monkey (other than Colbus)
	Hartebeest Tora	Oribi
	Hoopoe	Oryx Beisa
	Hornbill, ground	Reedbuck
	Ibis (all species other than bald headed)	Roan antelope
		Sheep, wild
	Marabou	Tiang
	Monkey, Colbus	Warthog
	Nile leehwe (Mrs. Gray's water-buck)	Waterbuck
		Wild cat (all species)
	Oryx algazal	Zebra
	Ostrich (wild)	
	Pangolin	
	Secretary bird	
	Sita tunga	
	Spoon bill	
	Saddlebill	
	White stork	
	Wooley necked stork	

could change any animal protection status but this has been rarely practiced. Different tribes are allowed to hunt animals in Schedule III without licenses provided that they do not use firearms and apply traditional methods not prohibited by the law. Similarly the limited hunting of elephants and giraffes without the use of firearms may also be authorized with the approval of the Minister. However, this was not practiced since 1975. Laws concerned with national parks, game sanctuaries and game reserves were discussed earlier in this chapter. Prohibited methods of hunting include hunting from a vehicle and aircraft, the use of fire, lights, poisons, explosives, traps and pits and the use of dogs, except in certain circumstances. The use of shotguns and 0.22 calliper rifles is restricted to bird shooting.

Control of traffic of protected animals and their trophies requires export and import licenses and prohibits their sale except as allowed in the regulations. The Ordinance also states that certain protected animals and their trophies are the property of the government, such as those killed in self defense or in contravention of the ordinance, and may be seized by authorized government officials.

The Game Regulations: The 1939 Game Regulations (Sudan Government 1962), as amended until 1975, lay down the forms and conditions for ordinary licenses and special permits. The ordinary licenses are divided into 6 classes: A and C allow hunting all over the Sudan and the rest of the licenses are restricted to specified locations. Class F is a one day license. In practice, only A and C licenses are issued (Moore 1974). A bird shooting license, License B, has been introduced in 1975 and it is required that all owners of shotguns must show a valid License

B if they want to purchase their annual quota of ammunition. A reptile license, License D, was introduced in 1979 for those who collect or trade in reptile skins.

Special licenses for Schedule II animals may be issued only to holders of Class A ordinary licenses or to a Sudanese holding a Class C license, though in the later case the special license is valid only within the province of residence of the holder. Purchasers of hunting licenses are required to report to the Wildlife Administration about the dates and places they hunted, sex of each kill, and injured animals. Royalties of SL 15 (about U.S. $40) are paid on each killed elephant. Table 11 presents numbers of animals of each species that may be killed on each license. Closed seasons, when hunting is prohibited, were declared for sandgrouses, bustards, ducks and geese.

International Agreements on Wildlife Conservation

The Sudan is a signatory of the African Convention on the conservation of nature and natural resources of 1968. The convention imposes a general obligation on signatory states to adopt the necessary measures to ensure conservation, utilization and development of soil, water, floral and faunal resources in accordance with scientific principles and in the best of interests of the people. Wise use and development of faunal resources is encouraged within the framework of landuse planning and of economic and social development. Signatory states are encouraged to adopt adequate legislation on hunting, capturing and fishing, regulating the issue of permits and prohibiting certain destructive methods of hunting. The convention also provides for special protection to be accorded to species threatened with

Table 11. Number of each species that may be killed on different game licenses in the Sudan.

Name of Animal	Available for whole Sudan License A	Available for whole Sudan License C	Available for one day License F
Bushbuck, other than giant	3	2	-
Bush pig	2	1	-
Dik dik	2	1	-
Duiker, Abyssinian	3	2	-
Duiker, red flanked	1	-	-
Duiker, blue	2	-	-
Eland, lesser	1	-	-
Gazelle, Giant	4	-	-
Gazelle, Mongalla	6	4	-
Gazelle, Rufifrons	4	4	-
Gazelle, Sommering's	6	4	1 or 1 rufifrons
Gazelle, Dorcas or Isabella	8	8	1
Hartebeast (all species except tora)	6	3	1
Hippopotamus	1	-	-
Ibex	2	-	-
Klispringer	1	-	-
Kob	6	6	-
Kudu, greater	2	-	-
Kudu, lesser	2	-	-
Leopard	4	2	-
Oribi	6	4	-
Oryx	1	-	-
Reedbuck (Chanler's)	1	-	-
Reedbuck (all other species)	6	2	-
Roan antelope	3	1	-
Sheep, wild	2	-	-
Tiang	8	4	1
Warthog	4	1	1
Waterbuck	8	4	1
Total	105	53	6

extinction or may become so threatened. Signatory states are to maintain and extend, where appropriate, existing conservation areas, preferably within the framework of land use planning programs, assess the necessity of establishing additional zones. The convention also includes provision on customary rights, the encouragement of research, the promotion of conservation education, the organization of national conservation services and interstate cooperation (Moore 1974).

The protocol between the Sudan, Uganda and Zaire on conservation of common natural resources was signed in 1982. It included provisions to control poaching and smuggling of endangered animals. The three governments agreed on meeting twice every year to review the situation and enforce the rules of the Protocol. Similar agreements were made between the Sudan and the Republic of Central Africa, and between the Sudan and Kenya. The Sudan is also a signatory of the 1973 Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The Sudan ratified CITES in 1982.

Public Attitudes Toward Wildlife

Residents of urban areas in Northern Sudan have only a few wild animals left around their areas and they cannot afford the expenses to travel to wildlife areas. The Sudanese education system teaches very little about wildlife and general conservation concepts. Curricula in primary schools and high schools do not include basic environmental studies or offer the students any knowledge of the Sudanese wildlife. A preliminary wildlife course has been introduced in the curricula of the Zoology and Forestry Departments of the University of Khartoum for the first time during the last 10 years. The Institute of Environmental

Studies (IES) of the University of Khartoum was established in 1979. The IES teaches post-graduate courses and conducts research in wildlife management and other environmental studies.

As a result of the lack of education in wildlife the urban population of the Sudan have little knowledge and awareness of existing wildlife resources. The Sudanese media has very little coverage of wildlife related information. The Sudanese's two major daily papers were reviewed for articles or news about wildlife. A total of 2,264 issues, covering the period from 11.21.1978 to 7.7.1982, were reviewed. Wildlife related information appeared in about 5% of the reviewed issues. The 120 articles, news items, and advertisements published in the reviewed issues are classified as follows: 38% are general conservation information (a great portion of them were copied from foreign sources with little relevance to the Sudan), 23% are related to the Wildlife Administration, 23% are related to Khartoum Zoological Gardens, and 16% are about the Dinder National Park. From the above it could be noted that the media coverage of wildlife related matters is very minimal and most of it is not dedicated to provide the public with information about the wildlife resources of the Sudan.

In contrast to the urban population lack of knowledge and interest in wildlife, people in rural areas were known to appreciate wildlife. That was mainly due to their more frequent contacts with wildlife, and because traditional hunting had been a significant part of their lives. With increased livestock numbers, expansion of mechanized rainfed agriculture, and increased possession of firearms,the activities of people in rural areas are becoming deterimental to the future of wildlife.

The establishment of the Sudanese Environmental Conservation Society (SECS) in 1975 is one positive development concerning changes in public attitudes towards wildlife conservation. SECS has a membership of about 400 and has been involved in holding meetings and exhibitions about wildlife conservation. The Sudanese Wildlife Society was established in 1982. This new society adopted an ambitious working program including raising funds for wildlife conservation projects, lobbying for better wildlife laws and conducting public education programs.

SOUTHERN DARFUR WILDLIFE

Introduction

Southern Darfur province was chosen to develop a case study from which conclusions about wildlife values and management practices could be applied elsewhere in Northern Sudan. The province is located in the western part of the Sudan and occupies an area of about 260,000 km^2. Population is about 2.5 million. Climate can generally be considered to be semi-arid with rain varying from 900 mm in the south to about 400 mm in the north. The rainy season is from June to September followed by a long dry season. Average annual temperatures of 27°C prevail but diurnal variations in excess of 20°C are common in the dry season. Vegetation is largely of a low-rainfall woodland-savannah type, with thorny, predominantely *Acacia* species in the north being replaced by more dense, taller deciduous trees in the south. Topography is generally level to gently undulating with an average elevation of 500 to 600 m. The northwestern corner of the province is dominated by the dormant Tertiary volcano, Jebel Marra, which has a maximum elevation of approximately 3,000 m (Wilson 1979).

Southern Darfur was chosen to develop a case study because it is one of the least developed provinces of Northern Sudan and still has a good variety of wildlife. In the following pages present distribution of wildlife in Southern Darfur will be discussed along with soils, flora and fauna of the major wildlife areas. The Radoam area, the most

important wildlife area of Southern Darfur, will be described in more detail. Observations on wildlife, results of questionnaires about wildlife values, and problems threatening the wildlife of the Radoam will also be discussed. The activities of the Wildlife Administration in Southern Darfur as well as records about hunting, poaching and wildlife damage will be covered.

Development Plans in Southern Darfur: There are several development projects being currently executed in Southern Darfur, but all of them failed to come up with a balanced multiple-use approach to utilize the natural resources. The Umm Aggaga (Figure 5) mechanized rain-fed agricultural scheme was established in 1976 and had been planned to occopy a maximum area of 44, 534 hectares. After a few years of production the scheme was closed as it failed to attract enough farmers and capital, however in 1982, there were new plans to reopen it. As typical of all other development projects in Southern Darfur, the project had been established in areas of natural pastures and the planners did not consider previous use of the area by nomads and wildlife.

In Jebel Marra and Wadi Salih (Garsila area) an agricultural development project has been started. Its activities are directed towards improvement of traditional agriculture and forestry plantation. The Western Savannah Development Project started in 1978, is presently operating with a capital of U.S. $57,000,000. Its goals are broadly described as rural development and it covers an area of 92,000 km^2 including most of the wildlife area to the south of Reheid el Berdi. Another similar project operating presently with a capital of about U.S. $150,000,000 has also been started with the main objective of

improving traditional agriculture in the whole region of western Sudan. None of the above projects are considering the wildlife resources of the region in their development plans.

The establishment of a regional government for Southern Darfur in 1981 was considered to be a progressive step which would lead to a better understanding of the natural resources of the region and their conservation. The regional government, however, did not show any serious intentions towards dealing with these subjects.

Present Distribution of Wildlife in Southern Darfur

Wilson (1979) stated that most species found in Southern Darfur have undergone severe reduction in numbers and suffered a decrease in their distributional range over the last 75 years. He noted, however, that only a very few species which had been recorded in the province are not found there now. He explained that the principal causes of the reduction in numbers and range are the indirect effects of man and his domestic animals through habitat destruction. He further added that the elephants and giraffes have suffered from poaching and traditional hunting, and the larger carnivores were systematically exterminated as a livestock protection measure.

The Wildlife Administration (1981) reported that the most important wildlife areas in Southern Darfur have been: the Radoam area (Figure 5) in the southwestern corner of the province, the Garsila area along the Sudan-Chad and the Sudan-Central African borders, and the area to the south of Rehied el Berdi. Other areas with less abundant wildlife are: the area to the south of Abu Matariq, Jebel Marra with its unique mountainous habitats, and Lake Kundi which provides good habitats for resident and migratory waterfowl (Figure 4).

None of the above mentioned areas had been declared as a protected area with the exception of the Radoam area which was only declared as closed for hunting in 1981. Intentions to establish a national park at Radoam area and game reserves elsewhere are hindered by lack of personnel, funds,and minimum interest and motivation among government officials who are supposed to pursue the complicated legislative and administrative procedures to achieve such goals.

The Radoam Area: The area is located between latitudes 9^{o} 53' and 8^{o} 50' north and longitudes 23^{o} 40' and 24^{o} 37' east. It is bounded on the west with the Sudan-Central Africa border and on the south the boundary between Southern Darfur and Bahr el Ghazal provinces. Total area is 11,344 square km.

The area consists of a clay plain with a few scattered hills and some sandy ridges. The landscape becomes decidedly hilly towards the south and southeast. The whole region is straddled by a vast network of streams, most of which lead to Bahr el Arab, a tributary of the White Nile. The largest of these streams are Adda, Umbelasha, and Rikki.

Rainfall data from Radoam town, on the extreme northwestern part of the area, were analyzed for the period 1943 to 1972 and a reduction of one third of the rainfall from 940 mm in 1943 to 630 mm in 1972 is indicated by the analyzed data. As there are no other rainfall recording stations, Field (1974) using rainfall data from neighbouring Central Africa, estimated the rainfall in the Radoam area to vary between 900 mm in the extreme south to 630 mm in the north. The rainy season extends from late April to November.

The vegetation of the area was classified by Harrison and Jackson (1958) as Woodland Savannah. The dominant trees are *Combretum*

spp., *Terminalia laxiflora*, *Anogeissus schimperi*, and *Isoberlina doka*. In addition *Khaya senegalensis* and *Kigelia aethiopica* are all well represented. The wet meadows (dahals)[1/] are a characteristic feature of the vegetation of the Radoam. The dahals occupy low depressions and are flooded by the streams and frequently contain one or more water pools that persist throughout the dry season. Dominant grasses are: *Hyparrhenia* spp., *Chloris gayana*, *Panicum maximum*, and *Cyndon dactylon*. The dahals with their abundant green vegetation and water pools are utilized by animals during the dry season.

The Radoam area has a wide variety of wildlife. Elephant, Giraffe, buffalo, giant eland, roan antelope, korrigum tiang, waterbuck, kob, reedbuck, bushbuck, oribi, duiker, red-fronted gazelle, warthog, bush pig, jackal, hyaena, lion, leopard, wild dog, patas monkey, baboon and ostrich are all present. A rich variety of birds is also present which includes: bustards, guinea fowl, francolins, ground hornbill, marabou stork, saddle-bill stork, crowned craine, grey heron, great white egret, chanting goshawk, bateleur eagle, cormorant, pied kingfisher, hammerkop, ibises, woodpeckers, blue-eared glossy starling, green wood hoopoe, bee-eaters and Abyssinian roller.

Table 12 presents wildlife observations in woodland habitats in the Radoam area in 1974 (Field 1974), 1976 (The Wildlife Research Unit 1976), and 1982 (observations by the author). Table 13 presents wildlife observations in grassland habitats in the Radoan area in 1976 and 1982. Observations of animals in woodland habitats were made by recording all animals seen from vehicles and approximately 150 km were surveyed each year. Observations in grassland were conducted in three locations

[1/] Dahal in local Arabic means "wet meadows."

Table 12. Wildlife observations in woodland habitats at Radoam area in 1974, 1976 and 1982.

	Giant eland	Tiang	Kob	Waterbuck	Bushbuck	Reedbuck	Warthog	Oribi	Roan antelope	Dik dik	Red-fronted gazelle	Hyaenas	Wild dog	Python	Baboon	Patas	
1974 (Field 1974)	50	46	50	15	1	7	23	22	27	3	5	2	--	--	*	*	Total 251
1976 (The Wildlife Research Unit 1976)	--	106	90	--	--	3	19	4	70	2	--	--	8	--	*	*	Total 302
1982 Observations by the author	21	70	26	52	1	10	16	--	1	3	--	--	--	5	66	5	Total 276

*Monkeys were not recorded in the observations of 1974 and 1976.

Table 13. Wildlife observations in three locations of grassland habitats at Radoam area in 1976 and 1982.

	Hippo	Tiang	Kob	Waterbuck	Bushbuck	Reedbuck	Warthog	Oribi	Roan antelope	Lions	Total
1976 [1]	10	16	66	8	1	--	14	--	3	--	113
1982 [2]	8	12	62	73	--	5	--	2	--	1 + 2 cubs	165

[1] The Wildlife Research Unit (1976).

[2] Observations were made by the author.

while walking (average distance of 5 km for each location) and recording all seen animals. Appendix Table 4 presents wildlife observations made at different localities of Radoam area in 1974, 1976 and 1982. All the observations recorded in the tables above were made during the late part of the dry season (mid-March to late-April) and were conducted during the periods from 6 a.m. to 10 a.m. and from 3 p.m. to 6 p.m. The observations were repeated at least 2 times each year and averages are included in the tables. It will be possible to make comparisons between the total numbers of animals observed in the different years, but the data is not adequate to allow us to make statements in changes in numbers of each species.

Garsila and South of Rehied el Berdi Areas: The Hunting Technical Services (1974) in a study of geomorphology, geology, soils and vegetation of Southern Darfur classified the landscape into four major land systems. These systems are the Basement, Qoz[2/], alluvial complex and Bahr[3/] land systems. The average rainfall ranges from 359 mm in the northeast to about 700 mm in the south with increase in rainfall from north to south and an orthographic increase from east to west due to the higher land on Sudan-Chad border and the Jebel Marra massif.

The area is characterized by an average maximum temperature of 34.2°C (93.6°F) and minimum of 19.8°C (67.6°F).[4/] Hunting Technical Services (1974) stated that there is some evidence that climatic changes are taking place. They reported that the rainfall in the period 1965 -

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[2/] Qoz in Arabic means "sand dune."

[3/] Bahr in local Arabic means "river."

[4/] Temperature records are for Nyala as no long term data is available for other areas.

1972 shows an overall 10% decrease compared with the long term average.

The soils of the Basement land system are predominantly residual in origin, mainly shallows, clay loam, sandy clay loam or sandy clay. Transported alluvial sands, loamy sands and silt loam occur along valley bottoms, together with limited areas of cracking clays. Qoz soils are predominantely transported coarse sands originating from weathering of rocks. Sands of mixed aeloian-residual origin also occur. Scattered dunes of Qoz sands are to be found throughout the other land systems and are probably of local origin.

The alluvial land system predominates over much of the southern part of the area and is characterized by alternating areas of sandy clay loam, known locally as "naga'a," and slightly higher areas of lighter soils knonw as "atmur." Overgrazing in the "naga'a" has resulted in an almost bare soil forming a continuous, impermeable, uncracked surface on which sheet wash occurs.

The Bahr land system is a narrow strip of land along the seasonal Bahr el Arab River. Alluvial soils of relatively high clay content are the most common, along with dark cracking clay soils.

The vegetation of the area is classified as low rainfall woodland savannah (Harrison and Jackson 1958). The vegetation of the Basement area consists mainly of *Acacia melifera* and *Acacia nubica* thorn scrub with scattered baobab *Adansonia digitata* on residual soils. Dominant grasses, *Eragrostis tremula* and *Tetrapogon cenchriformis* with *Chloris* spp., *Sporobolus* spp. and *Aristida* are also present.

On the Qoz the dominant trees are: *Combretum glutinosum*, *Sclerocarya* spp., *Terminali browni*, *Anogeissus schempri*, and *Prosopis*

africana. The dominant grass and herbs are: *Cassia mimosoides*, *Eragrostis* spp., *Brachiaria* spp., *Digitaria* spp., *Ctenium elegans*, *Blepharis linariifolia*, *Cenchrus biflorus*, *Hyparrhenia* spp., *Echinicchloa* and *Andropogon* spp.

Acacia senegal and *Acacia seyal-Balanites* association are most important on the alluvial land system. *Panicum* spp., *Eragrostis* spp., *Echinochloa* spp., *Brachiaria* spp., and *Sporobolus* spp. are important in this association, as are *Dactyloctenium aegyptium* and *Tristachya superba*. In the Bahr land system *A. seyal-Balanites*, *Terminalis-Anogeissus-Prosopsis* and riverine association are the most common. Tall perennial grasses occur, the most dominant is *Echinochloa stagnina*.

There is a lack of any systematic survey of wildlife in the Garsilia area and south of Rehied el Berdi area. General terms of "present" or "absent" are used in the Wildlife Administration reports. In the southern part of the area there is a wet-season use of the area by some migratory wild animals from Bahr el Arab.

Giraffes are reported in the southwest of Rehied el Berdi. Other animals found to the south of Rehied el Berdi are: roan antelope, tiang, kob, waterbuck, reedbuck, warthog, red-fronted gazelle, lion, hyaena, baboon, patas monkey, python and Nile monitor.

The Garsilia-Wadi Salih-Foro Burunga area is reported to have the following animals: roan antelope, tiang, greater kudu, kob, waterbuck, reedbuck, warthog, red-fronted gazelle, lion, hyaena, baboon, grivet monkey, python and Nile monitor.

South of Abu Matariq Area: The northern part of this area is alluvial land system and the southern part is Bahr land system. There is more

use in this area by nomadic cattlemen during the dry season and more wildlife move into the area after the movement of the nomads to the north following the beginning of the rains.

Wild animals reported in this area are: giraffe, roan antelope, tiang, kob, reedbuck, warthog, red-fronted gazelle, lion, hyaena, jackal, baboon, patas monkey, grivet monkey, python and Nile monitor (Wildlife Administration 1981).

Lake Kundi: Lake Kundi is located 180 km to the south of Nyala. The lake is connected during the rainy season to Wadi Ibra, a seasonal tributary of Bahr el Arab. The flood waters of Wadi Ibra contribute greatly to the fertility of the lake. Lake Kundi is subjected to considerable seasonal variations in area (the lake is estimated to cover an area of 200 ha after the floods) and depth and may thus be described as a flood plain. The lake begins to dry up from August onward following recession of Wadi Ibra flood waters. The aquatic vegetation is then grazed by cattle and sometimes burnt by humans.

Hunting Technical Services (1974) stated that the lake is characterized by rich vegetation, insects, crustacea, fish and bird life. Dominant plant species reported are: *Nymphaea* spp., *Aeschynonene* spp., *Cyprus* spp., and *Echinochloa* spp.

Birds observed by the author at Lake Kundi during a two day visit in February 1982 were: Abyssinian ground hornbill, crowned crane, white pelican, long tailed cormorant, spurwinged goose, knob-billed goose, white-faced tree duck, glossy ibis, sacred ibis, hammerkop, grey heron, cattle egret, squacco heron, open-bill stork, wooly-necked stork,

marabou stork, African fish eagle, secretary bird, crowned plover, spur-winged plover, and pied kingfisher.

Jabel Marra: Jebel Marra is a large extinct late-Tertiary volcano. The Jebel is an isolated massif surrounded by arid savannah woodland. The central crater, 2,130 m. above sea-level, contains two lakes and is encircled by rugged cliffs rising to over 2,700 m. Extensive foothills radiate out from the crater and in the valleys small perennial streams run out into the surrounding semi-desert. The higher parts of the foothills are open grassland but the valleys contain forest and dense vegetation. The temperatures show large diurnal and seasonal fluctuations, the crater and higher regions have frost in the winter. The rainfall is about 800 mm per year which is considerably higher than the rest of central Darfur (Happold 1966, Ramsy 1957).

The vegetation shows a marked zonation with altitude. The sparse savannah woodland surrounding Jebel Marra consists mainly of acacias, but the composition varies from place to place depending on soil and rainfall. The lower zone up to 1,800 m. has a dense vegetation in protected places and the acacias are gradually replaced by other species. The middle zone is mainly open grasslands, dissected by valleys and covered with occasional *Olea* spp. and *Acacia albida* trees. The upper zone is mostly bare with a few grasses, *Lavendula* spp., and *Olea* spp. trees. Near their source the streams are commonly surrounded by forests which form a canopy over the water. More detailed accounts of Jebel Marra and its vegetation are given by Ramsy (1957), Harrison and Jackson (1958), Lebon and Robertson (1961), Robertson (1965) and the Hunting Technical Services (1977).

The fauna of Jebel Marra has been better studied than other areas in Darfur (Gilan 1918, Lynes 1921, Thomas and Hinton 1923, Mackenzie 1954, Setzer 1956, Happold 1966). Recent reports indicated the presence of the following animals: greater kudu, duicker, red-fronted gazelle, procupine, lion, leopard, hyaena, baboon, grivet monkey, and patas monkey (Hunting Technical Services 1977, The Wildlife Administration 1981).

The Present Status of Wildlife in the Rodoam Area

The Radoam area is the most important wildlife area in Southern Darfur. The remoteness of the area, the presence of the tsetse fly, and being only sparsely inhabited by people have led to the survival of wildlife in this area for a long time. However, during the last decade several new factors have been developing which are causing serious threats to wildlife in the Radoam area.

Poaching: The most serious problem is the increase of poaching. There are four major groups of poachers operating in Radoam area. The first consists of local inhabitants using traditional traps and poisoned arrows and hunting mainly for food with limited impact on wildlife populations. Local inhabitants may also be supplied with food rations and firearms by traders so that they can go on longer hunting trips mainly searching for elephants and big game. Another serious group of poachers is mainly composed of the nomads from Western Africa who are experts in using poisoned arrows and mainly hunt animals that move in large herds and also kill considerable numbers of leopards and cheetahs. They usually hide

close to the herd and manage to kill large numbers as the arrows make no sound to scatter the herd. They trade the dried meats and skins. The most serious group of poachers is made up of camel graziers of Northern Darfur. They move into the area about early Novmeber and do not return to the north until after the beginning of the rainy season in May. They usually move in large caravans made up of 40 to 60 camels and they are armed with modern automatic rifles. Their major target is the elephant for its tusks and meat; they also search for giraffes, buffalo, and roan antelope. They have been reported in the last few years to cross the borders into Central Africa and Zaire.

Illegal trade in wildlife products is flourishing in the Radoam area. Financiers in Nyala and Omdurman advance cash to agents in Radoam for hunting expeditions, food for the trip, donkeys and traps. Sometimes modern firearms are also made available to poachers. The money is advanced on credit for the poaching parties (Agad) which are still organized on traditional lines. The return of credit is in number of tusks or skins for the amount advanced. The traders may get as much as 300% profit leaving the local proachers very little or no revenue (Ahmed and Abdel Rahman 1979).

In the 1960's the trade in hashish (bongo) narcotics had flourished and Radoam being the major producing area in Northern Sudan was greatly affected. The traders again extended their financial services; and essentially, the same people who were poaching during the dry season would engage in bongo cultivation during the rainy season (Ahmed and Abdel Rahman 1979). This resulted in accumulation of capital and the establishment of a strong underground traffic in bongo and wildlife products.

Increased Human Population: In 1928 the British decided to evacuate Kafia Kingi town and they moved the Arab population to the north of the confluence of the Umblacha and Ada rivers between 1928 and 1930. The British declared reasons behind these actions were to stop the activities of the Arab traders in ivory and slave trade and to turn the ivory trade into a state monopoly (Ahmed and Abdel Rahman 1979). The population of Kafia Kingi was drastically reduced as most of its inhabitants moved to the newly established Radoam town. After independence in 1956 the national governments tried to encourage people to move back to Kafia. The population of the area to the south of Bahr el Arab remained very low until a few years ago. The increase in population, if not controlled, will result in increased change of habitats and poaching.

Livestock Use: Due to the presence of the tsetse fly, the Radoam area has been free from any use by domestic livestock. During the last three years, nomads, frustrated by deterioration of pastures to the north of Bahr el Arab, and encouraged by availability of vaccines for their cows, started invading the Radoam area in the dry season with thousands of their livestock. This trend, if not checked, will not only result in chasing the wild animals from the Rodoam area, but will also extend the overgrazed and depleted pastures south of Bahr el Arab.

Lack of Personnel, Transportation and Effective Laws: The Wildlife Administration established a station in Radoam manned with 1 game officer and 15 game scouts. This limited manpower is supposed to patrol an area of almost 12,000 sq. km. They have only 1 old

truck and very limited and sporadic supplies of fuel. They once had a few horses but they all died several years ago and have not been replaced.

There are no effective laws protecting wildlife in Radoam. The decision reached by the Southern Darfur People's Executive Council in 1977 declared the Radoam area closed to hunting. This decision is of no practical value as those who used to hunt big game legally in all Southern Darfur province did not exceed an average of 10 license holders per year. The decision to protect Radoam neglected all other threatening factors such as poaching, livestock grazing, and increasing human settlement.

Laws against poaching and illegal trade in wildlife products are not strong enough to discourage offenders even if they get arrested. The Council of Judges at the Radoam Court is elected from the inhabitants of the Radoam. Table 14 presents a total of 27 cases tried at Radoam Court between 1971 and 1980. During the period from May 1975 until May 1978, no cases were tried at Radoam as the Higher Court at Nyala ruled that all wildlife and "bongo" cases should be referred to the Nyala Court.

An average of three cases of poaching per year were brought to court during the eight years presented in the table. That is a poor indicator of the size of poaching and illegal traffic in wild animals' products. However, it could be looked upon as a good indicator of the operations of the Wildlife Administration in controlling poaching. During the last five years the Wildlife Administration,discouraged by the results of bringing cases to the court, was satisfied to settle for confisication of captured wild animals' products, traps and fire-arms. Table 15 presents confisicated animals' products in Radoam area

Table 14. Records of poachers arrests,capture of wild animals' products, and court decisions at Radoam, 1971 to 1980.

No.	Date of arrest	Occupations of poachers	Animals' products captured	Court decision
1	8/18/71	3 farmers	Elands, giraffes & tiang skins; 2 tusks; 441 lbs. of dried meat; 3 traps	A fine of LS 3[1/] each.
2	12/16/71	5 farmers 1 merchant	1,218 lbs. dried meat.	A fine of LS 3 for first three and 6 LS for the rest.
3	12/26/71	merchant	250 lbs. dried meat.	Fined LS 2.5
4	1/23/72	farmer	Unspecified quantity of dried game meat.	Fined LS 2.
5	2/27/72	merchant	Unspecified quantity of dried game meat.	Fined LS 4.
6	2/23/72	farmer	One cheetah skin.	Fined LS 2.
7	3/7/72	farmer	Small quantity of dried game meat.	Fined LS 3.5
8	3/8/72	merchant	Large quantity of dried game meat.	Fined LS 5.
9	3/16/72	4 farmers 1 merchant 1 tailor	Unspecified quantity of dried game meat	Two fined LS 3 each; one whipped 5 lashes and the rest acquitted.
10	6/11/72	6 farmers	2 elephant tusks	Each fined LS 2.
11	10/11/72	farmer	Unspecified quantity of game meat.	Fined LS 3.
12	10/15/72	merchant	Unspecified quantity of dried game meat.	Fined LS 3.
13	3/7/73	farmer	About 200 lbs. dried game meat and unspecified number of skins.	Fined LS 10.
14	3/10/73	farmer	A small quantity of dried game meat and one python skin.	Fined LS 6.

Table 14 (continued). Records of poachers arrests, capture of wild animals' products, and court decisions at Radoam, 1971 to 1980.

No.	Date of arrest	Occupations of poachers	Animals' products captured	Court decision
15	3/20/73	farmer	A small quantity of dried game meat.	Fined LS 7.
16	5/23/73	Goverment official "forester"	Killed unspecified number of animals.	Fined LS 15.
17	6/11/73	unspecified	14 lbs. dried game meat; 1 eland skin and 1 tiang skin.	Fined LS 7.
18	3/25/74	farmer	2 elephant tusks weighing 76 lbs.	Jailed for 3 months.
19	12/28/74	merchant	129 lbs dried game meat.	Fined LS 10.
20	1/30/74	farmer	1 lb. dried game meat and 1 lb. ostrich feathers.	Fined LS 20.
21	2/6/75	6 farmers 1 Government worker	About 2,800 lbs. dried meat.	Fined LS 20 each and the rest fined LS 15 each.
22	2/7/75	2 farmers	About 100 lbs. dried game meat and 2 gallons of elephant fats.	Fined LS 20 each.
23	5/6/78	merchant	About 350 lbs dried game meat.	Fined LS 50.
24	2/3/79	farmer	60 lbs. dried game meat.	Fined LS 10.
25	2/22/79	merchant	340 dried game meat, 4 elephant tusks, weighing 16 lbs.	Fined LS 20.
26	4/4/79	merchant	12 elephant tusks weighing 85 lbs.	Fined LS 20.
27	1/3/80	merchant	540 lbs. dried game meat.	Fined LS 20.

1/ LS Sudanese pound ≈ 1 U.S. dollar. The value of the Sudanese pound had been 3 U.S. dollars in 1971; it has been devaluated several times during the last 10 years. The current value reached is 0.9 U.S. dollars. Data compiled from the Records of the Radoam Court.

Table 15. Captured wildlife products at Radoam, 1967 to 1980.

Year	Dried game meat in kg.	Skins								Elephant tusks	Other items
		Leopard	Cheetah	Wild cats	Tiang	Other ungulates	Nile monitor	Python	Crocodile		
1967	589.7						30	7	13	Unsp. Nos.	
1971	1912.8										
1972	362.9									9	
1973	1195.7					3			Unsp. Nos.		
1974	1700.1						95	43	173		
1975	3129.4		3			2	245	5			
1976	1020.5	4	5								
1977	3617.0	1	38	1		24	16				Ostrich feathers
1978	659.1			16							
1979	886.8										
1980	973.0										

and could be a better indicator of poaching and traffic in wildlife products. It should be stressed according to the Wildlife Administration (1981) confisicated wildlife parts are estimated as about 5% of the real traffic in wildlife products in Southern Darfur.

In the trials of the Radoam court it should be pointed out that the court sentenced only one to jail out of the 52 persons tried and was content to pass judgments of minimum fines to the rest although it had the option of imprisonment in all cases. The gradual increase in the amount of fine decided by the court reflects an increase due to the drop in the value of the Sudanese pound rather than a real increase in fines.

Wildlife Values in Radoam Area

A questionnaire was conducted among 25 persons in the Radoam area. Their ages ranged between 13 and 53 years and they included a few students, farmers and nomads. They all admitted that they had practiced illegal hunting and that they made at least one hunting trip every year. They all belonged to large families, with an average of 11 members per family, and explained that game meat helped to feed their families and excess game meat was dried and sold along with skins and tusks.

Of those interviewed, 56% admitted that they possessed illegal firearms. They usually hunted buffalo, elephant, giraffe, eland and roan antelope with their firearms. Expensive bullets are not wasted on smaller antelope which could be killed by arrows, traps and spears. Hunting is usually conducted in groups of 5 to 10 and a hunting trip took an average of 3 weeks. There is at least one firearm in each hunting group. Those who do not own firearms used their traditional weapons and they usually got a share of whatever animals were killed by firearms.

Hunters' rate of success is usually very high. They reported that they rarely came back without killing big game. The number of animals they killed on each trip depended on several factors such as the kind and numbers of weapons, the number of donkeys to carry the meat, and the duration of the hunting trip. The lowest number of animals killed by a group in one hunting trip was two buffalo. As much as 30 buffalo in one trip were reported to be killed by a group using poisoned arrows. The same group collected 60 boffalo in three trips made during one year. Other groups using firearms, claimed to have killed 30 roan antelope, tiang and elephant in two trips, 25 elephants, buffalo and roan antelope in 6 trips and 40 elephants, buffalo and roan antelope in 4 trips.

Those questioned reported that they sold dried game meat, ivory, skins and other wildlife products to the merchants in Rodoam town, who resold some of these products in the local markets but most of their purchases were usually sent to larger cities in Southern Darfur. Prices of dried meat of giraffe, buffalo, eland, roan antelope, tiang and other smaller game animals was LS 0.5 to 0.6 per pound. Dried elephant meat was sold for LS 0.4 to 0.25 per pound. Skins of roan antelope and tiang were sold for LS 2 and those of eland for LS 3. Skins of the leopard were sold for LS 150 to 200 and ivory sold in Rodoan at LS 6 to 7 per pound.

About 80% of the questioned poachers admitted that -- at the time of the questionnaire -- they had at their homes elephant tusks and leopard or cheetah skins. All those questioned had several skins of one or more of the following animals: kob, tiang, lion, gazelle, python and Nile monitor. A few had crocodile skins, ostrich feathers and eggs

and giraffe tails. Twenty-five percent of those questioned reported to have live wild animals kept at their homes -- mostly dik dik and gazelles captured when very young.

Besides the trade in big game meat and other products the questionnaire provided information on a wide trade in guinea fowl. Thousands of guinea fowl were captured by nets or killed by shot guns and sold dead and dried or live for a price from LS 0.75 to LS 1 a piece. Ostrich feathers were sold for LS 3 per pound and ostrich meat for LS 0.60 per pound.

The questionnaire provided information on wildlife depredation on crops and livestock. Forty percent of those questioned reported that the warthog was causing most of the damage to cultivated crops. Other animals causing crop damages were dik dik, gazelle and waterbuck. Depredations by hyaena and lion on livestock were reported by all those questioned. Losses occurred to those questioned by hyaena were as follows: 2 goats, 5 goats, and 30 goats reported by different individuals. Losses occurring due to lion were: serious injuries to one member of the questioned person's family, 10 goats, 4 cows and 1 donkey; 20 goats and 4 cows; and 9 goats reported by different individuals. Losses due to wild dogs were 4 goats reported by one individual.

The interviewed people stated that they guard their cultivated crops and livestock against wildlife depredation and that they cooperate with other people in chasing away and killing hyaenas and lions. Several of those questioned reported that they make use of hyaena fats as a preventive medicine against leprosy and lion meat as medicine for asthma.

Another type of questionnaire was conducted among primary school pupils. The results are presented in Table 16. Answers of the pupils generally agreed with information provided by the first questionnaire. The first question was designed to make pupils relax and to establish some confidence measures in their answers as their answers could be checked with knowledge of general distribution patterns of animals around Radoam town.

Answers of the pupils to the second question provided interesting information about the extent of illegal hunting. Over 90% of the pupils' parents practiced hunting but none of them thought that hunting could be an occupation. Farming, which was given as parents' occupation by most of those questioned, most probably took much less of their time than hunting, as farming is mainly rain-fed and only one crop is grown every year following the first rainfall early in June. The percentage of farmers among poachers, as given by pupils, agrees with information provided in Table 14. About 90% of the poachers tried at Radoam court stated that they were farmers. It could be concluded that hunting is probably more important to the people of Radoam than any other occupation. They don't call themselves hunters because their hunting is illegal from the standpoint of the government.

Almost all the pupils hunted birds. Also a great number of them participated in the hunting trips of their parents. Almost all of the 5th grade pupils and about half of those in the 1st grade participated in hunting trips with their parents. This could be explained that as children reach the age of 12 to 15 (age of 5th grade pupils), their parents start teaching them how to hunt big game. Information about possession of "illegal" firearms also established the above facts.

Table 16. Results of questionnaire conducted among primary school pupils at Radoam in 1982.

Question		1st Grade (%)	5th Grade (%)
	Pupils' Ages	7 to 9 years	12 to 15 years
	Number of Pupils	60	30
1.	Which of the following animals have you had the chance to observe in the wild?		
	Baboon	100	93
	Grivet monkey	100	100
	Patas monkey	100	100
	Colbus monkey	63	53
	Hippo	33	33
	Warthog	90	90
	Lion	22	36
	Loepard	12	3
	Cheetah	37	67
	Tiang	62	87
	Kob	27	73
	Dik dik	98	93
	Giraffe	10	17
	Reedbuck	75	90
	Bushbuck	75	87
	Hyaena	28	90
	Jackals	85	87
	Buffalo	13	7
	Python	47	63
	Crocodile	13	20
	Giant eland	12	20
	Elephant	28	73
	Ostrich	47	83
	Wild dog	37	77
2.	Occupation of father?		
	Merchant	28	6
	Farmer	92	77
	Big Game Hunter	37	60
	Python, crocodile and Nile Monitor hunters	62	33
	Fisherman	40	23
	Honey collector	50	6
3.	Do you hunt birds?	97	93
4.	Did you take part in big game hunting with your father?	43	90

Table 16 (continued). Results of questionnaire conducted among primary school pupils at Radoam in 1982.

Question		1st Grade (%)	5th Grade (%)
	What type of weapons does your family own?		
	Bow and arrow	25	40
	Traps	47	53
	Spear	97	83
	Local made firearm	42	51
	Shot gun	17	43
	Imported firearm	23	50
5.	How many times per month do you eat game meat?		
	More than 15 times per month	100	90
6.	Did your family experience any losses due to wildlife damage?		
	Lions killing livestock	13	50
	Hyaena killing livestock	72	70
	Jackals killing chickens and goats	18	40
	Warthog, baboon and other animals destroying crops	97	87
	Some wild animals attacking a member of your family and causing him injuries	20	40
7.	Which of the following animal products are found in your home?		
	kob skins	17	63
	Tiang skins	48	67
	Reedbuck skins	28	43
	Bushbuck skins	25	17
	Python skins	23	13
	Nile Monitor skins	43	20
	Crocodile skins	3	7
	Ostrich fat	12	7
	Ostrich eggs	15	23
	Ostrich feathers	33	27
	Colbus monkey skins	3	10
	Gazelle horns	13	67
	Giraffe tails	27	33
	Leopard skins	3	33
	Cheetah skins	2	13
	Wild cat skins	18	10
	Elephant tusks	17	23

As children reach 12 to 15 years of age they are more trusted with their parents' secrets and they come to know about the possession of firearms and probably started to get their first lessons on how to use them.

The economical importance of wildlife to the people of Radoam is stressed in answers to questions 5, 6, and 7. Game meat provided more than 50% of the meat consumed by people in Radoam and animal skins are widely used in various domestic uses such as making ropes which are used to make beds and chairs. Also in all Radoam houses, there has been some wildlife products ready for marketing. The negative values of wildlife are also emphasized by injuries cuased to people and losses of livestock and crops.

The Role of The Wildlife Administration in Southern Darfur

The Wildlife Administration lacks the personnel and funds for adequate transporation to conduct its role in a satisfactory way. The headquarters are located at Nyala and manned by 46 game inspectors, officers, game scouts, clerical staff and workers. The largest regional office is located at Radoam 278 km south of Nyala with about 15 game officers and scouts. Three smaller stations are located at Buram, Reheid el Berdi and Ed Dain, each manned by one game officer and three game scouts.

The major duties of the Wildlife Administration is enforcement of the wildlife laws. This is done mainly by occasional inspection of the markets in search of illegally acquired wild animal products. Depending on availability of vehicles and fuel, some wildlife areas are patrolled in search of poachers. During the period from January

1981 to May 1982 only three patrols totalling 16 days and covering a distance of less than 1,000 km were conducted in Radoam area. A three day patrol covering a distance of about 100 km was conducted in Rehied el Berdi area. Due to the lack of transportation some important wildlife areas of the province have not been visited by the Wildlife Administration officials during the last five years.

Table 17 presents the amounts of dried game meat and numbers of animal skins captured in five locations at Southern Darfur grouped for five year periods during the duration from 1966 to 1980. Yearly captures are presented in Appendix Table 5. No records were found for captured wildlife products prior to 1966. The great increase in captured wildlife products after 1970 could be attributed partly to administrative reasons such as the Radoam station as well as the Ed Dain office were opened in the 1970's. Nevertheless, the great increase in captured wildlife products is good evidence of the growth of illegal trade in wildlife products. The large increase in leopard and cheetah skins -- both leopard and cheetah being endangered in the Sudan -- should be of great concern. The Wildlife Administration (1981) estimated that captured wildlife products during the period from 1966 to 1980 have been less than 5% of the total illegal trade in wildlife products in Southern Darfur. The Wildlife Administration explained that their limited success in stopping the illegal trade in wildlife products had been due to lack of personnel and transportation to enable them to conduct more frequent market inspections and anti-poaching patrolling.

Table 18 presents the numbers, total weights, average weights and largest weight of elephant tusks registered in Southern Darfur for the period from 1965 to March 1981. These include mostly ivory captured

Table 17. Captured wildlife products in five locations in Southern Darfur from 1966 to 1980.

Year	Dried game meat in kg	Leopard	Cheetah	Wild cats	Ungulates	Crocodile	Lizards	Python	Elephant tusks	Other items	Location
1966	605.6	-	1	1	5	13	30	7	2	-	Radoam
to	--	-	-	-	-	-	-	-	-	-	Ed Dain
1970	832.4	-	-	-	4	-	-	-	2	-	Rehied el Berdi
	735.3	-	-	-	4	-	-	-	6	-	Garsila
	527.7	-	-	-	-	-	-	-	-	-	Nyala
	2701.0	-	1	1	13	13	30	7	10	-	Total
1971	8300.8	-	3	-	5	173	340	48	46	1/	Radoam
to	--	-	-	-	-	-	-	-	-	-	Ed Dain
1975	144.2	-	-	-	25	-	-	-	-	-	Rehied el Berdi
	--	-	-	-	-	-	-	-	8		Garsila
	1723.7	5	13	3	19	-	158	80	17	2/	Nyala
	10168.7	5	16	3	49	173	498	128	71	1/ 2/	Total
1976	7156.4	5	43	17	24	-	-	-	234	-	Radoam
to	1042.4	18	88	-	14	55	110	7	178	-	Ed Dain
1980	--	3	-	49	-	3	8	7	-	-	Rehied el Berdi
	--	-	-	-	-	1	14	26	-		Garsila
	1047.8	5	-	18	59	-	8801	849	-	3/	Nyala
	9246.6	31	131	84	97	59	8933	889	512	- 3/	Total

1/ Four giraffe tails; 2/ Ostrich feathers - 26.5 ounces; 3/ 48 guinea fowl.

Table 18. Numbers and weights of elephant tusks registered in Southern Darfur from 1965 to March 1981.

Years	1965 to 1967	1968 to 1970	1971 to 1973	1974 to 1976	1977 to 1979	1980 to March 1981
No. of tusks	110	23	95	188	773	285
Total weights in kg.	708.5	129.7	644.8	1875.6	5469.5	943.3
Average tusk weight in kg.	6.4	5.6	6.8	10.0	7.1	3.3
Largest tusk weight in kg.	21.8	15.0	19.7	54.7	34.0	11.3

from poachers and a few tusks legally acquired. The data suggest an increase in elephant poaching which was mainly triggered by the increase in international prices of ivory. The decreased average size to 3.3 kg in 1980-1981 with largest tusk weight of 11.3 kg should be a cause for concern. This reflects that poachers are killing more younger elephants with smaller tusk sizes after they eradicated most of the elephants with larger tusks. Ivory registered in Southern Darfur is not necessarily from elephants killed at that province as poachers are known to go as far as Zaire and Central Africa as well as Southern Sudan during their elephant hunting trips.

Trials of Poachers in Southern Darfur: In most of the incidents concerning arrested poachers, the Wildlife Administration would be satisfied with confisication of the wildlife products and the weapons used and would not file a charge against the poachers. The Wildlife Administration personnel argue that trials take too much time and that sentences passed by courts are not severe enough to deter poachers. Table 19 presents data on trials of poachers and traders in illegally obtained wildlife products at Nyala court for the period from 1954 to 1982. A total of 44 cases were tried with an average of less than two cases each year. In all cases where the accused were convicted the court ordered confisication of wildlife products. The court passed a jail sentence (3 months) in only one case and was satisfied in passing of fines in all other cases. The fines averaged LS 8.3 and ranged from a maximum of LS 100 to a minimum of LS 0.25.

It should be noted that the court judgments did not seem to be influenced by particular wildlife species and numbers killed. Killing

Table 19. Trials of poachers and traders in illegally obtained wildlife products at Nyala Court for the period from 1954 to 1982.

No.	Date and place of arrest	Occupation of accused	Captured animals' parts	Court decision
1	3/31/54 Buram	Unspecified	2 tiangs & 1 roan antelope skins & meat	Fined LS 10.
2	3/24/61 Nyala	Engineer	Gazelle skin & meat	Fined LS 2.
3	7/4/61 Nyala	Post-master	Gazelle skin & meat	Fined LS 12.
4	6/8/61 Nyala	Merchant	Game meat	Fined LS 5.
5	7/8/61 Nyala	Merchant	Game meat	Fined LS 5.
6	7/17/61 Nyala	Merchant	Tiang skin	Acquitted
7	11/9/67 Nyala	1 farmer & 1 merchant	6 elephant tusks	Fined LS 2 each.
8	6/27/70 Nyala	Farmer	7 crocodile skins	Skins confisicated
9	4/7/70 Ed Dain	Farmer	Game meat, 4 gazelle skins & 1 python skin	Fined LS 20.
10	6/25/70 Nyala	Farmer	2 wild animal skins	Fined LS 20.
11	2/17/71 Radoam	Farmer	Cheetah skin	Fined LS 5.
12	3/22/72 Nyala	Nomad	Buffalo dried meat	Jailed 3 months & Fined LS 5.
13	10/7/73 Nyala	Carpenter	Unspecified	Acquitted.
14	3/12/74 Radoam	Merchant	9 elephant tusks, weighed 50 kg	Fined LS 100.
15	1/25/75 Buram	Merchant	Unspecified	Fined LS 10.

Table 19 (continued). Trials of poachers and traders in illegally obtained wildlife products at Nyala Court for the period from 1954 to 1982.

No.	Date and place of arrest	Occupation of accused	Captured animals' parts	Court decision
16	1/25/75 Buram	Merchant	Unspecified	Acquitted.
17	3/24/75 Buram	Shoemaker	Unspecified	Fined LS 2.
18	3/16/75 Buram	Farmer	Unspecified	Fined LS 2.
19	2/24/75 Buram	Merchant	Unspecified	Fined LS 30.
20	12/19/75 Buram	Merchant	Unspecified	Fined LS 15.
21	12/19/75 Buram	Farmer	Unspecified	Fined LS 15.
22	12/19/75 Buram	Farmer	Unspecified	Fined LS 25.
23	6/20/75 Nyala	Unspecified	Elephant tusks (Nos. & Wts. not specified)	Acquitted.
	6/20/75 Nyala	Unspecified	Elephant tusks (Nos. & Wts. not specified)	Acquitted.
	6/20/75 Nyala	Unspecified	Elephant tusks (Nos. & Wts. not specified)	Acquitted.
	6/20/75 Nyala	Unspecified	Elephant tusks (Nos. & Wts. not specified)	Acquitted.
24	6/22/75 Nyala	Unspecified	Wild animals' skins	Acquitted.
25	1/19/75 Nyala	Merchant	Wild animals' skins	Fined LS 2.
26	1/19/75 Nyala	Merchant	Wild animals' skins	Fined LS 2.
27	1/19/75 Nyala	Merchant	Wild animals' skins	Fined LS 2.
28	1/19/75 Nyala	Merchant	Wild animals' skins	Acquitted.
29	1/19/75 Nyala	Merchant	Wild animals' skins	Fined LS 3.

Table 19 (continued). Trials of poachers and traders in illegally obtained wildlife products at Nyala Court for the period from 1954 to 1982.

No.	Date and place of arrest	Occupation of accused	Captured animals' parts	Court decision
30	4/13/75 Nyala	Teacher	Wild animals' skins	Fined LS 0.25.
31	4/29/75 Nyala	Farmer	Dried game meat	Fined LS 3.
32	5/26/75 Nyala	Farmer	Dried game meat	Fined LS 2.
33	4/17/75 Nyala	Farmer	Dried game meat	Acquitted.
34	5/2/75 Nyala	Merchant	Dried game meat	Fined LS 2.
	5/2/75 Nyala	Farmer	Dried game meat	Fined LS 2.
35	6/11/75	Farmer	1 wild animal's skin	Fined LS 0.25.
36	6/11/75	Farmer	Dried game meat & 1 wild animal's skin	Fined LS 3.
37	6/16/75	Merchant	Dried game meat	Fined LS 0.50
	6/16/75	Merchant	Dried game meat	Fined LS 0.50
	6/16/75	Merchant	Dried game meat	Fined LS 0.50
38	5/16/75	Merchant	Dried game meat	Fined LS 1.
39	6/16/75	Shoemaker	Wild animals' skins	Fined LS 0.950.
40	6/16/75	Merchant	Wild animals' skins	Fined LS 0.50.
41	6/16/75	Merchant	Wild animals' skins	Fined LS 0.50.
42	4/7/74	Farmer	Unspecified	Acquitted.
43	2/16/82	Merchant	Dried game meat	Unspecified.
44	1/16/82	Merchant	10 large parcels of reptile skins	Fined LS 25.

an endangered and "protected" species is treated the same way as killing a common gazelle and in several cases the species of the killed animal was not even recorded.

Game Licenses Issued at Southern Darfur: Table 20 presents the sale of different types of licenses in Southern Darfur for the period from 1976 to 1981. Comparing the total numbers of game license sales to the population of Southern Darfur (about 2.5 million people) it becomes clear that "legal" hunting as administered by the Wildlife Administration is of minor significance. Possession of firearms in the Sudan is bounded by several constraints. Only Senior government officials, important politicians, and rich people are permitted to own firearms. Although possession of illegal firearms has increased greatly in Southern Darfur as rebels from Chad and Eritria sold some of their weapons to the people and also some weapons were smuggled in from Libya and Ethiopia. Owners of illegally obtained firearms may not purchase game licenses and are forced to practice poaching.

Most of the purchasers of class "B" licenses -- bird licenses -- are not interested in shooting birds. They are forced to purchase a "B" game license as a condition to make them eligible to buy their yearly quotas of 200 shotgun shells. Once these quotas are bought they can be resold with considerable profits to owners of illegal firearms, or used, illegally, in shooting gazelles or antelope.

License "D" is for reptile hunters. It entitles its holder to collect up to 50 crocodiles, 40 Nile monitors, 40 land lizards, 5 turtles and 25 pythons. This license does not require the possession of firearms. The generous bag limit in reptiles requires urgent revision. Table 21 provides information on the number of reptile skins

Table 20. Game licenses issued at Southern Darfur, 1973 to 1981. [1/]

Type of License	1973-1974	1974-1975	1975-1976	1976-1977	1977-1978	1978-1979	1979-1980	1980-1981 until March
A	35	7	40	--	4	14	19	15
B	78	104	516	324	215	443	613	242
C	--	11	64	21	15	5	11	1
D	--	--	36	71	85	160	224	85
Special	--	--	--	--	--	3	--	--

[1/] Data compiled from the Wildlife Administration records.

Table 21. Permits granted by veterinary department for export from Darfur of crocodile, lizard and snake skins, 1967 to 1977.[1/]

Year	Number of skins		
	Crocodile	Lizard	Snake (python)
1967-68	103	15874	6229
1968-69	240	17228	16887
1919-70	--	48485	4082
1970-71	710	47361	2709
1971-72	43	44983	18115
1972-73	147	48050	4509
1973-74	3564	62812	5088
1974-75	265	45797	946
1975-76	45	18020	1097
1976-77	226	32055	586

[1/] From Wilson (1978).

legally exported from Southern Darfur during a period of 10 years. Wilson (1978) remarked that crocodiles were no longer found in Southern Darfur and all crocodile skins and considerable numbers of the lizard and snake skins exported from Southern Darfur were originally collected from Southern Sudan, Chad and Central Africa. He further noticed that the figures presented in the table did not include large numbers of skins which were used within the province for the manufacture of such items as shoes and bags, nor do they give any indication of the extent of unrecorded movement of these items.

Wildlife Damage in Southern Darfur: Although the Wildlife Administration is supposed to be legally responsible to control all wildlife damage problems, no serious efforts are made in that area. The wildlife damage is more extensive and serious than generally acknowledged by the Wildlife Administration and the local government in Southern Darfur. The Wildlife Administration is technically not equipped to handle such problems and has to seek help from the Veterinary and Plant Protection Departments in supplying and administering poisons used in control operations.

People affected by wildlife damage do not blame the Wildlife Administration or the local government and accept their losses as natural or Acts of God. The Wildlife Administration does not pay any compensations for losses and people never challenged in court the responsibility of the Administration to compensate them. People even paid the travel and living expenses in several incidents to the game scouts involved in control operations.

Table 22 presents a summary of data on wildlife damage reported to the Wildlife Administration during the period from 1973 to 1980. Details of damage incidents from different localities are presented in Appendix Tables 6 to 19. Wildlife damage is occurring all over the province with the largest numbers of reports from Jebel Marra and Reheid el Berdi areas. However, it should be mentioned that Garsila area probably had more problems than those reported as there has been no Wildlife Administration office in that area. People in Garsila had to travel to Nyala if they wished to submit a report. In the Radoam area very few incidents of wildlife damage were reported to the Wildlife Administration. That was probably due to the wide practice of poaching in the area and people were not interested in increasing the presence of the Wildlife Administration staff which might interfere with their illegal hunting. Wildlife damage has probably been occurring generally more frequently all over the province, much more so than is reflected in the tables. People are generally discouraged about reporting their problems to the Wildlife Administration which did nothing to help them in previous incidents.

Animals responsible for the greatest portion of damage reported in Southern Darfur are the baboons and hyaenas. The Wildlife Administration (1967) explained the increase of baboon population and their damage was due to a disturbed prey-predator relationship resulting from killing the leopards in great numbers by local people as prices of leopard skins increased. Both the striped and spotted hyaenas were responsible for damages related to hyaenas as they both occur in Southern Darfur but the former does not extend to the southernmost part of the province. Jackal-related damages were reported from

Table 22. Reports of damage caused by 10 species of wild animals in five areas of Southern Darfur during the period from 1973 to 1980. [1/]

Animal area	Baboon	Hyaena	Jackal	Grivet monkey	Patas monkey	Lion	Cheetah	Dik dik	Warthog	Hippo	Total	Percentage
Jebel Marra	25	16	9	8	6	6	-	-	1	-	71	37.7
Rehied el Berdi	27	21	10	3	2	1	1	-	-	-	65	34.6
Nyala	10	11	7	-	-	1	-	1	-	-	30	16.0
Garsila	4	2	1	3	2	-	-	-	-	-	12	6.4
Ed Daein, Ragag & Kundi	5	2	1	-	-	1	-	-	-	1	10	5.3
Total	71	52	28	14	10	9	1	1	1	0.5	188	-
Percent	37.8	27.7	14.9	7.4	5.3	4.8	0.5	0.5	0.5			-

[1/] Data compiled from the Wildlife Administration records.

all over the province while grivet and patas monkeys were reported causing problems only in Jebel Marra, Reheid el Berdi and Garsila areas. Lion damages were mostly reported from Jebel Marra. Cheetah, dik-dik, warthog and hippopotamus related problems were each reported once from different areas in the province. Quela and rodent related problems were not reported to the Wildlife Administration as these problems were addressed to the Plant Protection Department.

It is difficult to estimate any monetary values on wildlife damages. Reports often ignored the extent of damage caused or refer to them in general terms. Losses in human lives were reported in two incidents. Two children were killed by a baboon at Geradaya (Nyala area) in 1973 and 7 people killed by a lion and hyaenas at Idd el Ghanam during the early 1970's. All these dramatic events failed to generate any action from the Wildlife Administration.

Seventy-five percent of the reported cases of widlife damage resulted in no action from the Wildlife Administration. The Wildlife Administration explained that it lacked the personnel, transportation, poisons and ammunition to deal with reported problems. In 25% of the cases where action was taken, the results of such action were not specified in most cases. The control action in all cases has been of a temporary nature and could only have very limited results. In each case where action was taken, one or two game scouts were dispatched to the affected area with very limited ammunition and were instructed to solve the problem in a period of a few days. No information was gathered about damage patterns, areas most frequently affected, seasons of damage and population of animals causing the damage. Hence it was not possible to come up with any long-term control strategy.

During the mid 1960's enough political pressure was created by representatives of Southern Darfur in the Sudanese Constituent Assembly resulting in a baboon control campaign. It was stated that losses caused by baboons during that period were: 5,330 goats, hundreds of tobacco farms completely destroyed and several villages deserted by the people after destruction by the baboons. The campaign resulted in killing 21,712 baboons with poisons and shooting (The Wildlife Administration 1967). Although wildlife damage continues and losses caused by wildlife can be compared to those that occurred in the 1960's, no other similar campaigns have been organized.

WILDLIFE VALUES IN NORTHERN SUDAN

Introduction

The need to estimate economical values of wildlife in Northern Sudan is discussed in this chapter. The problems related to the methodology employed in assessing wildlife values are also discussed. As most of the methodology of assessing wildlife values were established in North America, a brief review of methods employed there is made. Wildlife values in Africa are discussed in general, and methods used in assessing them are reviewed. The Wildlife Administration's approach to estimate wildlife values in Northern Sudan are also reviewed. Records of game license sales, exports of reptile skins, export of different wildlife products and ivory trade are briefly discussed.

The Importance of Knowledge Concerning the Economic Value of Wildlife in Northern Sudan: The drought of the early 1970's led to a shocking realization by most Sudanese how much habitat destruction man can cause. It is generally accepted that the right approach to fight the drought and desert encroachment is through organized landuse. The problem of landuse planning is part of the general domain of resource allocation. Efficiency or optimality in resource allocation may be achieved through the operation of free markets but in a number of natural resources problems there are either no markets or else they work imperfectly.

Davis (1968) stated that conservation of natural, historic and cultural resources is an economic goal in two senses. In the market sense the economics of conservation of natural resources is essentially a problem in maximizing the value of resources over long periods of time. In an extra market sense conservation of historic and cultural resources through preservation enriches national life in ways not fully measured in the market place.

Among urbanized communities in the Sudan appreciation of wildlife is very minimal. The education system, started by the British colonizer and followed to date, does not emphasize natural history or environmental values. The planners and decision makers, who are the victims of their education, are very ready to sacrifice wildlife for other "practical" objectives. The economical models adopted by the national governments have been affected by such logic. Horizontal expansion in agriculture is the major emphasis of development plans. While the development of additional intensive agriculture in the Sudan appears paramount, there are ways to plan the use of land so as to provide for both agriculture and wildlife.

Expansion in agriculture is decided without identification of the physical consequences of alternative courses of action. One example of such conflicts has been an irrigation canal which had a planned route which passed in one place within 9 km of the Dinder National Park. If the canal was constructed along this location, it would cut off large numbers of the park animals from their wet season ranges. Also it could be expected that the construction of such a canal would be followed by an expansion of both agriculture and human settlement along the new water course. Thus the construction of the canal in this location

would not only bar large numbers of animals from their wet season ranges, but would rather rapidly result in the conversion of these ranges into cultivated areas in which the animals could not be tolerated. Recommendations were made to the Sudanese Government to alter the location of the planned canal since it would result in heavy losses of animals and would seriously degrade the value of the Dinder National Park (Holthworth 1968, Dasmann 1972). No official response was ever made to those recommendations and the canal construction was only cancelled due to the failure of the government to secure enough loans for the project.

During the above investigations the value of the Dinder Park was dealt with briefly. High economic potenital of the park was emphasized in broad terms stressing that the park is the closest African national park to Europe. No detailed economical studies were available for the decision makers to compare wildlife losses with the well estimated agricultural benefits (in most cases very much exaggerated benefits!). Recommendations to alter the route of the canal were never seriously considered.

Another example illustrating the vital need for some economical value of wildlife in the Sudan is the Jongeli Canal Project. This project is planned to decrease the loss of the White Nile water by evapotranspiration in the "Sudd" swampy areas of Southern Sudan. The canal will alter the natural route of the White Nile and will result in drying up the swampy areas. Anticipated benefits from irrigation and improved navigation were carefully calculated in monetary values. However the cost:benefit analysis of the project did not incorporate the negative externalities such as probable decrease in fisheries

production, loss of vital wildlife habitats and loss of pastures for livestock. Such externalities were completely ignored due to the lack of technical knowledge to estimate them and lack of methodology to express them in comparable monetary values.

In a country such as the Sudan there should be room for expansion in agriculture and livestock as well as wildlife and forestry. However, up to this point the inability of the decision makers to recognize immediate values of wildlife, forestry and even livestock comparable to benefits from agricultural development is leading to completely ignoring such alternatives. This narrow approach to resource allocation will result in economic, ecological and socio-political difficulties. To overcome this trend we should come up with acceptable methodology for economic evaluation of present values of these largely ignored resources. We should also investigate all possible avenues to utilize wildlife resources and assess their potential economic values.

Methods Used in Assessing Wildlife Values in North America: Traditionally, wildlife biologists and "nature lovers" in North America have assumed that everyone must or should share their emotional and "scientific" attitudes toward the whole outdoor complex -- animals, plants and scenery. To most, the placing of a price tag on a goose, a bass, or a river valley seems impractical, if not impossible (Bailey *et al.* 1974).

In U.S.A. environmental assessment impact are required now by law and counter-statements must be filed by competitive agencies and interest groups before a development project is undertaken on public lands. This has led to the establishment of methodology for assessing wildlife values (Bailey *et al.* 1974).

Langford and Cocheba (1978), Coomber and Biswas (1973), and Lerner (1958) described and criticized methods of assessing wildlife values. Steinhoff (1979) stated that the key problem addressed by most methods is that of evaluating a non-market resource, by the use of indirect measures. Another problem frequently mentioned is the incommensurability of some kinds of wildlife values, especially the aesthetic ones.

Conventional evaluation methods can be used, on commercial fishery or a private wildlife enterprise. However, there may be other elements besides commercial wildlife values. Indirect methods can be used to evaluate benefits which cannot be expressed in monetary terms. In the individual expenditure method expenditures for equipment, travel, lodging, etc. are measured. Steinhoff (1978) used the term "expenditure" as a substitute for cost. He gave components of a deer hunting experience to include deer, firearms and ammunition, vehicle, hunting license and other travel expenses.

Prewitt (1949) used the government expenditure method and suggested that the benefits arising from a reservoir as equal to the specific costs of developing, operating and maintaining it. Crutchfield (1962) suggested assigning a daily value to recreation equal to GNP per day per capita. This method has been criticized that all time is not of equal value (Steinhoff 1979).

The local economic impact of commerce generated by wildlife and other outdoor recreation activities is felt beyond the tourist industry directly involved. Dollars spent by recreationists may be exchanged several times in the local economy. This is called the "multiplier effect" and may be useful in assessing impacts on a local community.

The "consumer's surplus" method includes constructing a demand curve from expenditures and distances to a given area for a recreational experience (Hotelling and Clawson 1959). Mayer (1975) developed a method which consisted of directly asking people what they would be willing to pay for the wildlife experience. These methods have been criticized since by asking a hypothetical question one will get a hypothetical answer. To avoid this, special technique and questioning methods have been developed.

Non economic methods dealing with aesthetic values of wildlife have been least developed. The question of commensurability is a major one. The following methods were developed: rating comparative attitudes toward predator control, systematic gathering public opinion, and clarifying values in the minds of people (Steinhoff 1979).

Wildlife Values in Africa: Advocates of wildlife conservation in Africa suggested that conservation and economic development should ideally be directed towards a common goal -- the rational use of earth's resources to achieve the highest quality of living for mankind (Dasmann *et al.* 1973). The strategy for wildlife conservation has been centered around the concept of multiple landuse. In Africa, the major economic benefits currently produced by wildlife are derived from hunting and game viewing. Game cropping, ranching and farming are of some importance only in South Africa and Zimbabwe. In East Africa explorations of game cropping, game ranching and game farming were made, but it will be a long time before the returns from these can be compared with the tourist-recreational value of wildlife (Clarke and Mitchell 1968).

A study was conducted in East Africa to assess the value of hunting and outfitted safari industry (Clarke and Mitchell 1968). Questionnaires were used and responses analyzed to find out the average money spent by hunters. The study was trying to evaluate hunting as a form of landuse for particular areas in a way which would permit comparison with other uses such as ranching. Clarke and Mitchell (1968) estimated that in East Africa safari hunting generated an annual expenditure of U.S. $3.75 million, while photographic safaris were worth U.S. $4.2 million. Tourism based on wildlife in Botswana was estimated to be worth U.S. $1.4 million in 1968-1969 of which U.S. $261,800 was direct revenue from the leasing of controlled hunting areas (Child 1970).

Subsistence hunting is practiced in several parts of Africa and in some cases, Africans are almost totally dependent on hunting for their protein supply. The value of "bushmeat" to the economy of West Africa has been demonstrated by Asibey (1971) while Child (1970) presented data from the semi-desert regions of Botswana. Commercial exploitation of several species of crocodiles, monitor lizards, snakes, ungulates and cats for their skins was also reported (Child 1970). Income resulting from capture and export of live animals is not significant in Africa (Bigalke 1975).

Commercial game cropping for meat production for use and export has been the focus of attention of conservationists for a long time (Dasmann and Mosmann 1962, Talbot *et al.* 1965, Ledger 1968, Skinner 1973). According to these authors the advantages of using wild game for meat production are that wild game can be cropped in regions where livestock cannot be utilized or are of little economic values. Tse-tse infested areas, and arid and semi-arid areas where some game animals

can thrive without continuous access to free water are always given as examples where game cropping can be advantageous (Williamson and Payne 1980). The high game biomass available for cropping where there is a multiplicity of animal and plant species was mentioned by Lamprey (1964). Also the reproductive rates of some game animals are quite high, while liveweights are of the same order as those for indigenously managed domestic livestock (Williamson and Payne 1980). Game animals are credited with high killing-out percentage and lean meat content (Talbot *et al.* 1965, Von Chevallerie 1972). More economic values could be achieved from operating a tourist industry in areas established for cropping industry, and from selling the by-products of game cropping.

Earlier writings about game cropping showed general optimism for venison production. However more recent authors have been more cautious regarding the prospect of game being a primary meat producer (Bigalke 1975, Skinner 1975, Grunow 1977). Caughley (1976) explained that the failures of game cropping in East Africa were due to the short period over which they were tried, the huge initial expenses involved and the level of expertise needed to harvest multi-species complex. The cost of required infrastructure, marketing difficulties and legal problems related to game ownership were also considered among factors resulting in limited success of game cropping. The expectations that game, through its ability to utilize a larger segment of available herbage when in a multi-species mix or with domestics, will of necessity be more efficient than a mono-species utilization, has not as yet been a persuasive argument for game farming (Conroy 1982).

Pioneer work on game ranching was conducted in Zimbabwe in the early 1950's (Dassman 1964). In South Africa, according to Skinner

(1973), farmers can exercise lawful ownership of wild springbok and blesbok by enclosing them in ordinary paddocks. Riney and Kettlitz (1964) found that 3,000 landowners in Transvaal were utilizing game. Bigalke (1973) estimated that about 5,000 farmers in South Africa are utilizing game commercially. He stimated the total farm population of springbok to be 250,000 and blesbok 85,000. Parker and Graham (1973) reported on the commercial use of Thomson's gazelle and impala on a Kenya beef ranch. Wild animals are integrated with domestic livestock in most cases and game ranching as a primary from of production is rare (Bigalke 1973). In Transvaal Province of South Africa wild animals (mostly impala and blesbok) are raised with livestock on private land. Game meat production which had been exported from Transvaal to Europe averaged 240 metric tons for the period from 1978 to 1981 (Dekcer 1983).

Methods Used in Assessing Wildlife Values in the Sudan: King (1966) made the following general classification of wildlife values: economical, recreational, biological, scientific, social and aesthetic. These values are often quoted by conservationists in the Sudan. However, too much emphasis is placed on scientific, biological and aesthetic values with very superficial handling of the other tangible values. Whenever the Wildlife Administration tries to quantify the economical values of wildlife it deals only with money directly collected as part of the Administration's activities. These include selling confisicated ivory, income of Khartoum Zoo, sale of hunting licenses, sale of wild animals, export fees on life wild animals and wild animals' products and income from entry fees to national parks. Such monetary values fail to account for benefits derived from tribal hunting and poaching. Also benefits occurring to the economy as the result of revenue from export of ivory,

wild animals' products and tourists' expenditures are not accounted for.

The gross benefit has been frequently used by the Wildlife Administration without any mention of costs. Gross benefits were reported to be LS 34,387.000 in 1962-1963, LS 28,974.000 in 1963-1965, and LS 30,618.715 in 1966-1967. Budget of the Wildlife Administration for 1971-1972 was reported to be 115,267.000 (U.S. $322,748) and revenue was estimated to be LS 63,840 (U.S. $174,750). A direct cost/benefit ratio is not an adequate method of judging the value of a game department. The conservation of wildlife yields multiple secondary returns such as the expenditure of tourists for hotels, food, equipment and transportation and also the value of ivory, meat, skins and trophies to the economy.

The Importance of Hunting: Table 23 presents game licenses issued in Northern Sudan from 1976 to 1980. Game license records for each province of Northern Sudan are provided in Appendix Tables 11 to 15. The average numbers of game licenses sold per year show that less than 0.004% of the Sudan's population practice legal hunting. Sudanese citizens are not enjoying hunting privileges equally as firearm possession is a class privilege. Only senior government officials, important politicians, rich merchants and rich farmers (who pay considerable sums of taxes) may be eligible for a firearm possession license. However, even if poor people are legally permitted to own firearms, they cannot afford to buy them. Besides the legal and financial constraints on possession of firearms, the remoteness of wildlife areas from densely populated urban areas make hunting unaccessible for most urban people.

The numbers of game licenses purchased at the different provinces of Northern Sudan are not a good indicator of where hunting is popular.

Table 23. Game licenses issued in northern Sudan from 1976 to 1981.[1/]

Type of License	1976-1977	1977-1978	1978-1979	1979-1980	1980-1981
A	52	25	54	84	51
B	4823	4009	4523	5828	5872
C	243	136	134	233	159
D	126	152	187	322	273
Total	5244	4322	4898	6467	6377

[1/] Data compiled from the Wildlife Administration records. License A and C are big game licenses. License B is bird license and D is reptile license.

However, it reflects where most firearms are in possession. In most cases people will purchase a game license since one is required by law of all those who want to purchase their annual quotas of ammunition should have game licenses. The ammunition may then be resold on the black market at a good profit to owners of illegally obtained firearms who may use that ammunition for poaching, or more often in the frequently occurring tribal fights resulting from disputes over pastures.

Classification of game licenses was referred to earlier in the study. The largest number of game licenses sold are game bird licenses -- Class B licenses. This is not an indicator of the popularity of game bird hunting. Shotguns and 0.22 rifles have been relatively cheaper than other rifles and therefore more people were able to purchase them. However, most people will not waste their "expensive" ammunition in shooting game birds or else there are no game birds around to shoot in their province. The largest number of "B" licenses are sold in Northern Kordofan which has less game birds than any of the other provinces. The Northern Kordofan nomadic tribes, especially the rich Kababish, are known to possess large numbers of shotguns and rifles.

Class "D" licenses are restricted to reptile hunting. The purchase of this license does not require possession of firearms. Pythons and monitor lizards are killed by clubs and spears and crocodiles are killed by the use of snares and spears. Class "D" licenses are mostly purchased by merchants and collectors of reptile skins, who do little or no hunting themselves, but finance several hunters. The sale of "D" licenses could be considered as an indicator of the legal trading in reptile skins and not as a measure of the popularity of reptile hunting.

Exports of Skins of Lizards, Python, Crocodile, Wild Cats and Leopards, 1976 to 1982: Table 24 presents the numbers of lizards, python, crocodile, wild cat and leopard skins exported from the Sudan from 1976 to 1982. Reptile skins are the second most important wild animal product, after elephant tusks, exported from the Sudan. The export figures do not show the real numbers cropped from each species as a large number of skins are used locally within the country for the manufacture of such items as shoes and bags, and there are no estimates of skins smuggled out of the country. It has been reported that Khartoum Tannery has produced 7,900 reptile skins in 1978-1979 and 3,900 skins in 1980-1981. No records are available from hundreds of smaller tanneries.

There is no information about the populations of reptiles in Northern Sudan. Wilson (1978) reported that some of the reptile skins exported from Darfur were illegally imported into Darfur in the first place, from Southern Sudan, the Republic of Central Africa and Chad. It would be very difficult to make any conclusion about the level of reptile harvest practiced now and whether it is detrimental to the survival of each species or not.

The data on wild cats include civet cats, serval cats and the African wild cat. The records of the Wildlife Administration do not specify numbers of skins exported from each species. Leopard and cheetah skin exports are controlled also by the Ministry of Commerce. Leopard and cheetah skins are mostly smuggled from the country as the Ministry of Commerce and Wildlife Administration rarely issue licenses for their export. However, large numbers of wild cat skins, especially those of leopard and cheetah, are used locally within the country for the

Table 24. Export of skins of lizards, python, crocodile, wild cats and leopards from Northern Sudan, 1976-1982 [1/]

Skins	Years					
	1976-1977	1977-1978	1978-1979	1979-1980	1980-1981	1981-1982
Lizards	49,924	30,848	99,355	168,258	56,582	240,008
Python	1,236	2,794	1,827	4,330	7,990	4,223
Crocodile	4,583	5,068	2,160	1,544	37	1,274
Wild Cats	599	37	509	188	80	73
Leopards	119	1	13	--	--	3

[1/] Data compiled from the Wildlife Administration records.

manufacture of shoes and bags. Export of manufactured items is subjected to lesser control and restrictive measures. Unfortunately there are no records of manufactured export items.

The export of other wild animals' skins and other parts for the period 1976 to 1982 is presented in Table 25. These items include trophies, skins and other parts taken by tourists. Larger numbers of these items were probably smuggled from the country intentionally or unintentionally as few people are aware that they require permits. Inspection is very seldom conducted to check whether people traveling abroad are smuggling wild animals' parts or not.

Export of live monkeys, dorcas gazelle, ostrich, guinea fowl, Sudan doich (weavers) and love birds in the period from 1976 to 1982 is presented in Table 26. Data about animals exported less frequently are presented in Table 27. The Wildlife Administration controls all capturing operations in Northern Sudan and has been permitted to conduct capturing operations in Southern Sudan. In several cases the Wildlife Administration has encouraged citizens to capture some species of animals and deliver them to the Administration which pays them some fees for their efforts. In a few other cases, interested people who would like to export some animals, which were not available for sale at the Wildlife Administration collection centers, were permitted to conduct their own capturing expeditions. As all wild animals are considered government property, people have to pay their fees to the Wildlife Administration before they can be allowed to keep them as pets or export them.

Wild animals are frequently requested by Sudanese presidents so as to be forwarded as gifts to other presidents and kings. The

Table 25. Export of different wild animals' skins and other parts from Northern Sudan for the period 1976 to 1982.[1/]

Animals	Years					
	1976-1977	1977-1978	1978-1979	1979-1980	1980-1981	1981-1982
Dorcas gazelle-skin	1	-	-	-	9	7
Dorcas gazelle-head	2	7	-	-	35	27
Zebra-skin	1	2	1	-	-	1
Zebra-other parts	-	-	-	-	-	1
Lion-skin	1	-	4	-	-	1
Ostrich-egg	8	-	-	3	-	-
Ostrich-feathers	-	6 lbs	-	-	-	-
Crocodile-stuffed	1	10	-	-	-	-
Buffalo-head	-	-	3	-	2	-
Tiang-skin	-	-	13	-	-	5
Tiang-head	-	-	1	-	-	-
Bushbuck-skin	1	-	-	-	-	-
Kob-skin	1	-	-	-	-	-
Nubian ibex-skin	-	-	-	-	8	8
Nubian ibex-head	-	-	-	-	6	29
Turtle	1	-	-	-		
Total Exported Items	17	20	22	3	60	69

[1/] Data compiled from the Wildlife Administration records.

Table 26. Export of live monkeys, dorcas gazelle, ostrich, guinea fowl, Sudan doich and love birds from Sudan, 1976 to 1982. 1/

Animals	Years					
	1976-1977	1977-1978	1978-1979	1979-1980	1980-1981	1981-1982
Grivet monkey	26	59	45	82	62	83
Patas monkey	6	2	-	4	12	12
Dorcas gazelle	12	37	56	36	80	141
Ostrich	1	7	4	3	7	16
Guinea fowl	30	97	20	-	36	32
Sudan doich	60	200	200	200	202	-
Love birds	33	129	56	73	64	64

1/ Data compiled from the Wildlife Administration records.

Table 27. Export of different live animals from Sudan, 1976-1982. [1/]

Animal	Years					
	1976-1977	1977-1978	1978-1979	1979-1980	1980-1981	1981-1982
Mongala gazelle	-	10	3	-	3	-
Tiang korrigum	-	9	1	-	-	-
Giraffe	-	2	3	-	-	-
Zebra	-	-	-	-	-	-
Roan antelope	-	2	-	-	-	-
Red-fronted gazelle	-	-	-	-	-	-
Reedbuck	-	1	-	-	-	-
Kob	-	-	-	-	2	-
Wild cat	-	1	-	-	-	-
Mongoose	4	-	-	-	-	-
Colbus monkey	-	1	-	-	-	-
Land turtle	-	-	4	-	4	6
Nile monitor	2	-	-	-	-	-
Python	1	-	-	-	-	-
Song birds	88	7	10	-	8	-
Falcons	1	3	1	-	1	6
Crowned crane	1	6	-	-	4	-
Parrots	-	1	-	-	3	14
Geese	-	4	14	14	-	20
Ducks	-	-	-	3	-	-
White stork	-	-	-	9	-	-
Marabou stork	-	4	-	-	-	-
Stork	-	1	-	-	-	-
Saddle-bill stork	-	-	-	-	1	-
Ibises	-	4	9	-	-	-
Pelicans	-	4	-	-	-	-
Francolin	-	-	-	2	-	-
Sand grouse	-	-	-	-	-	18
Doves	-	-	-	6	-	48

[1/] Data compiled from the Wildlife Administration records.

Wildlife Administration so far is not satisfying the growing demand for live animals from the President and private citizens. The capturing operations are conducted through primitive methods and no efforts are made to improve them. Captured animals very often die after they are delivered to Khartoum.

Exported animals shown in the tables reflect the capturing success of the Wildlife Administration. The most easily captured animals represent the largest numbers exported. Some of the animals delivered as presidential gifts are not shown in the tables and no records were found on them.

Countries Importing Wild Animals' Skins and Live Animals from the Sudan: Table 28 shows countries importing lizards, python, crocodile, and wild cats skins from the Sudan. Egypt is importing the largest numbers of lizard and python skins. Next to Egypt are France and the United Kingdom in importation of lizard skins and Greece in the importation of python skins. Switzerland has imported the largest number of crocodile skins, followed by France and Egypt.

Table 29 shows countries importing live animals from the Sudan. Egypt imported the largest number of grivet and patas monkeys. Saudi Arabia and the United Arab Emirates are the main importers of the most live animals exported from the Sudan. This can be explained as large numbers of Sudanese citizens work in these countries and they take some animals with them to sell or to give as gifts to their employers. Similarly, lesser numbers of wild animals were exported to Qatar, Kuwait and other Middle-eastern countries -- mostly the oil rich countries. A few live animals were exported to Europe and other

Table 28. Countries importing lizard, python, crocodile, wild cat and leopard skins from Sudan during the period 1971 to 1982. [1/]

Country	Lizard Total Export No.	%	Python Total Export No.	%	Crocodile Total Export No.	%	Wild Cat Total Export No.	%	Leopard Total Export No.	%
Egypt	192,752	41.2	8,061	63.5	1,908	16.3	8	2.4	2	4.4
Other Middle-eastern countries	20		577	4.5	62	0.5	202	60.1	21	45.7
France	124,012	26.5	14		2,152	18.3	1		--	
Greece	--		2,886	22.7	12		1		1	2.2
Switzerland	59,000	12.6	2		2,968	25.3	2		1	2.2
West Germany	2,287	0.5	45		54	0.5	55	16.4	5	10.9
United Kingdon	80,023	17.1	792	6.2	476	4.1	7	2.1	5	10.9
Italy	16		49		48	0.4	8	2.4	3	6.5
Other Countries	9,816	2.1	279	2.2	4,043	34.5	52	15.5	8	17.4
Total number of exported skins	467,926		12,705		11,723		336		46	

[1/] Data compiled from the Wildlife Administration records.

Table 29. Countries importing live animals from the Sudan during the period 1971 to 1982.[1/]

Country	Grivet monkey No.	%	Patas monkey No.	%	Dorcas gazelle No.	%	Other mammals No.	%	Reptiles No.	%	Ostrich No.	%	Guinea fowl No.	%	Love birds No.	%	Other birds No.	%
Saudi Arabia	31	16.3	4	14.3	115	12.9	4	12.9	--		14	46.7	24	63.2	188	64.8	123	45.6
United Arab Emirates	11	5.8	--		76	29.2	22	71.0	21	75.0	10	33.3	10	26.3	12	6.6	106	39.3
Qatar	1		1	3.6	49	18.9	2	6.5	--		--		4	10.5	10	5.5	--	
Kwait	7	3.7	--		2		--		--		--		--		3		--	
Egypt	81	42.6	14	50.0	13	5.0	1	3.2	--		--		--		--		8	3.0
Other Middle-eastern countries	10	5.3	--		1		--		--		4	13.3	--		10	5.5	8	3.0
Other countries	50	26.3	9	32.1	4	1.5	2	6.5	7	25.0	2	6.7	--		20	15.9	25	9.3
Total number exported	190		28		260		31		28		30		38		182		270	

[1/] Data compiled from the Wildlife Administration records.

countries. That was probably due to the lack of any private enterprize working in live wildlife export in the above table. Most of the export was done by Sudanese citizens working abroad.

Revenues Collected by the Wildlife Administration from Export of Wild Animal Parts and Live Animals: In Appendix Table 16 the Wildlife Administration's export fees of live animals and animals' parts are presented. Tables 30 and 31 present revenues collected by the Wildlife Administration as fees for export of wild animals' parts and live wild animals. Several changes were made on export fees of wild animals' products in 1979-1980. The fees on lizard skins were changed from LS 0.025 per skin to LS 0.1 per skin, python skin fees from LS 0.125 to LS 1, wild cat skins from LS 1.0 to LS 5.0 and ostrich eggs from LS 1 to LS 5. Export fee increases on crocodile skins from LS 1 to LS 5 and buffalo heads from LS 1 to LS 10 were effective as of 1980-1981.

Fees on live animals were subjected to even more changes during the period from 1976 to 1981. Fees on monkeys were increased from LS 2 to LS 3.5 to LS 5. Dorcas gazelle fees were increased from LS 3 to LS 20 in 1979-1980 and then reduced to LS 12.8 in 1980-1981. Ostrich fees were increased from LS 1.5 to LS 3.6 in 1978-1979 and to LS 20.5 in 1979-1980 and then reduced to LS 2.1 in 1980-1981. Fees on song birds, parrots, white storks, and ibises were all subjected to some increases.

Changes in export fees are difficult to interpret. From 1976 to 1981 the Sudanese pound has been devalued several times and some of the increases were probably due to the inflation rate in the country. However most of the fees are unreasonably low and fees on the Wildlife

Table 30. Revenue collected by the Wildlife Administration as fees for export of wild animals' parts during the period from 1976 to 1981.

Years	Animals' parts												Total revenue in LS
	Lizards skins	Crocodile skins	Python skins	Wild cat skins	Leopard skins	Ghazel skins and heads	Ostrich feathers and eggs	Tiang heads and skins	Zebra skins	Other Animals			
1976-1977 numbers	48924	4584	1236	599	118	1 skin 2 heads	8 eggs	--	1	1 kob skin	1 lion skin	1 turtle shield	
Revenue in LS	986.550	4584.000	315.750	599.000	1180.000	3.000	8.000	--	15.000	10.000	3.000	3.000	6645.300
1977-1978 numbers	30848	5068	2794	37	1	7 heads	6 pounds/ feathers	--	2	10 stuffed crocodiles	--	--	
Revenue in LS	771.200	5068	698.500	37.000	10.000	7.000	6.000	--	3.000	30.000	--	--	6630.700
1978-1979 numbers	99350	2160	1827	509	13	--	--	13 skins & 1 head	1	1 cheetah skin	4 lion skins	3 buffalo heads	
Revenue in LS	2483.875	2160.000	456.750	509.000	130.000	--	--	14.000	10.000	10.000	12.000	3.000	4788.625
1979-1980 numbers	168250	1544	4330	188	--	--	3 eggs	--	--	--	--	--	
Revenue in LS	15220.650	1656.000	3877.000	816.000	--	--	15.000	--	--	--	--	--	21584.650
1980-1981 numbers	56582	37	7900	80	--	9 skins & 35 heads	--	--	--	8 Nubian ibex heads	--	2 buffalo heads	
Revenue in LS	5658.200	185.000	7900.000	400.000		27.000 + 159.000	--	--	--	200.000	--	200.000	4589.200

Table 31. Revenue collected by the Wildlife Administration as fees for export of live animals during the period from 1976 to 1981.

Animal	Years									
	1976-1977		1977-1978		1978-1979		1979-1980		1980-1981	
	No.	Fee	No.	Fee	No.	Fee	No.	Fee	No.	Fee
Grivet monkey	26	52.000	59	118.000	45	90.000	82	305.000	62	310.000
Patas monkey	6	12.000	2	4.000	--	--	4	14.000	12	60.000
Dorcas gazelle	12	36.000	37	111.000	56	138.500	36	768.000	80	1025.000
Ostrich	1	1.500	7	10.500	4	14.500	3	61.500	7	15.000
Guinea fowl	20	45.000	97	145.500	20	39.000	--	--	36	60.000
Sudan doich	60	15.000	200	50.000	200	50.000	200	50.000	202	50.500
Love birds	33	8.250	129	32.250	56	84.000	73	136.000	64	160.000
Mongala gazelle	--	--	10	30.000	3	30.000	--	--	--	--
Tiang korrigum	--	--	9	36.000	--	--	--	--	--	--
Giraffe	--	--	2	20.000	1	100.000	--	--	--	--
Zebra	--	--	--	--	3	300.000	--	--	--	--
Colbus monkey	--	--	1	5.000	--	--	--	--	--	--
Roan antelope	--	--	2	6.000	--	--	--	--	--	--
Red fronted-gazelle	--	--	--	--	--	--	--	--	--	--
Reedbuck	--	--	1	3.000	--	--	--	--	--	--
Kob	--	--	--	--	--	--	--	--	--	--
Wild cat	--	--	9	9.000	--	--	--	--	--	--
Mongoose	--	--	--	--	--	--	--	--	--	--
Rat	--	--	--	--	200	50.000	--	--	--	--
Land turtle	--	--	--	--	4	20.000	--	--	4	20.00
Lizard	2	4.000	--	--	--	--	--	--	--	--
Python	1	3.000	--	--	--	--	--	--	--	--
Song bird	88	22.000	7	1.750	10	2.500	--	--	4	10.000
Canary bird	1	1.500	--	--	2	3.000	--	--	4	10.000
Falcon	2	3.000	3	4.500	1	1.500	--	--	1	10.000
Crowned-crane	--	--	6	9.000	--	--	--	--	--	--
Parrot	--	--	10	30.000	--	--	--	--	3	20.000
Geese	--	--	4	6.000	8	21.000	14	21.000	--	--
Duck	--	--	--	--	6	18.000	3	15.000	--	--

Table 31 (continued). Revenue collected by the Wildlife Administration as fees for export of live animals during the period from 1976 to 1981.

Animal	Years									
	1976-1977		1977-1978		1978-1979		1979-1980		1980-1981	
	No.	Fee	No.	Fee	No.	Fee	No.	Fee	No.	Fee
White stork	--	--	2	3.000	--	--	9	55.000	--	--
Marabou stork	--	--	4	6.000	--	--	--	--	--	--
Saddle-bill stork	--	--	--	--	--	--	--	--	1	15.000
Ibis	--	--	4	6.000	9	27.000	--	--	--	--
Pelican	--	--	4	6.000	--	--	--	--	--	--
Francolin	--	--	--	--	--	--	2	6.000	--	--
Sand grouse	--	--	--	--	--	--	--	--	--	--
Dove	--	--	--	--	--	--	6	9.000	--	--
Total Revenue		259.250		652.000		989.000		1441.000		1765.000

Administration list were not enforced. Lower fees were collected for almost all animals exported.

Ivory Trade: Elephant population in the Sudan is estimated to be 134,000. The Sudan is considered to have about 10% of all the present population of African elephants. The country is rated to be fourth after Zaire, Tanzania, and Zambia. The range of the elephant is estimated to be 34% of the area of the country of which only 9% are protected wildlife areas (Douglas-Hamilton 1980).

The elephant range in the Sudan includes all the Southern region and extends into Southern Darfur, Southern Kordofan and the south-eastern part of the Blue Nile provinces. The average density of elephants in the Sudan is estimated to be 0.16 elephant/km^2. Among the sparsest populations in Africa were those in Southern Kordofan province, at 0.001 elephant/km^2 (Watson *et al.* 1977).

History of elephant exploitation in the Sudan has been discussed in previous chapters. During the 1960's and 1970's elephants were exploited by both the Sudanese Army and Anyanya Fighters taking part in the civil war in the south. Poaching is considered the most imminent threat and poachers in one recent incident machine-gunned 40 elephants and wounded one game scout (Minga 1980).

There are several laws pertaining to the hunting of elephants and the property of ivory in the Sudan. Elephants with less than 5 kg tusks are among the animals of Schedule 1 and are strictly protected. Shooting an elephant with a tusk exceeding 5 kg requires that the holder of an ordinary game license Class "A" should apply for a special license for that purpose. Permits to kill elephants with spears were

issued to different tribes in western and Southern Sudan with tribal quotas of elephants changed from time to time. However since the mid-1970's all legal hunting of elephants was banned and currently only a few special licenses for hunting elephants are issued in Southern Sudan.

All acquired tusks must be presented at the headquarters of the Wildlife Administration of the district of origin for registration and marking. Each district has a distinguishing number and the tusk will be branded with a district number and a consecutive number. Records of registered tusks from all districts, which includes weights of individual tusks, are sent to Khartoum.

Private ownership of ivory is limited to registered and marked tusks weighing more than 5 kg and killed by holders of special permits or with tribal permits. All other ivory is considered government property. This includes tusks weighing 5 kg or less, tusks of elephants killed without a valid license or permit, tusks of elephants killed by game scouts on operations to control elephant damage, and tusks of elephants killed in self defense of life or property. Rewards are given to finders of tusks of dead elephants depending on the weight of the tusk, but such tusks are also considered government property.

Records of elephant tusks from all districts in the Sudan are presented in Appendix Table 17 and a summary is presented in Table 32. Data for years 1963, 1964 and 1975 could not be found within the Wildlife Administration's records. The table reflects the general increase in elephant poaching as most of the ivory has been confiscated from poachers after legal hunting was restricted. Low numbers of tusks recorded in the 1960's and early 1970's was probably due to

Table 32. Elephant tusk numbers and weights recorded by the Wildlife Administration in the Sudan, 1952 to 1982.[1/]

Year	Number of tusks	Total weights (kg)	Average tusk weight (kg)
1952	46	209.85 + (9052.63)	4.56[2/]
1953	113	629.76 + (1524.05)	5.57[3/]
1954	78	253.40	3.25[4/]
1959	509	3854.13	7.57
1960	531	4113.20	7.75
1961	200	967.79	4.84
1962	50	1048.55	20.97
1965	9	19.28	2.14
1966	28	227.31	12.63
1967	56	1084.17	19.36
1968	4	52.63	13.16
1969	126	1611.84	12.79
1970	864	6801.95	7.87
1971	94	1717.11	18.27
1972	316	3698.28	11.70
1973	91	1844.60	20.27
1974	11	111.62	10.15
1976	413	6150.18	14.89
1977	1,182	13008.85	11.01
1978	596	6568.97	11.02
1979	625	7195.10	11.51
1980	1,035	10514.29	10.16
1981	3,688	22612.39	6.13
1982	2,231	16098.46	7.23

[1/] Data for 1982 includes records for the first half of the year until June 1982. Data for years, 1955, 1956, 1957, 1958, 1963, 1964 and 1975 are missing (could not be located among the Wildlife Administration records).

[2/] [3/] [4/] Tusks with average weights presented were boarded (thrown into the river) as they were considered worthless for selling or any other purpose. Weights presented in brackets show total weights recorded without numbers of tusks or individual tusk weights.

limitations of the Wildlife Administration activities during the civil war period in the south.

The sharp increase in numbers and total weights of recorded tusks during the last three years is pointing toward a well organized illegal traffic in ivory operating in the Sudan. This could be substantiated by one incident in 1981 when the Sudanese police were able to capture 2,230 tusks (11,349 kg) along the Red Sea coast ready to be smuggled from the country.

The continuous decline of average tusk weights and increased total weights suggest that elephants are not shot on a selective basis, but complete herds were machine-gunned and large numbers of elephants with small tusks were killed. The recorded tusks represent only a small portion of the real traffic in ivory. This is due to the limited activities of the Wildlife Administration in patroling and inspections dictated by limitations of personnel, transportation and fuel.

Collected government ivory is auctioned in Khartoum to Sudanese ivory traders. Prices are decided according to the weights of tusks and whether they have any defects or not. Tusks of the first class "A" are those weighing 30 pounds or more and have no defects. Tusks of the first class "B" are those weighing 30 pounds or more but have some defects. Tusks of the second class "A" are those weighing 15 to 29.5 pounds and free from defect while those of the same weights but with some defects are considered second class "B". Tusks of the third class are those weighing 10 to 14.5 pounds and fourth class tusks weighing 9.5 pounds or less but have no defects. The broken tusks and scrap ivory are considered the least valuable.

In 1969, the Ministry of Industry criticized the practice of the Wildlife Administration to sell ivory and confisicated wild animal skins at auctions. The Ministry of Industry noted that a monopoly had been created and poor craftsmen were not able to buy raw materials needed for their industries. The Ministry of Industry further suggested that ivory and wild animal skins should be sold at fixed prices to craftsmen according to their needs. The above suggestion was rejected and the Wildlife Administration continues to sell ivory at auctions.

Local craftsmen carve large amounts of ivory. Manufactured ivory items are subject to no restrictions and can be sold in the country to citizens or visiting tourists. There are no records of the size of this industry and it is almost impossible to find out sources of such ivory and whether it was acquired legally or illegally.

Prices paid for ivory at the Wildlife Administration auctions, prices of exported ivory from the Sudan and international prices of ivory for the period 1952 to 1982 are presented in Table 33. Prices paid to the Wildlife Administration are very low in comparison to prices received from exported ivory which are also very low in comparison to international prices. Prices in the Wildlife Administration's auctions in 1960-1970 were only about 50% of the international prices while prices in 1970-1982 were less than 50% of the international prices.

The Wildlife Administration does not take part in exporting government ivory. The Administration auctions the ivory to local ivory traders claiming that it encourages the local industry of ivory

Table 33. Ivory prices in the Wildlife Administration auctions, prices of exported ivory from the Sudan, and international ivory prices for the period 1952 to 1982.

	The Wildlife Administration Auctions							Exported Ivory Prices	International Prices	
	1st Class		2nd Class		3rd Class	4th Class	Broken Scab			
	A	B	A	B						
	L.S./kg							US $/kg	FR/kg	US $/kg
1952	0.97 Average Price									
1953	1.54	--	0.88	--	--	--	--			
1955	1.98	1.54	1.32	--	0.99	0.77	--			
1960	1.65	1.16	1.34	1.10	1.15	0.48	0.68			
1961	1.56	1.38	1.23	1.15	1.06	1.01	0.63			
1968	1.78	0.99	1.32	1.32	1.32	0.66	0.60		812.62	6.0-3.72[3]
1969	1.76	1.74	1.54	1.48	1.49	0.99	0.44		991.33	4.55
1970	1.76	1.74	1.54	1.50	1.47	1.32	0.90		1583.0	7.26
1974	8.81	4.62	6.94	6.61	6.61	4.41	1.79			
1976								CIF[4] Hong Kong 16 and 20	2454.37	11.25
								CIF Hong Kong 18-17.5		
1977								CIF Japan 20-30		19.84[3]
								CIF Cairo 35		34.27[3]
1978								CIF Hong Kong 18-9		50.0 [3]
1979				25.35[2]				CIF Malawi via London 9		
								CIF India 30		
								France 40		
								W. Germany 40		
								Hong Kong 40		
								Cairo 10		
1980	26.450									
1981	41.225	28.674	31.225	25.352	20.225	18.275		CIF Hong Kong 20-40		
								Japan 15		
1982								France 15-32		
1981	41.225	28.674	31.225	25.352	20.225	18.275				

[1] Douglas-Hamilton (1980); [2] Average price paid in Southern region for ivory bought from Ex-Anyanya; [3] Wylie (1980). [4] CIF: Cost, insurance and freight.

carving. Very few traders manage to buy all auctioned ivory and ultimately export most of it.

The prices declared by Sudanese ivory exporters are very low compared to international prices. Average price reported by Sudanese ivory traders shipped by air to Hong Kong during the period 1976-1982 was U.S. $22.06/kg., CIF-Air Freight and insurance included in that price. Average international prices for this period had been U.S. $50/kg.

Total weights of ivory exported from Sudan and weights and percentage imports by different countries for the period from 1970 to 1982 are presented in Table 34. Hong Kong and Japan import the largest quantities of the Sudan ivory. Their imports of 40.4% and 26.7% respectively, agrees with their imports of total world ivory reported by Douglas-Hamilton (1980).

Table 34. Total weights (kg) of ivory exported from Sudan and weights and percentages imported by different countries for the period 1970 to 1982.[1/]

	Years											Total	%/total
	1970	1971	1972	1973	1976	1977	1978	1979	1980	1981	1982	weights	export
Hong Kong			1207.5	453.1	5553.1	13306.5	2064.8	2262.4	5100.5	4000	16000	49948.5	40.4
Japan						7452	1447		2000	15000	7100	32999	26.7
Egypt						22	2632.9	3400	5000	2272.2		13427.4	10.9
India					135				1500			6653	5.4
Botswana							6221.6			5000		6621.6	5
Middle-east countries	7.9					4402		23	156.5	170		4759.4	3.8
France								23		9.75	4000	4053.6	3.3
United Kingdom				1134				1735	20.8	6.4		2875.4	2.3
West Germany				1417		22	22.9		9.1	1026.8		2555.4	2.1
Other countries	52.8	33.6		12.7	14.9		14.5		56.3			184.8	0.1
Year's Totals	60.7	33.6	1207.5	3017.4	5703	25204.5	12403.7	7601	13843.5	27485.5	27100	123660.1	

[1/] Data compiled from the Wildlife Administration records. 1982 data covers the period until June. Data for 1974 and 1975 were not found.

DISCUSSION

The wildlife of Northern Sudan is disappearing at an alarming rate. Abundance and distribution of several species has been drastically reduced during the last few decades. Several species are threatened with extinction such as the sommering gazelle and the wild dog. Both species were once abundant in large areas of the country but are now restricted to a few locations. The addax and oryx survival in Northern Sudan had been considered very doubtful as none were reported to occur there during the 1970's. However, in 1983 an illegal capturing operation was reported to involve 14 addax, 12 of which were killed during capturing and transportation and 2 were exported (Awad 1983). Tht total absence of reliable sight records of the Nubian wild ass has led to the assumption that the pure-bred wild animal may by now be extinct and that all surviving stocks are ferral (Fisher *et al.* 1969).

Watson *et al.* (1977) summing up the results of a low sampling aerial census of livestock and wildlife in the Sudan, suggested that wildlife in Northern Sudan does not constitute an exploitable resource of any significance. They further stated that illegal killing of all wildlife species goes on in the Sudan without the slightest control from the authorities. They also reported that it is possible for the trader to acquire exportation documents for almost any quantity of any wildlife product. Anti-poaching patrols are virtually unknown, and local inhabitants are probably unaware that any legislation exists

protecting wild animals. They reported that poaching is also practiced by some government and military personnel, who operate government vehicles without any restraint in the pursuit and killing of wildlife.

The above statements are considered generally true. While the wildlife populations are low over most of Northern Sudan, there are still some localized areas with exploitable wildlife resources. Of course, such scattered populations of wildlife will require more intensive aerial census and were overlooked in the 1977 census. The necessity for drastic changes in concepts, philosophy, management practices and laws is stressed in this study if the wildlife resources of Northern Sudan are to be conserved.

Conservation status in all wildlife "protected areas" of Northern Sudan is considered unsatisfactory. The Dinder National Park is confronted with several problems that threaten its very existence. These problems arise primarily from other conflicting landuse policies, and hence can only be solved in the context of an overall landuse plan for the whole region. Such plans should cater for all landuse facets including wildlife, livestock, grazing land, forestry and agriculture.

The lack of any protective measures for wildlife and their habitats in the game reserves and game sanctuaries has resulted in the loss of most of their wildlife. It is urgently required that realistic objectives should be adopted. The Wildlife Administration should abandon some of the game reserves and game sanctuaries which have lost most of their wildlife and habitats. Some of the reserves and sanctuaries such as the Rahad Game Reserve are not suitable any more to be classified as reserves or sanctuaries. The Sabaloka Game Reserve should be reevaluated for suitability of future transplant of the wild

sheep. All other "protected areas" should be surveyed and realistic plans should be implemented on the basis of such surveys.

While some of the "protected areas" have lost most of their wildlife, there are other areas in Northern Sudan which still have a variety and abundance of wildlife. Immediate conservation efforts should be implemented in areas with more wildlife potential. Such areas include some locations in the desert region of Northern Kordofan and Northern Darfur where there are still dorcas gazelles, red-fronted gazelles, wild sheep and ostriches. The presence of addax, oryx and addra gazelle in the deserts of Kordofan and Darfar should be investigated. In the Red Sea Hills the Nubian ibex is found in many localities. The dorcas gazelle and ostrich are found in the Red Sea coastal plains together with other associated species. In the desert reaches west of Omdurman to the eastern boundaries of Northern Kordofan and north of Omdurman to the southern boundaries of the Nile Province, few numbers of dorcas gazelles are present. Jebel el Dair, south of El Rahad town in Northern Kordofan has a small population of the greater kudu. In Khor el Rasai and other localities in Kassala province a small population of sommering gazelle is found. The important wildlife areas of Southern Darfur have been described in a previous chapter.

Reservation of areas for wildlife conservation should be a part of regional landuse plans. The merits of wildlife conservation should be communicated to the local public and any conflicts of interests resulting from such decisions should be resolved and minimized. The Wildlife Administration should have effective presence in any area designated as sanctuary, reserve or national park.

The Wildlife Administration

Darling (1961) pointed out that the Wildlife Administration was originally conceived as a licensing and policing body and had been manned as such. He advised the government to adopt the "newer" concept of a wildlife department as a technical natural resource conserving body, intimately concerned with management of habitats and animal populations. Very minor progress has been achieved toward that goal. The Wildlife Administration has less than 5% of educated and specialized personnel (those with high school education and above) working in the four Natural Resources Administrations of the Sudan. This percentage is the lowest among the four Natural Resources Administrations (Table 6). The Wildlife Administration has now 11 graduates from Biology and Foresty Departments of the University of Khartoum -- most of them appointed recently -- among its 110 senior staff and game officers.

The three other Natural Resources Administrations -- Forestry, Pastures and Soil Conservation -- are much better equipped with qualified personnel than the Wildlife Administration. During the period when the Wildlife Administration was a part of the Agency of Natural Resources it took little advantage of the experts working in related natural resources administrations. For example, problems of livestock trespassing in the Dinder National Park could only be solved in a joint project involving experts from the Pastures Administration. Coordinated efforts between administrations working in the Natural Resources Agencies will not only increase man-power available for each administration, but will also increase other facilities such as

transportation and equipment for executing programs of common interest. The coordinated natural resources programs will be possible with some in-job training and adoption of a broader philosophy dealing with all the natural resources rather than restricting each administration to its area of specialization. Such understanding had not been adopted when the Wildlife Administration was a part of the Agency of Natural Resources of the Ministry of Agriculture. The recent separation of the Wildlife Administration from the Ministry of Agriculture and its becoming a part of the Ministry of Interior should be reevaluated on the basis of the above argument.

The Wildlife Research Unit of the Agricultural Research Corporation should have a well defined and legalized relationship with the Wildlife Administration. The Wildlife Research Unit has the largest group of wildlife specialists in the country. The unit is staffed with 10 biologists all of them had post-graduate education. There is no official coordination between the Research Unit and the Wildlife Administration. The role of the research in wildlife conservation efforts should be decided and research priorities should be directed to solve existing problems.

The separation of the Wildlife Administration in the Southern region should be reconsidered. Wildlife conservation in the Sudan requires well coordinated efforts in northern and southern parts of the country. Wildlife populations move from the Southern region into the Northern region and similarly poachers often travel from one part of the country into the other. Control of the illegal trade in ivory and other wildlife products cannot be achieved without coordinating efforts in the south and north and neighbouring countries.

The man-power distribution of the Wildlife Administration in the different provinces of Northern Sudan shows that 47% of all the man-power, 53% of the senior staff, and 35% of the game officers are located in Khartoum (Table 7). This distribution of man-power is obviously not related to the distribution of wildlife in Northern Sudan and should be revised.

Khateeb (1978) suggested that the Wildlife Administration should not have all its efforts directed towards increasing its revenue from selling more hunting licenses and capturing wild animals for export. He recommended that there should be more emphasis on efforts to protect wildlife. The priorities and working strategy of the Wildlife Administration were reflected in the five-year (1970 - 1975) and six-year (1978 - 1984) development plans (Table 9). The five-year plan allocated money for capture of wild animals, cropping, developing of Dinder National Park and wildlife research. The six-year plan allocated money for capture of wild animals, development of Dinder National Park, wildlife census, enforcement of wildlife conservation and public relations program. The six-year plan allocated LS 30 million, or about 90% of the six-year development budget, for the purpose of establishing a zoo in Khartoum. The six-year plan did not reflect a reasonable understanding of the priorities of wildlife conservation in Northern Sudan. However, only a small portion of the approved funds were made available for the five-year and six-year plans. Almost all of the funds allocated for the Wildlife Administration were utilized in capturing wild animals and promotion of the Dinder Park.

The Wildlife Ordinance

The Wild Animals Ordinance and Regulations, 1935, and the National Parks, Sanctuaries and Reserves Regulation, 1939, were great steps forward in their time, but are now out of step with world progress in this field (Dasmann 1972). Although the wildlife legislation has been amended on numerous occasions, it is not related to present wildlife problems or the requirements of the country. The 1939 Wild Animals Ordinance has been criticized in several areas such as lack of a clear distinction between a game reserve and game sanctuary (Darling 1961, Moore 1974), laws related to big game, game birds and reptile hunting require major changes. The bag limits are far too liberal and not in accord with the decline of animals involved. Having the same bag limits in the 1980's as that in the 1935's is unrealistic.

The Food and Agriculture Organization of the United Nations provided assistance to the government of the Sudan in drafting a new comprehensive Wildlife and National Parks Act and implementing regulations (Moore 1974). The new law is necessary to overcome most of the problems of the old law. However, the new law proposal has not been passed as a legislation. More work is needed now on the proposed law to cater for some of the issues which were not addressed by the proposal and to consider other changes which have occurred since that time. The adoption of a new law is a first priority in wildlife conservation efforts in the Sudan.

Southern Darfur Wildlife

The effect of the establishment of a regional government in Darfur on the future of wildlife in Southern Darfur is not yet clear. Regional governments in Northern Sudan will be more susceptible to local political pressures and will put more emphasis on the immediate needs of the local people. The tendency of the regional governments will be to sacrifice wildlife to other development objectives. This will be the acceptable political alternative as long as benefits from wildlife are not obvious to the local governments. Current economic benefits from wildlife in Southern Darfur are incorporated in the illegal trade in wildlife products and are not reflected in the revenue of the local government. The development of any wildlife utilization programs is not expected in the near future. The Central Government in Khartoum should interfere, whenever necessary, and overrule local immediate interests. The Central Government should dictate wildlife conservation programs based on national interests and future potentials.

Immediate survey of the wildlife resources of Southern Darfur is required. The survey should include the important wildlife areas listed in the section about Southern Darfur. Data should be collected on numbers of wildlife, seasonal ranges, landuse practices in the area and their impact on wildlife. Based on such information appropriate decisions should be made.

The importance of Lake Kundi as a waterfowl habitat should be stressed. The lake is used intensively by the nomads as a major supply of water for their livestock during the dry season. Studies should be conducted to find possible ways to minimize livestock impacts on

the waterfowl habitats. Development projects in Jebel Marra should only be approved if they will not destroy the unique montane habitats and their fauna and flora.

The Radoam area is the most important wildlife area in Southern Darfur. It is the second important wildlife area, after the Dinder Park, in Northern Sudan. Recommendations to establish a national park in the Radoam area were submitted to the Sudanese Government (Field 1974, Wildlife Research Unit 1976). A decision should be reached as soon as possible on whether a national park is to be established in the Radoam area or not. Establishment of a national park will necessitate that all conflicting landuse practices be completely eliminated. The human population in areas south of Radoam town (a few thousand) should be moved to other suitable areas. Livestock use in the area should be stopped. Poaching, trade in wildlife products should be controlled. This can only be achieved with assistance from the Sudanese Armed Forces as the Wildlife Administration is not equipped to deal with the strongly armed carvans of nomadic poachers from Northern Darfur. Coordination with the Police Forces is essential as the merchants who deal with the illegal trade of hashish (bongo) are also involved in the illegal trade of wildlie products.

The importance of game meat to the people of Radoam is reflected in the responses of the wildlife values questionnaire. At least 90% of the adult men of Radoam practiced illegal hunting. A large percentage of the Radoam population are also involved in the illegal cultivation of hashish (bongo). The efforts of the government to control both illegal activities practiced by the people of Radoam should also consider providing them with alternative ways to make a living.

The Wildlife Administration should be more involved in controlling wildlife damage. Studies of the baboon and hyaena damage are required and methods of control should be developed.

Wildlife Values

Some estimates should be developed regarding the contribution of wildlife to the economy of the country. Wildlife products are of great importance to the people of rural areas. Values of wildlife products are incorporated in illegal trade and are not expressed in government figures.

The Wildlife Administration in Southern Darfur (1981) estimates that captured wildlife products represent about 5% of the illegal trade in wildlife products. This estimate has been based on real accounts of the activities performed by the Wildlife Administration in Southern Darfur in controlling poaching and illegal trade in wildlife products. The basic assumption made by the author and the senior wildlife inspectors in Southern Darfur was that the probability of capturing illegally acquired wildlife products is the same every day during the dry season. The 5% estimate will be used in this study to calculate the upper limit of the total illegal trade of wildlife products and a more conservative estimate of 10% will be used to calculate the lower limit. Based on the above estimates and using the average captured wildlife products for 1976 to 1980 (Table 17) the total yearly trade in wildlife in Southern Darfur could be estimated to be between 35,984 and 18,492 kg of dried game meat, 124 to 62 leopard skins, 866 to 430 wild cat skins, 388 to 194 ungulate skins, 35,732 to 17,866 Nile monitor skins, 3,556 to 1,778 python skins and 2,048 to 1,024 elephant tusks.

Applying the above estimates and using average captured ivory in Northern Sudan for the period 1979 to 1982, the total yearly trade in ivory in Northern Sudan could be estimated between 37,894 to 18,947 tusks weighing 282,100 to 141,050 kg collected from 21,052 to 10,526 elephants. The same procedure cannot be used to estimate total trade in reptile skins. There are less restrictions on the purchase of reptile hunting licenses or export permits and hence the Wildlife Administration records of reptile skins will represent higher percentages of the total trade in reptile skins. However, the large amount of reptile skins used in the country for manufacutring of shoes, bags and other items are not included in the Wildlife Administration records.

The purpose of the above estimates is not to reach definite monetary values for the wildlife trade in northern Sudan. It is only an attempt to estimate. However, some limits could be established which will make it easier to appreciate economic benefits from wildlife in Northern Sudan.

The potential of selling live wild animals is great. There is an increasing demand for these animals from rich Middle-Eastern countries. The capturing techniques employed by the Wildlife Administration are primitive and the results are generally poor. The Wildlife Administration should train some of its personnel on modern capturing techniques.

The elephant populations in the Sudan are among the largest in Africa. Ivory trade should recieve more attention. The ivory trade in the Sudan does not involve only elephants killed in the country, but also ivory smuggled from the neighbouring countries. The control of

elephant poaching in the Sudan is beyond the limited resources of the Wildlife Administration as it involves large organized groups of poachers armed with modern firearms. This necessitates the involvement of the Sudanese Armed Forces in the control of poachers.

Drastic changes are needed in all aspects of the ivory trade. The supplies of ivory required by local craftsmen should be organized by the Wildlife Administration. At the present time the Wildlife Administration has no system to check the sources of manufactured ivory. This encourages craftsmen to purchase ivory from poachers. The Administration should supply craftsmen with their needs of ivory from its confisicated ivory. Larger amounts of the Sudanese ivory should be manufactured in the country. This will increase its prices when exported and will provide new employment opportunities. The Wildlife Administration should consider monopolizing all export of unmanufactured ivory. Revenue from ivory export will provide funds that are badly needed to promote conservation programs. The Wildlife Administration's monopoly of ivory export will eliminate the role played by the few merchants who are controlling ivory export from the Sudan. It is most likely that some of these merchants are influential in financing and encouraging elephant poaching. With the Wildlife Administration's monopoly on legal export of ivory and increasing the control on smuggled ivory, the poachers will probably have difficulty in finding buyers for their ivory.

The revenues received by the Wildlife Administration for the sale of ivory, skins and live animals is very low compared to the international prices. Export fees collected by the Wildlife Administration on export of wildlife products is very low compared to prices of exported

products. The price list of the Wildlife Administration should be reviewed. Prices of wildlife products and export fees should provide a sizeable increase in the revenue of the Administration.

The growing market of manufactured wildlife products in Omdurman and Khartoum should be subjected to a very close supervision by the Wildlife Administration. These markets are an outlet for the products collected through poaching. The adopted policy of the Wildlife Administration is not conducting any checks on sources of manufactured wildlife products. These products should also be subjected to special taxes and export fees which should be utilized in conservation programs.

Public Education

The public's attitudes toward wildlife in Northern Sudan are the result of lack of education about the Sudanese wildlife. All of the urban areas of Northern Sudan have lost most of their wildlife. Wildlife presence is restricted now to remote areas. Preliminary environmental concepts, natural history and information about wildlife in the Sudan should be incorporated in wildlife programs in the Sudan. The experiences of Kenya, Malawi, Tanzania and Egypt in environmental education of the youth should be studied and relevant programs adopted. Although the Dinder National Park is located close to most urban areas of Northern Sudan, only a few Sudanese have the chance to visit it. The low number of Sudanese visitors to the park could be mainly attributed to the lack of means of transportation and the lack of reasonably priced accommodations. The Sudanese Tourist Corporation is concerned only with the wealthy first-class tourist. The lack of large numbers of rich tourists in the country is restricting the chances of the corporation to make profit.

The Tourist Corporation should direct some of its efforts to furnishing the opportunity for the Sudanese people to visit the park for reasonable prices. This would increase the revenue from tourism and would help to create public awareness about the importance of wildlife.

CONCLUSIONS

Based upon compiled information and results of conducted surveys and research in this study the following conclusions and recommendations are submitted.

Wildlife resources are renewable resources and their conservation should provide economic benefit for the Sudan. Wildlife conservation should be incorporated in national and regional landuse plans. Environmental assessment studies should be required prior to approving all major development projects. The impact of the spreading oil prospecting, drilling and other related activities on wildlife should be studied and possibilities to reduce negative impacts on wildlife should be investigated.

More information about wildlife distribution and abundance is the first step towards effective wildlife conservation policies in Northern Sudan. The surveys could be accomplished by joint efforts from the Wildlife Administration, Wildlife Research Unit, the Administrations of the Natural Resources in the Ministry of Agriculture and the University of Khartoum. Realistic wildlife conservation goals should be adopted based on the results of wildlife surveys.

The Wildlife Administration should introduce the new wildlife ordinance to the legislature as soon as possible. The Wildlife Administration should recruit more biologists. Training programs are required for the present staff stressing the principles of wildlife

management. The Administration should reduce its staff in Khartoum and relocate personnel and vehicles to different key wildlife areas. Co-ordination in wildlife programs is required between Southern and Northern Sudan and the role of the Wildlife Research Unit should be defined and legalized.

The central government in Khartoum should be involved in establishment of national parks and game reserves in coordination with the regional governments. The future of areas such as Radoam is of national concern and should not be influenced mainly by regional politics and interests. However, conservation decisions should not be in direct conflict with the interest of the local people and their traditional lives. If such conflicts cannot be resolved the government should provide acceptable alternatives.

Increasing the economic benefit from wildlife is of central importance for the future of wildlife in Northern Sudan. Safari hunting could provide some revenue and should be organized in suitable areas. Also laws should be reviewed to encourage more Sudanese citizens to hunt. Hunting areas should be established based on population surveys. More Sudanese citizens should be provided with the opportunity to visit areas like the Dinder National Park. This will not only generate some income, but will also help in educating the people about the importance of wildlife. The Wildlife Administration should train some members of its staff in methods of capturing wild animals. Capturing operations could be an important source of revenue if organized on a scientific basis.

The illegal trade in wildlife products should be controlled. All aspects of ivory trade should be studied and drastic changes should be

introduced. The Wildlife Administration should monopolize all ivory export. Taxes should be increased on all exported wildlife products. The Wildlife Administration should pursue the possibility of introducing laws to be able to use money generated from wildlife in conservation projects.

Public education programs should be initiated. Preliminary environmental concepts, natural history and information about the Sudanese wildlife should be incorporated in education programs in the Sudan. Progarms to increase public awareness about wildlife should be introduced in the Sudanese media. Education programs of the Sudanese Environmental Conservation Society and the Sudanese Wildlife Society should also be encouraged.

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APPENDIX TABLES

Appendix Table 1. Scientific names of mammals discussed in the study.[1/]

Scientific name	English name	Arabic name
Potamochoeros porcus porcus (Linnaeus)	Bush pig	Halouf
Alcelaphus buselaphus lelwel (Heuglin)	Lelwel hartebeest	--
Alcelaphus buselaphus tora (Gray)	Tora hartbeest	Taital Asfar
Cephalophus silvicultor silvicultor (Afzelius)	Yellow-backed duiker	--
Sylvicapra grimmia abyssinica	Abyssinian duiker	--
Gazella thomsonii albonatatus	Mongala gazelle	Gazal Mongala
Taurotragus oryx pattersonianus (Lydekker)	Lesser eland	El Bugga el Asghar
Tragelaphus scriptus dodingae (Matschie)	Giant bushbuk	Abu Nabah el Akbar
Equus asinus dianae (Dollman)	Nubian wild ass	Al Homar el Wahshi
Chimpansee troglodytes (Voight)	Chimpanzee	Shimpanzee
Colobus abyssinicus (Oken)	Colbus monkey	Sultan al giroad
Proteles cristatus (Geoffroy.)	Aard wolf	El Zeeb Al Aard
Genetta genetta	Genet cat	Kadis el Khala
Gerbillus	Gerbil	Gerbo
Manis temmincki (Smuts.)	Pangolin	Abu Girif

[1/] Scientific names of mammals provided in Table 1 are not repeated here.

Appendix Table 2. Scientific names of birds discussed in the study.[1/]

Scientific name	English name	Arabic name
Megalornis grus (Linnaeus	European crane	--
Poliocephalus ruficollis (Pallas)	Little grebe	--
Dissoura episcopus (Boddaert)	Wooly-necked stork	Abu ragaba
Aythya fuligula (Linnaeus)	Tufted duck	But
Casarca ferruginea (Pallas)	Ruddy sheld duck	But
Aythya nyroca (Güldenstädt)	White-eyed pochard	But
Aythya ferina (Linnaeus)	European pochard	But
Anas querqueldula Linnaeus	Garganey	But
Anas crecca Linnaeus	European teal	Ghattas
Anas penelope Linnaeus	Wigeon	But
Anas clypeata Linnaeus	Shoveler	But
Anas acuta Linnaeus	Pintail	But
Anas strepera Linnaeus	Gadwall	But
Anas platyrhynchos Linnaeus	Mallard	But
Phoenicopterus ruber Linnaeus	Greater flamingo	--
Phoeniconaias minor (Geoffrey)	Lesser flamingo	--
Sagittarius serpentarius Miller	Secretary bird	Sagur el Gidian
Coturnix coturnix (Linnaeus)	European quail	Firra
Gallinula chloropus (Linnaeus)	Moorhen	--
Fulica atra Linnaeus	Coot	--
Neotis nuba (Cretzschmar)	Nubian bustard	El Hubbar
Upupa epops Linnaeus	Hoopoe	Hud-hud

[1/] Scientific names of birds provided in Tables 2 and 3 are not repeated here.

Appendix Table 3. Partial bird list of Lake Kundi. Based on observations made in February 1982.

Scientific name	English name	Arabic name
Phalacrocorax africanus (Gmelin)	Reed cormorant	--
Pelecanus onocrotalus Linnaeus	White pelican	Baga
Ardea cinerea Linnaeus	Grey heron	Habib
Ardeola ralloides (Scopoli)	Squacco heron	--
Casmerodius alba (Linnaeus)	Great white egret	Tir el Bagar
Egretta garzetta (Linnaeus)	Little egret	Tir el Bagar
Leptoptilos crumenifera (Lesson)	Marabou stork	Abu Siain
Anastomosus lamelligerus Temminck	Open-bill stork	--
Dissoura episcopus (Boddaert)	Wooly-necked stork	Abu Ragaba
Threskiornis aethiopicus (Latham)	Sacred ibis	Naeiga-Abu mungal
Plegadis falcinellus (Linnaeus)	Glossy ibis	Maizel Bahr
Scopus umbretta Gmelin	Hammerkop	Abu Shakosh
Dendrocygana viduata (Linnaeus)	White-faced tree duck	But
Sarkidiornis melantotos (Pennant)	Comb duck	But
Plectoropterus gambensis (Linnaeus)	Spur-winged goose	Shaga
Sagittarius serpentarius Miller.	Secretary bird	Sugr Algidian
Cuncuma vocifer	African fish eagle	Bulli
Xiphidiopterus albiceps (Gould)	Crowned plover	--
Hoplopterus spinosus Linnaeus	Spurwinged plover	--
Ceryle rudis (Linnaeus)	Pied kingfisher	Agib

Appendix Table 4. Wildlife observations in several locations of Radoam area 1974, 1976 and 1982.

Location	1974	1976	1982
Bobaya to Yenboro	No data recorded for this area.	8 Tiangs, 2 Bushbucks 3 Roan antelope.	12 Tiangs, 1 Waterbuck 2 Oribi.
Dahal to Hamaraya	No data recorded for this area.	63 Kob, 14 Warthog, 4 Waterbuck.	62 Kob, 49 Waterbuck, 5 Reedbuck.
Birkat to Grinti	4 Hippos, the rest of the animals not recorded separately.	10 Hippos, 8 Tiangs, 4 Waterbuck, 3 Kob	8 Hippos, 24 Waterbuck, Lioness and 2 cubs.
Redina to Bobaya	28 Tiangs, 17 Roan antelope, 6 Oribi, 6 Reedbuck, 3 Warhogs.	41 Tiangs, 15 Roan antelope, 13 Warthogs, 1 Oribi, 1 Dik dik.	12 Tiangs, 4 Reedbuck, 10 Warthog, 1 Bushbuck, 3 Dik dik, 3 Patas monkeys, 1 dead elephant.
Idaero to Immi	1 Tiang, 50 Kob, 15 Waterbuck, 7 Warthog.	36 Tiangs, 90 Kob, 30 Roan antelope, 6 Warthogs, 1 Reedbuck, 1 dik dik.	55 Tiang, 51 Waterbuck, 26 Kob, 50 Baboons, 2 Bushbuck.
Radoam to Kafia Kingi	8 Tiang, 2 Roan antelope, 5 Red-fronted gazelle, 4 Oribi, 1 Reedbuck, 6 Warthogs, 2 Hyaenas, 1 Bushbuck, 1 Jackal.	8 Tiangs.	1 Waterbuck, 1 Warthog, 12 Baboons, 5 Pythons, 2 Patas monkeys

Appendix Table 5. Captured wildlife products at different areas in Southern Darfur, 1966-1980.

Year	Dried game meat in pounds	Skins: Leopard	Cheetah	Wild cats	Ungulates	Corcodile	Phython	Nile monitor	Elephant tusks	Location
1966	35		1	1	5					Radoam
										Ed Daein
										Rehied el Berdi
	4 giraffes				4					Garsila
										Nyala
1967	1,300					13	7	30	2	Radoam
										Ed Daein
									2	Rehied el Berdi
										Garsila
	414									Nyala
1968										Radoam
										Ed Daein
	2,435									Rehied el Berdi
										Garsila
										Nyala
1969										Radoam
										Ed Daein
	400				4					Rehied el Berdi
	21									Garsila
	700				19	(26.5 oz ostrich fea.)				Nyala
1970										Radoam
										Ed Daein
										Rehied el Berdi
									6	Garsila
	50		1	4		7				Nyala
1971	4,217									Rodoam
										Ed Daein
										Rehied el Berdi
							(1 ostrich)		8	Garsila
									6	Nyala
1972	800								9	Radoam
										Ed Daein
										Rehied el Berdi
										Garsila
		1	2							Nyala

Appendix Table 5 (continued). Captured wildlife products at different areas in Southern Darfur, 1966-1980.

		Skins								
Year	Dried game meat in pounds	Leopard	Cheetah	Wild cats	Ungulates	Crocodile	Phython	Nile monitor	Elephant tusks	Location
1973	2,636				3	Unsp. No.				Radoam
										Ed Daein
										Rehied el Berdi
										Garsila
										Nyala
1974	3,748					173	43	95	37	Radoam
										Ed Daein
	17.5			25						Rehied el Berdi
										Garsial
									6	Nyala
1975	6,800		3	2			5	245	1 gal elephant fat	Radoam
										Ed Daein
	300									Rehied el Berdi
										Garsila
	3,800	11	1	3	19	13 + 4 giraffe tails	80	158	5	Nyala
1976	2,250	4	5							Radoam
	1,125				14					Ed Daein
										Rehied el Berdi
										Garsila
	600	1		4	10		43	56		Nyala
1977	7,974	1	38	1	24				16	Radoam
	1,173	18	88			55	7	110	278	Ed Daein
										Rehied el Berdi
										Garsila
		1								Nyala
1978	1,453			16						Radoam
		Unspecified quantity of hippo skins								Ed Daein
		1		2		1	7	8		Rehied el Berdi
										Garsila
					3				2	Nyala (& 48 guinea fowl)

Appendix Table 5 (continued). Captured wildlife products at different areas in Southern Darfur, 1966-1980.

		Skins								
Year	Dried game meat in pounds	Leopard	Cheetah	Wild cats	Ungulates	Crocodile	Phython	Nile monitor	Elephant tusks	Location
1979	1,955									Radoam
										Ed Daein
		2		47		2	(ostrich fea.)			Rehied el Berdi
										Gorsila
		2			1		2	4		Nyala
1980	2,145								218	Radoam
								1	1	Ed Daein
										Rehied el Berdi
						1	26	14		Garsila
	1,710	3		14	45		804	8741		Nyala
1981										Radoam
							40	400		Ed Daein
	8	3*	7	47	1*	2	5*		37	Rehied el Berdi (+ 2 giraffe tails & ostrich feathers-3 lbs)
										Garsila
	84	4	2	13			91	940		Nyala

Appendix Table 6. Reports of wildlife damage in Jebel Marra area, Southern Darfur during the period from 1973 to February 1980.

No.	Locality and Date	Description of damage	Animals causing damage										Control Action
			Baboon		Grivet monkey		Jackal		Hyaena		Other animals		
1	Zalingi, 7/71	Crop damage	X	8	X	17							Nos. killed specified under each species.
2	Zalingi, 8/71	Livestock					X	116	X	47			Nos. killed specified under each species.
3	Zalingi and Kas, 10/71	Unspecified	X	45	X	21	X	28	X	35	P. monkey	9	Nos. killed specified under each species.
4	Zalingi and J. Marra, 11/71	Unspecified	X	176					X	8	P. monkey	105	Nos. killed specified under each species.
5	Zalingi, 12/71	Unspecified					X	63	X	25			Nos. killed specified under each species.
6	Zalingi, 12/71	Unspecified	X	76	X	47	X	107	X	35	9-P. monkeys, 2 warthogs		Nos. killed specified under each species.
7	Zalingi and Kas 1/72	Unspecified	X	43	X	11	X	67	X	56	11 P. monkeys		Nos. killed specified under each species.
8	Zalingi, 2/72	Unspecified	X	296									Nos. killed specified under each species.
9	Kas, 6/11/72	Unspecified	X	9	X	123	X	22	X	10	6-P. monkeys		Nos. killed specified under each species.
10	Kubum, 1/12/74	Unspecified							X				No action.
11	Kubum, 1/29/74	42 goats, 24 cows, 4 horses & 2 donkeys	X						X				No poison.

Appendix Table 6 (continued). Reports of wildlife damage in Jebel Marra area, Southern Darfur during the period from 1973 to February 1980.

No.	Locality and Date	Description of damage	Animals causing damage					Control Action
			Baboon	Grivet monkey	Jackal	Hyaena	Other animals	
12	Kas, 2/1/74	Fruit trees, chicken, 13 sheep & 17 goats	X					No action.
13	Kas, 10/73	Gum arabic trees & goats	X					No action.
14	Kubum, 2/28/73	Cattle & goats	X					No action.
15	Zaligi, 4/13/74	Unspecified	X					No action.
16	Kas, 1/20/75	Unspecified	X					No action.
17	Galoul, 10/27/75	Threatening people					Lion	No action.
18	Kednair, el Malam, 12/6/75	Unspecified			X		Lion	No action.
19	Kas, 1/75	265 domestic animals were lost			X	X	Lion	No action.
20	Zalingi, 1/19/75	Unspecified	X			X		No action.
21	Ngertiti, 3/5/77	Unspecified	X			X		The veterinarian used poison to kill hyaenas.
24	El Mulam, 1/27/77	Livestock	X	X	X			People chased baboons and killed 2 using horses & spears. A game scout killed 36 G. monkey using a 22 rifle.

Appendix Table 6 (continued). Reports of wildlife damage in Jebel Mara area, Southern Darfur during the period from 1973 to February 1980.

No.	Locality and Date	Description of damage		Animals causing damage: Baboon	Grivet Monkey	Jackal	Hyaena	Other animals	Control Action
25	Kubum, 2/18/78	Crops damaged	X						No action.
26	Zalingi, 4/26/77	Unspecified	X						No action.
27	Kas, 4/9/78	Unspecified	X		X		X		No action.
28	Zalingi, 4/23/78	Unspecified	X		X		X	P. monkey	No action.
29	Kas, 9/18/78	Crops damaged	X						Village inhabitants used fire-arms & killed 18.
30	Ngertiti, 11/6/78	Crops damaged	X						No action.
31	Zalingi, 3/21/79	Unspecified	X				X		No action.
32	Kas, 12/3/79	89 cows, 7 horses & 4 donkeys	X					Lion	No action.
33	Zalingi, 4/14/80	Crops & livestock	X						No action.
34	Mertagalo Galloul Beldong, 4/21/80	5 cows, 7 donkeys & 1 goat						Lion	No action.
35	Galloul, 11/27/80	1 horse, 6 dogs threat to people						Lion	No action.

Appendix Table 7. Reports of wildlife damage in Reheid el Berdi area, Southern Darfur during the period from 1973 to February 1980.

No.	Locality and date	Description of damage	Animals causing the damage					Control Action
			Baboon	Jackel	Hyaena	Grivet monkey	Other animals	
1	Massak, Nabaga, 3/24/73	Livestock		X	X			No action.
2	Tumbsko, 5/15/73	186 goats	X	X	X			No action.
3	Reheid el Berdi 10/10/73	Goat and donkeys		X				No action.
4	Tumbsko, 11/1/73	Crops, livestock & chicken. 41 goats and 3 donkeys	X	X	X	X		No action.
5	E. Serafaia, 1/7/74	Unspecified	X					No action.
6	Nabaga, 2/2/74	100 goats, 25 donkeys and 50 cows						No action.
7	Nitaiga, 2/3/74	Livestock		X	X			No action.
8	Belail, 1/19/76	376 goats, 10 cows and 60 donkeys			X			Strychnine poison was used for a short period.
9	Idd el Ghanam, 1/11/75 Kitaila area	7 people killed during last 5 years and hundreds of goats and cattle		X	X		lion	No action.
10	Rehied el Berdi, Ferkang, 3/2/75	35 goats	X		X			No action.
11	Idd el Ghanam, Kitaila, 4/1/75	Livestock			X			No action.
12	Serafaia, 5/18/75	Sheep, goat & threatened children & crop damage	X					No action.
13	Serafaia, 1/17/76	400 goats and sheep	X		X			No action.

Appendix Table 7 (continued). Reports of wildlife damage in Reheid el Berdi area, Southern Darfur during the period from 1973 to February 1980.

No.	Locality and date	Description of damage	Animals causing the damage					Control Action
			Baboon	Jackel	Hyaena	Grivet monkey	Other animals	
14	Deery, Idd el Ghanam, 2/76	Baboons aggressive to people at drinking places	X		X			No action.
15	Serfai, 3/4/76	150 sheep & cattle	X	X	X			No action.
16	Serafaia, 3/76	10 cows, 17 goats & 6 donkeys lost in 16 days	X	X	X			No action.
17	Idd el Ghanam area, 7/14/76	Crops damaged; livestock losses. Baboons agressive toward women & children at water places	X	X	X	X	Cheetah	No action.
18	Idd el Ghanam area, 12/76	Crops damaged & livestock losses	X		X			No action.
19	Idd el Ghanam area, 1/24/77	Livestock losses	X		X			No action.
20	Idd el Ghanam area, 3/17/77	Crops damaged & livestock losses	X					No action.
21	Idd el Ghanam area, 5/2/77	Crops damaged & livestock losses	X		X			No action.
22	Idd el Ghanam area, 8/77	Crops damaged & livestock losses	X					Game scout used 22 rifle with little success.
23	Idd el Ghanam, Nabaga, 2/78	35 cows, 15 calves, 75 goats	X		X			No action.
24	Reheid el Bardi, 1/14/79	Great losses in livestock & crops damaged	X		X			No action.

Appendix Table 7 (continued). Reports of wildlife damage in Reheid el Berdi area, Southern Darfur during the period from 1973 to February 1980.

No.	Locality and date	Description of damage	Animals causing the damage					Control Action
			Baboon	Jackel	Hyaena	Grivet monkey	Other animals	
25	Idd el Ghanam, 2/79	Baboon attacking children & women at water places. Livestock losses	X	X	X			No action.
26	Idd el Ghanam, 4/20/80	Baboon attacking women & children at water places. Goat losses.	X		X	X		No action.
27	Sarafaia, 8/12/80	Crops & livestock losses	X		X	X	P. monkey	A game scout was sent.
28	Sarafaia, 9/20/80	Crops damaged	X					A game scout was sent.

Appendix Table 8. Reports of wildlife damage in Nyala area, Southern Darfur during the period from 1973 to 1980.

No.	Locality and date	Description of damage	Animals causing damage				Control Action
			Baboon	Jackal	Hyaena	Other animals	
1	Gheriga - 15 miles from Nyala, 2/3/73	20 goats		X 8	X 4		Nos. shown under each species were killed.
2	Nyala Horticulture Nursery, 8/19/74	Damage to orchards	X				No action.
3	Nyala, 2/3/74	Chicken losses		X			No action.
4	Geradaya, 2/14/73	2 children killed	X				No action.
5	Um Kardos	Livestock losses			X		A game scout was sent for 5 days.
6	Delal Amgra, 4/21/74	Livestock losses		X	X		No action - no poisons were available.
7	Yara, 5/28/74	Vegetable, fruit trees & cattle, sheep, goats & donkeys	X	X	X		No action.
8	Wadi Nyala, 9/27/75	Sorghum, peanut, watermellon & cucumbers	X 9				9 were killed.
9	Um Sorier, 1/5/76				X		No action.
10	Karali, 2/5/76	Livestock			X		No action.
11	Gerba & Krokour, 2/29/76	63 cows, 40 donkeys & a number of goats & 19 sheep			X		No action.
12	Geraida & Sani Dofeiba, 3/31/76	50 cows in a "short" period of time			X		No action.
13	Fasha, 1/5/76	Sorghum plantation and goats	X				No action.
14	Fasha, 4/10/74	Sorghum, peanut plantation & livestock damage	X		X		No poisons available.
15	Delal Angra, 1/18/77	Livestock		X			No action.

Appendix Table 8 (continued). Reports of wildlife damage in Nyala area, Southern Darfur during the period from 1973 to 1980.

No.	Locality and date	Description of damage	Animals causing damage				Control Action
			Baboon	Jackal	Hyaena	Other animals	
16	Domaia, 2/12/77	Crop damage				Dik dik	No action.
17	Kertair, 7/1/75	Livestock	X	X	X	Lion	No action.
18	Sania, Dobiba, 8/17/77	Sorghum plantation	X				No action.
19	Idd el Geradaya, 5/3/78	Crop damage & goats killed	X				No action.
20	Ill el Garadaya, 12/4/79	Tomato plants	X				No action
21	Gerif, 2/10/80	Goats & donkeys		X	X		No action

Appendix Table 9. Reports of wildlife damage in Garsila area, Southern Darfur during the period from 1973 to February 1980.

No.	Locality and date	Description of damage	Animals causing the damage					Control Action
			Baboon	Grivet monkey	Jackal	Hyaena	Other animals	
1	Foro Burunga, 3/25/72	Crop damage		X				No action.
2	Garsila, 6/11/1972		X 10	X 130	X 10	X 22	P. monkey	Nos. shown under each species were killed.
3	Garsila, 1/19/77	Unspecified	X					No action.
4	Wadi Salih, 8/14/78	Crop damage	X					No action.
5	Wadi Salih, 9/22/78	Crop damage	X					No action.
6	Garsila, 1/2/79			X		X	P. monkey	A game scout killed about 36 baboons and hyaenas

Appendix Table 10. Reports of wildlife damage in Kundi, Ed Dain, Ragag, and Tulus areas, 1972 to February 1980.

No.	Locality and date	Description of damage	Animals causing damage: Baboon	Jackal	Hyaena	Other animals	Control Action
1	Tulus, 12/29/75	Unspecified	X				No action.
2	Ragag, 12/19/75	Unspecified	X				No action.
3	Ragag, 2/11/77	Unspecified	X				A game scout was able to shoot only 2 monkeys.
4	Ed Dein, 3/26/78	Livestock	X		X	Lion	No action.
5	Kundi	Crops damaged				Hippo	No action.
6	El Fardous, Abu Mataviq, 8/12/80	Crops & livestock damage	X	X	X		Game scouts were sent to shoot offending animals. No report on success.

Appendix Table 11. Game licenses issued at Khartoum, 1973 - 1980.

License Type	1973-1974	1974-1975	1975-1976	1976-1977	1977-1978	1978-1979	1979-1980	1980-1981
A	150	54	30	52	17	26	46	26
B	1071	1487	2028	1665	1091	1646	1537	1533
C	252	224	206	150	58	72	148	78
D	26	10	47	55	67	26	92	52

Appendix Table 12. Game licenses issued at Southern Darfur province, 1973-1981.

License Types	1973-1974	1974-1975	1975-1976	1976-1977	1977-1978	1978-1979	1979-1980	1980-1981[1/]
A	35	7	40	-	4	14	19	25
B	78	104	516	324	215	443	613	605
C	-	11	64	21	15	5	11	4
D	-	-	36	71	85	160	224	212
Special	-	-	-	-	-	3	-	-

[1/] Game license sales for 1980-1981 were estimated based on real sale figures until April 1981.

Appendix Table 13. Game licenses issued at Kassala province, 1973-1981.

License Types	1973-1974	1974-1975	1975-1976	1976-1977	1977-1978	1978-1979	1979-1980	1980-1981
A	1	-	-	-	-	-	-	-
B	178	188	244	172	88	191	289	290
C	-	35	23	14	4	26	35	36
D	-	-	-	-	-	-	-	-

Appendix Table 14. Game licenses issued at Northern Kordofan, 1973-1981.

License types	1973-1974	1974-1975	1975-1976	1976-1977	1977-1978	1978-1979	1979-1980	1980-1981
A	-	-	-	-	-	-	-	-
B	-	-	-	2376	2315	1643	2721	2758
C	-	-	-	46	49	9	13	10
D	-	-	-	-	-	-	-	3

Appendix Table 15. Game licenses issued at Southern Kordofan, 1973-1981.

License Types	1973-1974	1974-1975	1975-1976	1976-1977	1977-1978	1978-1979	1979-1980	1980-1981
A	-	-	-	-	4	14	19	-
B	-	-	95	286	300	600	668	635
C	-	-	5	12	10	22	26	31
D	-	-	-	-	-	1	6	6

Appendix Table 16. The Wildlife Administration's export fees of live animals and animals' parts.[1/]

Animals	Fees for a live pair	Fees for skin	Fees for head	Fees for other parts
Elephant	600	--		
Rhino	1000	--	0.100/lb or horn	25 for each leg
Hippopotamus	200	--	0.500/lb of teeth	15 for each leg
Giraffe	500	25	--	5 for each leg
Buffalo	100	3	10	
Zebra	200	50	--	5 for each leg
Addax	300	50	20	
Kudu	200	25	15	--
Eland	200	25	15	
Tiang & hartebeast	100	5	10	--
Oryx	300	50	20	--
Nubian ibex	200	5	25	--
Dama gazelle	300	50	20	--
Sommering gazelle	200	5	15	--
Waterbuck	100	5	10	--
Roan antelope	200	25	30	--
Wild sheep	200	5	20	--
Kob (all species)	100	5	10	--
Bushbuck	100	5	10	--
Bongo	300	20	30	--
Reedbuck	100	3	5	--
Mongala gazelle	50	3	5	--
Singa gazelle	50	3	5	--
Dorcas gazelle	50	3	5	--
Oribi	50	3	5	--
Klipspringer	100	5	10	--
Dik dik	50	3	5	--
Sitatunga	200	25	15	--
Nile Lechwe	200	25	15	--
Zebra	1000	500	--	--
Lion	200	10	5	--
Leopard	1500	50	--	10
Cheetah	500	10	--	5
Wild cat (all species)	50	5	--	2
Aard wolf	1500	50	--	10
Hyaena	50	5	--	10
Wild dog	50	5	--	5
Jackal (all species)	10	1	--	1
Gian bushpig	50	1	15	10
Warthog	40	1	15	10

Appendix Table 16 (continued). The Wildlife Administration's export fees of live animals and animals' parts.[1/]

Animals	Fees for a live pair	Fees for skin	Fees for head	Fees for other parts
Porcupine	10	1		
Mongoose	10	2		
Honey badger	30	5		
Crocodile	100	5		
Python	20	1		
Monitor lizard	10	0.100		
Turtle	10	3 for shield		
Chimpanze	100	3		
Colbus monkey	100	10		
Baboon	10	--		
Secretary bird	30			
Ostrich	30	10	--	0.500/lb of feathers
Marabou stork	10	2		
Shoe-bill stork	50	10		
Guinea fowl	6	2		

[1/] All prices are in LS. These prices have been subjected to frequent changes as the Sudanese pound has been devaluated several times during the last decade.

Appendix Table 17. Elephant tusks recorded at different locations in the Sudan, 1952 to 1982.

Years	Locations:	1	2	3	5	6	7	8	9	10	11	12	13	15	16	18	19	20	21	22	23	24	25	26	27	28	29	31	32	34	Total
1952	Nos.	6	2	2		33		2												2											47*
	Wts.	35	12	61		344.5		4												6											462.5
	Aver.	5.83	6	30.5		10.44		2												3											9.48
1953	Nos.	8	28	1		23						3							2	8		40									113*
	Wts.	29	212	10.5		133.5						26							3.5	78		895.5									138.8
	Aver.	3.63	7.57	10.5		5.80						8.67							1.75	9.75		22.39									12.20
1954	Nos.	5	11			35														12									15		78*
	Wts.	47.5	49			232.5														117.5									112		558.5
	Aver.	9.5	4.45			6.64														9.79									7.47		7.16
'55,'56,'57,'58																					587 tusks recorded for 1957, no details of weight or locations.										
1959	Nos.	162	90			191		6											27	33											509
	Wts.	1954	1297.5			3205		163.5											843	1031.5											8494.5
	Aver.	12.06	14.42			16.78		27.25											31.22	31.26											16.69
1960	Nos.	162	34			246		4		18	2								30	35											531
	Wts.	1927	612			3901.5		117		314	85								895	1214											9065.5
	Aver.	11.90	18.00			15.86		29.25		17.44	42.5								29.83	34.69											17.07
1961	Nos.	71	41	1	4	21			4			18		2					18		1	11			2		2	4			200
	Wts.	446	324	7	35	161			40			182.5		8.5					121		56	686			13		31	21			2133
	Aver.	6.28	7.90	7	8.75	7.67			10			10.1		4.25					6.72		56	62.36			6.5		15.5	5.25			10.67
1962	Nos.					13		1			9	17							10												50
	Wts.					657		65			452	679							458												2311
	Aver.					50.54		65			50.22	39.94							45.8												46.22
1965	Nos.																					9									9
	Wts.																					42.5									42.5
	Aver.																					4.72									4.72
1966	Nos.										18																				18
	Wts.										501																				501
	Aver.										27.83																				27.83
1967	Nos.					6		19			3	11							7			10									56
	Wts.					297		908			214	544							290			136.5									2389.5
	Aver.					49.5		47.79			71.33	49.45							41.43			13.65									42.66
1968	Nos.					4																									4
	Wts.					116																									116
	Aver.					29																									29
1969	Nos.					65		1			2	2					1		36								20				126
	Wts.					1697		15			83	127					6.5		1390.5								240				3552.5
	Aver.					26.11		15			41.5	63.5					6.5		38.63								12				28.19
1970	Nos.	77	134			68		80	147	46	1	216						70				6					17			2	864
	Wts.	1712.5	1470.5			1301		1322	1526	700.5	10	4061						2576				76					219			28	14991.5
	Aver.	22.24	10.93			19.13		16.53	10.38	15.23	10	18.80						36.79				12.67					12.88			9.00	17.35
1971	Nos.					73													21												94
	Wts.					2762.5													1022												3784.5
	Aver.					37.84													48.67												40.26
1972	Nos.	24				94		94	24	16	1	46	1						11	2			2						1		316
	Wts.	484				1314.5		2722	560	583.5	32	1918.5	32.5						331	79			55						39		8151
	Aver.	20.17				13.28		23.08	23.33	36.47	32	41.71	32.5						30.09	39.5			27.5						39		25.79
1973	Nos.	3				2		29	2	21	2	15						7	4	5									1		91
	Wts.	107.5				56		1401.5	109	841	84	783.5						240.5	250	157.5									35		4065.5
	Aver.	35.83				28		48.33	54.5	40.05	42	52.23						34.36	62.5	31.5									35		44.68
1974	Nos.					5														6											11
	Wts.					101														145											146
	Aver.					20.2														24.17											22.36
1976	Nos.	12	2	5	21	176	1	116	29	11	13	9				1		1			1	3				1	1	3	6	1	413
	Wts.	488	130	208	605.5	4696	83	4582	1098	397.5	211	445				31		62			33	110				30	17	99	198	31	13556
	Aver.	40.67	65	41.6	28.83	26.68	83	39.5	37.86	36.14	16.23	49.44				31		62			33	36.67				30	17	33	33	31	32.82
1977	Nos.	17		4	64	502	1	298	17	36	28	19			1				2	12		7		2	2		4	4	3	140	1182
	Wts.	829		154.5	2623	7426.5	46	10270	804.5	1467.5	530	745			22				92	380		177		70	70		177	77	151	1492	18671.5
	Aver.				40.98	14.79	46	34.46	47.32	40.76	18.96	39.21			22				46	31.67		25.29		35	35		44.25	19.25	50.33	10.66	24.26
1978	Nos.	5	1		30	123		150	35	6	12	56				2			24	16								1	2	133	596
	Wts.	161.5	14.5		508	2576		4459.5	1599.5	178	329	1656.5				98			836	534								44	62	1422.5	14478
	Aver.	32.30	14.5		16.93	20.94		29.73	45.7	29.67	27.42	29.56				49			34.83	33.38								44	31	10.7	24.29
1979	Nos.	2			2	187		294	9	7	19	77					1		5	14		4					3		1		625
	Wts.	22			42.5	3518.5		8014	191	269	728	2176					6.5		175	494		98					79.5		44		15858
	Aver.	11			21.25	18.82		27.26	21.22	38.41	38.32	28.26					6.5		35	35.29		24.5					26.5		44		25.37
1980	Nos.	84			126	193		477	146		4									4		1									1035
	Wts.	2037.5			2454	3104.5		11630.5	3620		191.5									92		43.5									23173.5
	Aver.	24.26			19.48	16.09		24.38	24.79		47.88									23		43.5									22.40
1981	Nos.	76			2	1026		289												63		2									1458
	Wts.	1454			81	15004.5		7222.5												1042		20.5									14824.5
	Aver.	19.13			40.5	14.62		24.99												16.54		10.25									17.03
1982	Nos.	155			94	2258		137	25		48	26							3	550									35		2231
	Wts.	2514.5			2645.5	15107.5		1978.5	344.5		1241	219.5							64.5	9452.5									913		35481
	Aver.	16.22			28.14	13.05		21.74	13.78		25.85	8.44							21.5	17.19									26.09		15.90