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OUTLINES OF WILDLIFE CONSERVATION IN ANGOLA

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ABSTRACT

A review of the history and present status of wildlife conservation in the Portuguese west African state of Angola is presented. The geomorphology, geology, climate and major biogeographic divisions are briefly described and the history of wildlife legislation and administration reviewed. The present status of existing conservation areas, wildlife utilization threatened ecosystems and rare species is discussed. Research priorities are noted and future trends in conservation policy outlined.

INTRODUCTION

Angola presents the paradox of possessing one of the richest and most varied, yet least well known wildlife resources in Africa. Although the first national parks and reserves were created in the 1930's, the importance of active and efficient conservation programmes has only recently been generally appreciated by the country's administrators. Following a national convention on nature conservation problems held in Angola in November 1972, serious efforts have been initiated by the Government to bring about a radical change in the status of wildlife conservation and utilization in the country. Rapid advances can be expected within this decade and the present is therefore an opportune time to review the current situation of wildlife affairs in Angola. In view of the general lack of information on Angola other than that published in the Portuguese language, a fairly detailed description of the country and its wildlife resources is presented before an outline of the history and present status of conservation is discussed.

Through the kindness of the Director, Servicos de Veterinária de Angola, it has been possible for me to travel extensively throughout the country during the 20 months since my arrival. During these field trips, totalling over 80 000 km, the opportunity has been available to collect first-hand information on all aspects of Angolan wildlife and to benefit from discussions with numerous persons well acquainted with the country.

While much of the material presented in this paper is based on such observations and discussions, I have also drawn heavily on the literature cited in the bibliography. Particular use has been made of the "standard works" on soils (Anonymous 1968), climate (Silveira 1967), vegetation (Barbosa 1970), birds (Traylor 1963) and mammals (Hill and Carter 1941). With the exception of mammals, in which case Dorst and Dandelot (1970) are followed, the nomenclature and statistics of these authorities are followed in this account.

THE COUNTRY

Situation

Angola is situated on the west coast of Africa, wholly between the Equator and the Tropic of Capricorn (Fig. 1). The contiguous districts of Angola extend from the Congo to the Cunene on the Atlantic coast, a distance of about 1 300 km, while the eastern frontier with Zaire and Zambia lies at about the same distance from the seaboard. The enclave of Cabinda, politically part of Angola, is separated from the remainder of the country by a narrow belt of the Zaire Republic. The total area of Angola is 1 246 700 km^2, with a human population of 5 670 000. Fig. 2 indicates the altitudinal zones.

Geomorphology

The country may be divided into six main geomorphological regions: the Coast Belt, the Transition Zone, the Marginal Mountain Chain, the Old (Highland) Plateau, the Congo Basin and the Zambezi-Cubango Basin (Fig. 3).

The Coast Belt varies from 12 to 200 km in width and does not exceed 300 m altitude. The entire coastline is sinking, resulting in the formation of hanging valleys and high cliffs and, especially to the north of the larger rivers, extensive sandbars which reach as much as 35 km in length as at Baia dos Tigres. Inland of the Coast Belt the land rises sharply on meeting the Transition Zone, a discontinuous escarpment belt varying from a series of gentle steps in the north to precipitous scarp faces of over 1 000 m height in the Serra da Chela in the south.

Above the Transition Zone and restricted to a narrow belt running along its margin from 11° to 16° S., the Marginal Mountain Chain is found. Residual land surfaces of possibly Gondwana age (King 1963) form the highest points here, attaining 2 620 m on Môco, 2 582 m on Mepo and 2 554 m on Lubangue.

East of the Transition Zone and the Marginal Mountain Chain are the extensive peneplains of the interior plateaux. The highest area of these is called the *Planalto Antigo* or Old Plateau (Anonymous 1968) and comprises the central highlands of the Huambo, Huila and Bié districts, here ranging from 1 600 to 1 850 m and gradually dropping to 1 200 m in the mid-Cunene. The Old Plateau is restricted to the southern half of the country where it separates the Atlantic from the interior drainage systems.

The Congo Basin is represented by the extensive peneplains of the southern Congo catchment area, including the vast Cassange Basin, the upper Cuanza Basin and the Cassai Basin. Numerous examples of river capture and rejuvenation are present here, the Cuanza now flowing directly into the Atlantic instead of entering the Congo, while the upper Cassai was originally a tributary of the Zambezi (Veatch 1935). The fairly well-incised plains of the Congo Basin range from 1 000 to 1 500 m in altitude.

The south-eastern third of Angola is drained by the Zambezi and the endoreic Cubango system. These vast plains are very gently undulated and are occupied almost entirely by deep Kalahari sands.

Geology

Angola comprises three main geological divisions: the Ancient Massif, the Continental Cover and the Coast Sediments (Fig. 4).

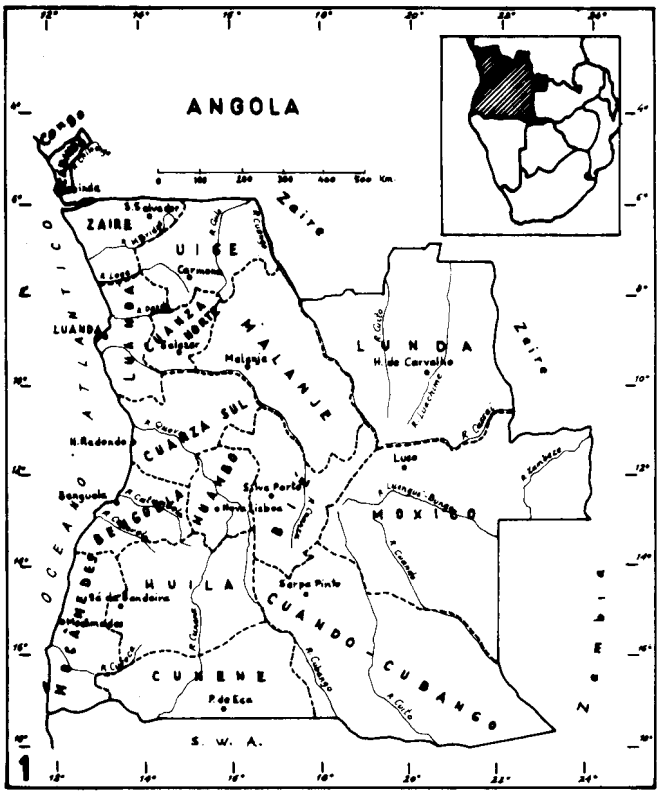

Fig. 1. Sketch map of Angola showing district limits and capitals.

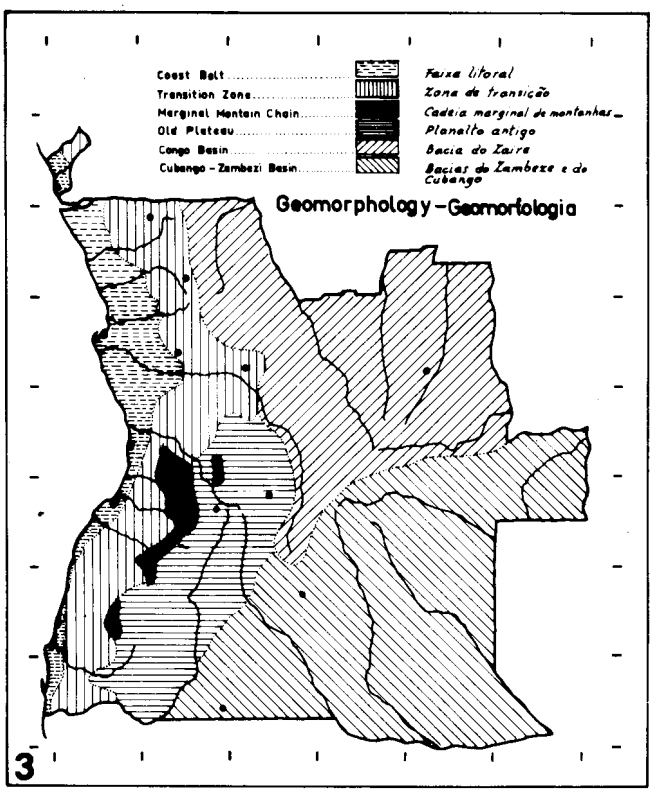

Fig. 3. Simplified geomorphological sketch map of Angola.

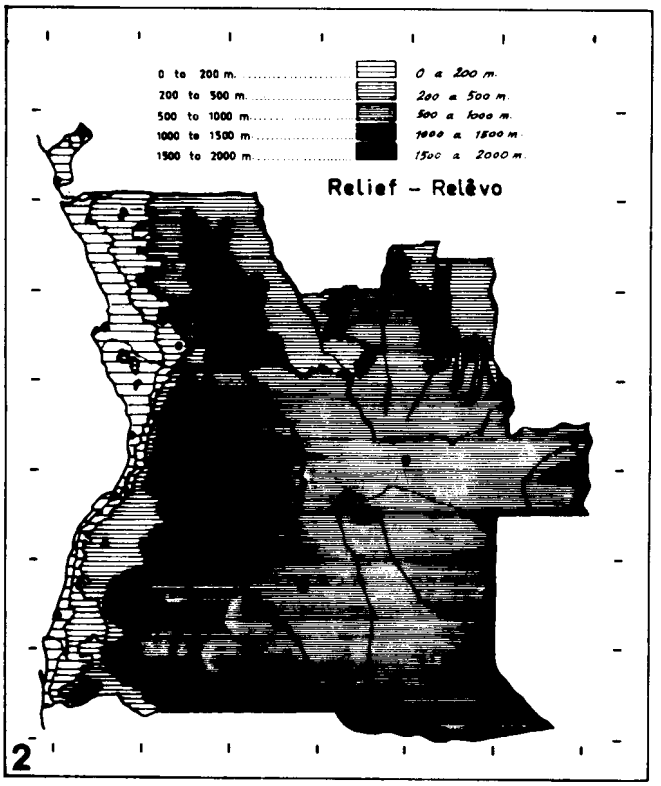

Fig. 2. Angola, topography.

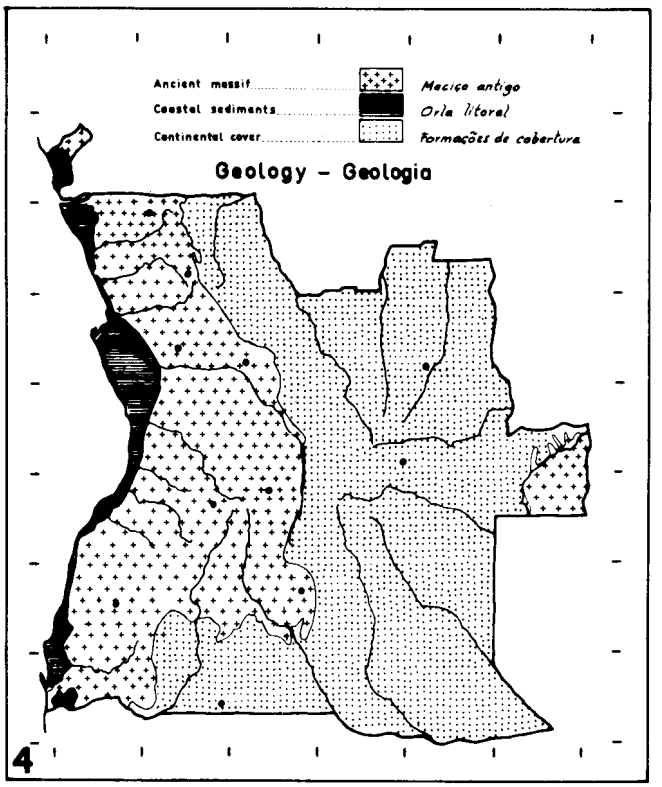

Fig. 4. Simplified geological sketch map of Angola.

The Ancient Massif is represented by the Precambrian Basement Complex and West Congo System, and by eruptive rocks. The Basement Complex comprises gneisses, gneissic granites and metamorphosed sediments, while the West Congo System includes schists, limestones and quartzites.

The Continental Cover accounts for about one half of the area of Angola, comprising gritty sandstones of the Karroo sediments and the extensive and deep deposits of aeolian sands of the Pleistocene Kalahari System.

Five main marine sedimentary basins are recognized in the Coast Sediments (Neto 1964) which comprise Cre-

taceous sandstones and marly and dolomitic limestones, Eocene marls, Oligo-Miocene clayey and gypsiferous marls and Pleistocene sands and conglomerates.

Climate

The greater part of Angola falls within the zone of the intertropical trades, characterized by hot wet summers and warm dry winters. To the west and south-west the desertic influences of the cold Benguela current are felt. Besides these major climatic factors, local climates are influenced by altitude, latitude and the distance from the sea.

The profound influence of the cold Benguela current is clearly illustrated in Fig. 5 and 6. Mean annual air temperatures are lowest (below 19°C) not only on the Highland Plateau at altitudes above 1 600 m, but also at sea level in a narrow strip of the Coast Belt southwards from Porto Alexandre. The hottest areas, with mean annual temperatures exceeding 25°C, occur on the inner margin of the Coast Belt north of the Queve River and in the Congo Basin.

Variation in mean monthly temperatures through the year is slightest in the north-east, with a range of only 1,3°C recorded at Dundo, while the greatest amplitude is felt in the south-east, Mavinga recording a range of 9,3°C. Diurnal temperature amplitudes are also greatest in the south-east, where they reach over 24°C in winter at Mavinga, and are lowest in the north-west with Cabinda and Luanda experiencing a maximum amplitude of only 8°C in winter.

The coolest months are July and August when subzero temperatures are frequently recorded on the Highland Plateau. Along the Coast Belt the hottest months coincide with the period of heaviest rains, March and April. In the interior the hottest months, September and October, precede the onset of the rains.

Rainfall over the greater part of Angola is of convectional origin although orographic factors no doubt contribute to locally high precipitation in the Transition Zone and Marginal Mountain Chain. Rainfall in Angola increases with increasing distance from the sea, with increasing altitude and with decreasing latitude. The highest rainfall records, exceeding 1 600 mm per annum, come from the Maiombe area of Cabinda and other areas of the Transition Zone, and from the higher points of the Marginal Mountain Chain and Highland Plateau. The driest areas are found along the Coast Belt, with extreme desert conditions of less than 50 mm per annum south of Mocâmedes.

Rainfall is seasonal throughout the country, the rain season being longest, from August to May, in the north-east and shortest, from December to March, in the south-west. In many areas of the north-west a short dry period, the *pequeno cacimbo,* is experienced in January or February.

Relative humidity is highest along the narrow strip of the Coast Belt closest to the sea, where mean records for 0600 GMT exceed 80 percent relative humidity throughout the year. High humidity and frequent dew formation in this zone account for the persistence of vegetative growth throughout the dry season over much of the arid Coast Belt. In the interior, atmospheric humidity decreases rapidly during the dry season.

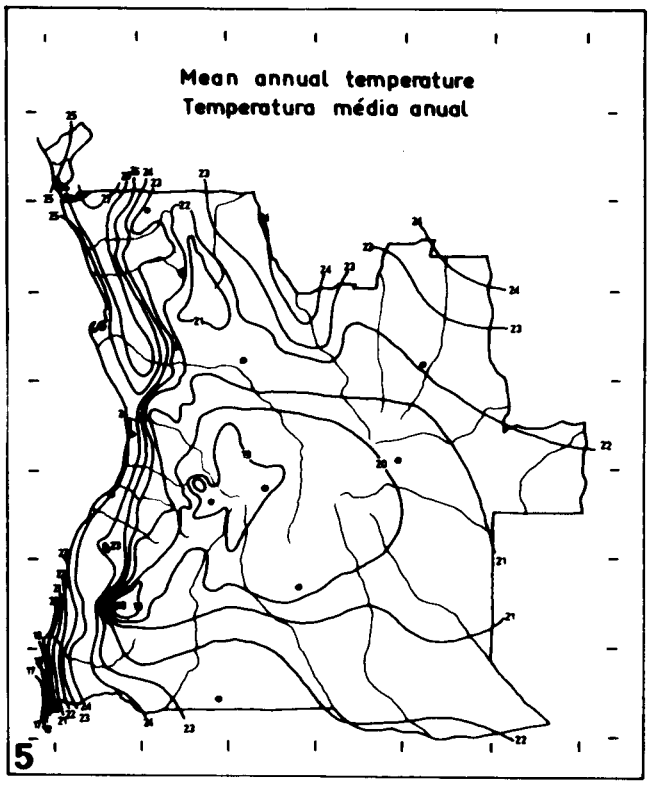

Fig. 5. Mean annual temperatures, in degrees Celsius in Angola.

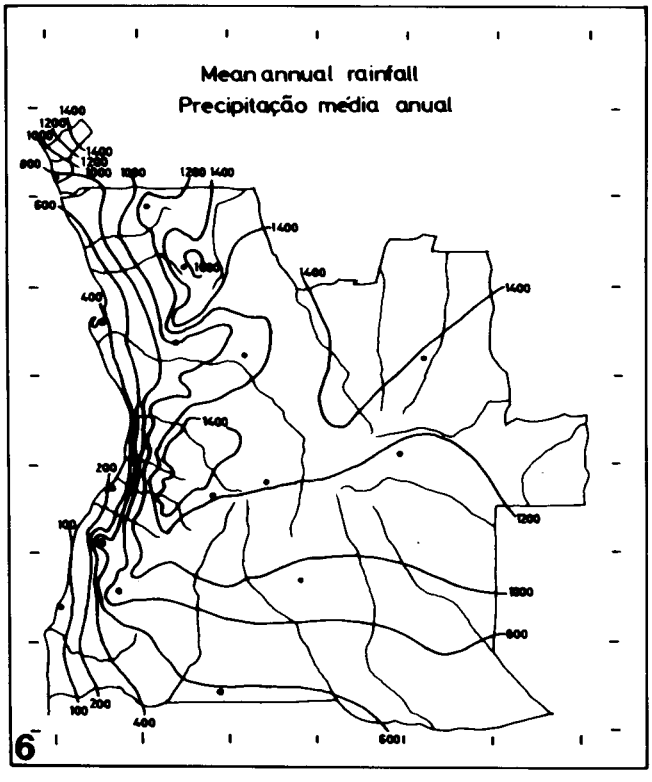

Fig. 6. Mean annual rainfall, in mm, in Angola.

THE WILDLIFE RESOURCE

Biogeographic outline

The great size, varied ecology and central position between the two major faunal divisions of the Ethiopian Region account for the unusual diversity of Angola's fauna and flora. An understanding of the composition

ecology and distribution of the numerous biogeographic divisions represented in Angola is essential for the planning of long-term wildlife conservation and utilization programmes. Experience throughout Africa has repeatedly illustrated the danger of focusing conservation efforts on large-game communities at the cost of less spectacular but highly important ecosystems. This observation is particularly relevant to the Angolan situation. For this reason and in view of the absence of any comprehensive account of Angolan wildlife, a brief resumé of the main biogeographic divisions is presented.

Chapin's (1932) classification of the Ethiopian Region is followed and is represented in Angola by both Sub-regions and five districts. The West African Sub-region includes the Lower Guinea Forest and Southern Congo Savanna districts. The South and East African Sub-region includes the Rhodesian Highland, South-west Arid and Eastern Montane districts. In this account these districts will be referred to as Guinea Forest, Congo Savanna, Brachystegia, South-west Arid and Montane Biomes (Fig. 7). The Escarpment Zone of Hall (1960 a) and the Atlantic coast communities are treated separately and their affinities with the other districts are discussed.

The Guinea forest biome

The distribution of evergreen and semi-deciduous Rain Forest in Angola is restricted to the interior of Cabinda and the large but discontinous patches of forest in the Zaire, Uige, Cuanza Norte and Cuanza Sul districts. The majority of these forests occupy well-drained escarpment slopes in the Transition Zone. Over most of this biome rainfall occurs in at least 10 months of the year, totalling over 1 300 mm per annum. Mean annual air temperatures exceed 23°C and orographic conditions favour the formation of fog, especially during winter.

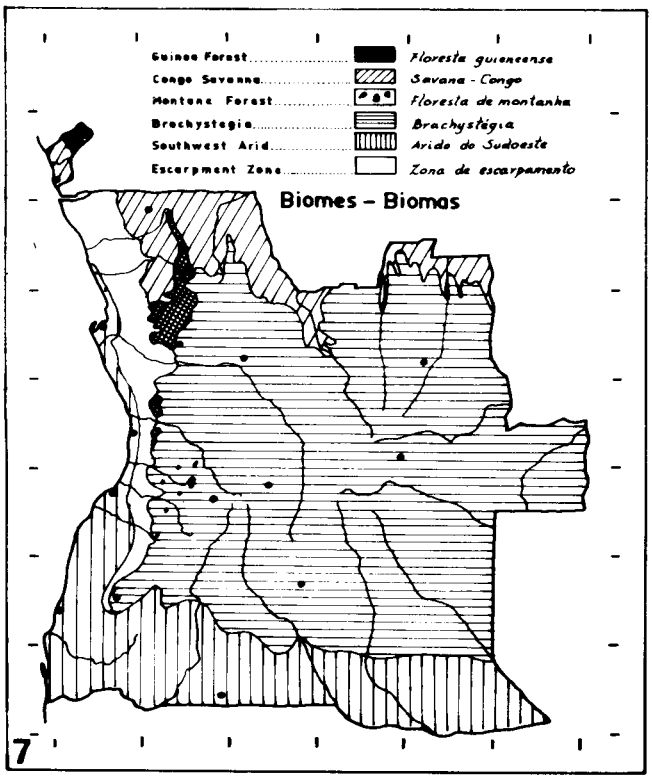

Fig. 7. Distribution of the major biogeographic divisions in Angola.

The only example of typical evergreen Equatorial Rain Forest found in Angola is the small tongue of the Cameroon and Gabon Maiombe Forest that extends southwards to the Congo River across Cabinda. This magnificent multi-storeyed forest of 40 to 60 m height is dominated by such genera as *Gilletiodendron, Librevillea, Tetraberlinia,* and *Julbernardia.* Here small populations of gorilla *(Gorilla gorilla),* chimpanzee *(Pan troglodytes),* greater white-nosed monkey *(Cercopithecus nictitans)* and moustached monkey *(Cercopithecus cephus)* are to be found.

Less spectacular forest of from 30 to 40 m height, in which some of the dominant species are deciduous, covers much greater areas. In Cabinda this forest includes *Gossweileriodendron, Pentaclethra* and *Oxystigma,* while to the south, in the extensive "coffee forests" of the Dembos, Cazenga and Gabela, such genera as *Celtis, Morus, Albizia, Bombax* and *Pterocarpus* are common.

The avifauna of this biome is particularly rich, some of the more important genera including *Tigriornis, Dryotriochus, Urotriorchus, Phasidus, Malimbus, Pholidornus,* etc. Two well-known species typical of this biome are the grey parrot *(Psittacus erithacus)* and the great crested lourie *(Corytheola cristata).* The former is abundant in Cabinda while the latter is frequent throughout the "coffee forests" of north-west Angola. Mammals of this biome include Beecroft's flying squirrel *(Anomalurops beecrofti),* giant forest squirrel *(Protoxerus stangeri),* forest elephant *(Loxodonta africana cyclotis),* golden potto *(Arctocebus calabarensis),* Bosman's potto *(Perodicticus potto),* giant pangolin *(Manis gigantea),* water chevrotain *(Hyemoschus aquaticus),* yellow-backed duiker *(Cephalophus sylvicultor),* black-fronted duiker *(C. nigrifrons),* bay duiker *(C. dorsalis),* blue duiker *(C. monticola)* and red buffalo *(Syncerus caffer nanus).*

The Congo savanna biome

Surrounding the extensive forests of Chapin's Lower Guinea Forest District are vast areas of tall grasslands interspersed by gallery forests in the valleys and isolated forest patches where these have maintained themselves in favourable situations on the plateaux. The gallery forests are particularly well-developed in the Cuango, Luachimo and Cassai valleys of the Congo Basin where such genera as *Piptadiastrum, Chlorophora, Ceiba* and *Xylopia* form dense forests of 30 to 40 m height in narrow belts along the watercourses. These gallery forests are surrounded by tall grasslands of *Hyparrhenia, Andropogon, Trachypogon, Loudetia,* etc., in which are scattered trees and shrubs of such genera as *Strychnos, Hymenocardia, Annona, Piliostigma, Combretum,* etc.

The mammalian fauna of the gallery forests is of special interest, including a variety of primates not found elsewhere in Angola (Machado 1969). These include the black-checked white-nosed monkey *(Cercopithecus ascanius),* de Brazza's monkey *(C. neglectus)* and the Angolan black-and-white colobus *(Colobus angolensis).* Antelope of these forests include black-fronted duiker, yellow-backed duiker, blue duiker, sitatunga *(Tragelaphus spekei)* and bushbuck *(T. scriptus).* Birds of this biome include Hartlaub's duck *(Pteronetta hartlaubi),* white-crested hornbill *(Tropicranus albocristatus),* naked-faced barbet *(Gymnobucco calvus)* and chestnut wattle-eye *(Dyaphorophyia castanea).*

The Montane forest biome

By far the greater area of Angola falls within Chapin's East and South African Sub-region. Over 80 percent of this comprises the Rhodesian Highland District or Brachystegia Biome, while the remainder includes the South-west Arid District and a few isolated relics of the Eastern Montane District, here referred to as the Montane Forest Biome.

The montane forests of Angola are of very great biogeographic interest as they are the sole surviving links in our knowledge of past climatic conditions which favoured a much wider distribution of this cool moist forest biome. Today these forests are represented in Angola by a few isolated patches on the protected slopes in the mountains of Huambo, Benguela and Huila districts. The combined area of these relics is probably less than 200 ha, yet they provide sufficient habitat for the maintenance of faunal and floral communities separated by over 2 000 km from their closest allies.

The best examples of this forest type are to be found in the Luimbale area, in particular on Mount Môco where at least 15 patches of from 1 to 20 ha survive. The forests are found mainly in deep ravines at altitudes from 2 000 to 2 500 m. The dominant trees, of 10 to 15 m height, include *Podocarpus, Pittosporum, Olea, Ilex,* etc. The surrounding short grasslands include *Monocymbium, Festuca* and scattered shrubs and trees including *Stoebe, Cliffortia, Protea, Phillipia, Cyathea* and *Lobelia.* The mammal fauna of these forests has been greatly reduced through hunting, but includes yellow baboon *(Papio cynocephalus),* red-footed squirrel *(Funiscuirus pyrrhopus),* blue duiker and bush-pig *(Potamochoerus porcus).*

Only the avifauna of these forests has been studied in any detail (Hall 1960 b), with extremely interesting results. Of 30 species collected in the montane forests of Mount Môco, seven, *Caprimulgus poliocephalus, Heterotrogon vittatus, Viridibucco coryphaca, Pseudoalcippe abyssinicus, Bradypterus mariae, Apalis cinerea* and *Poliospiza burtoni,* are restricted entirely to the relic montane forests of Fernando Po, the Cameroons, Ruwenzori, Tanzania, Ethiopia and Malawi, at a distance of 2 100 km to 3 400 km from Mt. Môco.

The montane ecosystem at Mount Môco also includes such rare and endemic species as *Francolinus swierstrai, Xenocopsychus anzorgei* and *Ploceus nigrimentum* (Pinto 1960, Hall and Moreau 1962).

The Brachystegia biome

Reference to the maps illustrating the relief and geomorphology of Angola will reveal that over 70 percent of the country comprises extensive peneplains at 1 000 to 1 500 m altitude. In the east these plains are formed by a deep mantle of Kalahari sand while in the central areas west of the 18th meridian crystaline rocks of the Ancient Massif form the substrate. The 800 m isohyet delimits an area of strongly leached soils; throughout this area the vegetation is dominated by Brachystegia woodland interspersed by grassy plains.

The physiognomy and floristic composition of the Brachystegia Biome varies considerably over the 750 000 km² of its extent in Angola. To the west, woodland of 5 to 10 m height dominated by *Brachystegia spiciformis, B. floribunda, B. boehmii, Julbernardia paniculata,* etc., interspersed by narrow drainage line grasslands of *Loudetia, Andropogon, Trachypogon, Tristachya,* etc., is most typical. The grassland component is much more extensive on the Kalahari sands. In the Congo Basin wide grassy plains with *Landolphia parviflora* occupy vast areas, while south of the Congo-Zambezi Divide an enormous seasonally inundated grassland dominated by *Loudetia simplex* is found. Although the main woodland components throughout these areas are *Brachystegia* species, small areas of *Marquesia acuminata* and *Cryptosepalum exfoliatum* dry woodland occur, especially in the extreme east.

The mammal fauna of the Brachystegia formation is poorer in both species and numbers than the savanna communities of the South-west Arid Biome. Larger mammals which may be considered typical of the Brachystegia system include sitatunga, roan *(Hippotragus equinus),* sable *(H. n. niger* and *H. n. variani),* puku *(Adenota vardoni)* and defassa waterbuck *(Kobus defassa).* The avifauna is rich and in Angola includes most of the Brachystegia endemics listed by Benson and Irwin (1966) such as *Parus griseiventris, Monticola angolensis, Sylvietta ruficapilla, Myopornis boehmi, Notiospiza angolensis,* etc.

The south-west arid biome

Southwards from Luanda the Angolan Coast Belt experiences an arid climate with extended dry seasons. These arid conditions are also found along the entire southern frontier of the country. The vegetation types found within this biogeographic district vary considerably according to soil substrate and climatic conditions, but throughout the zone plants share a deciduous habit and the ability to endure long rainless periods.

Conditions of extreme aridity are found in the ultra-desert (Koch 1962) of the Namib in S.W. Angola. Here the vegetationless dunes are occupied by a highly specialized invertebrate fauna dependant on wind-blown plant detritus for their food and water needs. Precipitation is negligible, Baia dos Tigres and Porto Alexandre receiving 15 and 12 mm per annum respectively. Inland from the mobile dunes perennial *Aristida* and *Stipagrostis* grasslands lead to *Acacia-Commiphora* savanna and thicket. Here *Welwitschia mirabilis* is common on gravelly substrates and the mammalian fauna includes aardwolf *(Proteles cristatus),* brown hyaena *(Hyaena brunnea),* bat-eared fox *(Otocyon megalotis),* Cape fox *(Vulpes chama),* Hartmann's zebra *(Equuus zebra hartmannae),* black rhinoceros *(Diceros bicornis),* Damara dik-dik *(Rhynchotragus kirkii),* black-faced impala *(Aepyceros melampus petersi),* springbok *(Antidorcas marsupialis)* and gemsbok *(Oryx gazella).*

Inland of the *Acacia-Commiphora* savanna, rainfall exceeds 300 mm with *Colophospermum* woodland dominant on clayey substrates and *Baikiaea* woodland dominant on Kalahari sands. In these slightly moister habitats species such as giraffe *(Giraffa camelopardalis angolensis),* red hartebeest *(Alcelaphus caama),* tsessebe *(Damaliscus lunatus)* and Cape buffalo *(Syncerus c. caffer)* make their appearance.

The escarpment zone

Between the South-west Arid Biome of the Coast Belt and the Brachystegia Biome of the interior plateau, a discontinuous series of moister vegetation types extends southwards from the Guinea Forest and Congo Savanna systems following the escarpment as far as Capangombe at 15° S. The importance of this biogeographic tension zone situated between three major biomes was recognized by Hall (1960 a) in her study of Angolan birds and supported with mammalogical evi-

dence by Cabral (1966). This "Escarpment Zone" has affinities with all three adjoining biomes but also acts as a barrier between the two drier biomes allowing sub-speciation to develop within them. It furthermore possesses its own endemic avifauna, including *Prinops gabela, Sheppardia gabela, Platysteira albifrons, Macrosphenus pulitzeri,* etc.

The Atlantic coastline

The Angolan coast includes several specialized ecosystems which do not form part of any of the biogeographic districts considered above but which are nevertheless of great biological interest.

Mangrove communities of great extent occur at the mouths of the Chiluango, Zaire, Loge and Cuanza rivers with smaller outliers appearing southwards to Benguela. The dominant trees of this ecosystem are *Rhizophora racemose, R. mangle, R. harrisonii* and *Avicennia africana,* the first two species reaching upwards of 30 m in height.

The lower courses of many Angolan rivers spread out over extensive floodplains before entering the sea; here the West African manatee *(Trichechus senegalensis)* occurs from the Zaire to the Longa, while another inhabitant of this habitat, the soft-skinned turtle *(Trionyx triunguis),* reaches its southern limit at the Cunene mouth.

Most of Angola's coastline is composed of soft marine sediments with the consequence that intertidal communities are poorly developed because of the lack of hardrock substrates. The cold Benguela Current is also a factor limiting the development of these communities; conversely, it accounts for the frequent appearance of fur seal *(Arctocephalus pusillus),* elephant seal *(Mirounga leonina)* and jackass penguin *(Spheniscus demersus)* on the coast south of Mocamedes during winter.

Summer visitors to the Angolan coast include at least five species of marine turtle, the leatherback *(Dermochelys coriacea),* green turtle *(Chelonia mydas),* loggerhead *(Caretta caretta),* olive ridley *(Lepidochelys olivacea)* and hawksbill *(Eretmochelys imbricata)* (Hughes et al. 1973). The status of these turtles has yet to be studied. An initial survey made on 12 December 1972 revealed over 613 nests on 150 km of coastline south of Luanda. Both green and leatherback turtles were nesting at the time.

CONSERVATION HISTORY

Legislation

The history of wildlife conservation legislation in Angola probably dates from 1911 with the establishment of the "Fundo de Caça", a fund into which monies paid for hunting licences were deposited (Paisana and Rosinha 1972). The first hunting regulations were approved by the Legislative Assembly in 1929 and these were extended into the "Regulamento para o exercicio de Caca na Colónia de Angola" in 1936. This legislation was no doubt inspired by the proceedings of the London Convention for the Preservation of Fauna and Flora in African Territories of 1933 to which Portugal was a signatory.

The creation of National Parks and Reserves was mentioned in the 1936 "Regulamento" and by Portaria No. 2421 of 2 October 1937 the first Angolan national park, designated Parque Nacional de Caça do Iona, was established. In the following year nine game reserves were established, of which Quicama, Bicuar, Mupa, Cameia and Luando are still in existence.

Even at this early stage in the history of conservation in Angola the authorities were aware of the shortcomings of existing legislation. In May 1942 the attention of the Legislative Assembly was drawn to the need for greater respect to be paid to Portugal's obligations as a signatory of the London Convention. Just how effective the early legislation was is difficult to assess, but regardless of how much had been achieved by the pioneer efforts of the 1930's and 1940's all was lost with the declaration of free hunting in the Huila district by Diploma Legislativo Nr. 2242 of 1 February 1950. The purpose of this legislation was to eliminate all game in this vast district of south-west Angola to make way for cattle ranching. Although some restraints were included in the Diploma a mass slaughter unequalled in the history of Angola took place. The result was the virtual annihilation of all larger mammals in the once rich Bicuar, Mupa and Oncócua areas. Participants in the slaughter report that as many as 1 000 black rhinoceros, several thousands of giraffe, elephant *(Loxodonta africana)* and tens of thousands of blue wildebeest *(Connochaetes taurinus),* zebra *(Equus burchelli* and *E. zebra hartmannae)* and Cape buffalo died during the 2½ years that passed before the Diploma was repealed.

Comprehensive legislation for the conservation of nature in all Portuguese African territories was established by Decreto No. 40 040 of 20 January 1955. This legislation forms the basis of the present Angolan "Regulamento de Caça" or Hunting Regulations, first published in 1957 and amended frequently thereafter. This "Regulamento" covers all aspects of the conservation and utilization of wild animals and the establishment and administration of national parks, reserves and controlled hunting areas. The most recent amendments to the "Regulamento" were passed on 13 November 1972 by Diploma Legislative No. 107/22 which provides for considerable increases in the costs of hunting licences and fines. Several previously unprotected species, including black-faced impala, brown hyaena and marine turtles, were added to the list of species which may not be hunted in Angola.

At present the revision of Decreto 40 040 is being studied and a modern conservation policy should soon be introduced.

Administration

In terms of Decreto No. 40 040 of 1955 a Nature Conservation Council (Conselho de Proteccao à Natureza) was established in Angola to act as an advisory board on all matters relating to the conservation and utilization of the soil, fauna and flora. The council is composed of the Governor General, as President, the heads of all government departments, and representatives of the private sector.

The executive bodies to which the administration of nature conservation policy is entrusted include the Division of Veterinary Services (game and parks), the Division of Agricultural Services (forests, inland waters and soil conservation) and the Navy (marine life). Within the Veterinary Services, the Repartiçao Técnica de Proteccao à Fauna is directly responsible for the conservation of wild animal life throughout Angola and the administration of national parks, reserves and controlled hunting areas.

The staff of the Repartiçao comprises a director and deputy-director, both of whom are veterinarians, an ecologist, a game catcher, 11 clerical assistants, 41 game rangers, 61 game guards and 50 labourers. The depart-

ment is responsible for the administration of six national parks totalling 50 980 km², three game reserves totalling 13 134 km², four controlled hunting areas totalling 91 500 km², and the implementation of the Regulamento de Caça throughout Angola's 1 267 000 km².

The administration of national parks and reserves has in the past varied considerably according to the local situation. In some cases parks have been administered directly from the Head Office in Luanda, in others either the District Governor, District Veterinarian or even private persons have assumed the direction of policy. Recent legislation (Diploma Legislativo 22/72, Regulamento dos Parques Nacionais of 22 February 1972) has clarified the position and stipulates that all policy matters will be the sole responsibility of the Repartiçao Técnica de Protecçao à Fauna of the Serviços de Veterinária.

Outside the parks and reserves hunting is controlled by district hunting committees *(Commissoes venatórias)* which comprise the District Veterinarian as Chairman, the District Governor, the District Head of Agricultural Services and two private persons selected by the Governor. Patrolling of these areas is conducted by a force of 23 game rangers.

In terms of manpower and finances the wildlife conservation administration of Angola has great difficulties. The total ranger force in all parks and reserves is only 18, or one ranger per 3 561 km² compared with one ranger per 1 395 km² in Kruger National Park and one ranger per 100 km² in Hluhluwe Game Reserve. Outside the parks the situation is even worse, with one ranger per 45 000 km² compared with one per 8 900 km² in the Transvaal and 1 000 km² in Natal. The annual budget for conservation in Angola is approximately R400 000 of which about half goes to the maintenance and development of parks and reserves. Expenditure in Parque Nacional da Quicama is approximately R60 000 per annum or R1 per 166 ha compared with R4 200 000 per annum or R1 per 0,45 ha in Kruger National Park.

The revision of Decreto 40 040 referred to above has as one of its main aims the establishment of an autonomous conservation agency with much stronger finances and more personnel.

THE PRESENT SITUATION

Status of conservation areas

Reference has already been made to the immense areas of land set aside for wildlife conservation in Angola. Most of the present national parks and reserves date from 1937 and 1938, when a few far-sighted men, inspired by the proceedings of the London Convention, set about conserving for posterity the great variety of Angolan wildlife. With few exceptions these conservation areas had ideal ecological limits and few disturbing factors within their boundaries at the time of their establishment. That such conditions do not pertain today is no fault of their creators. Despite the dedicated efforts of these men and their followers there is not a single conservation area in Angola today which satisfies the minimum requirements for national park status as laid down by the International Union for the Conservation of Nature and Natural Resources (Harroy 1972, personal communication).

It is not the purpose of this paper to criticize the present situation, however; rather it is intended to place on record the current status of the country's conservation areas to serve as a base on which future improvements can be assessed. The existing conservation areas in Angola fall into five categories; national parks, strict nature reserves, partial reserves, regional reserves and controlled hunting areas (Fig. 8). In describing the parks, reserves and hunting areas, I have grouped them according to their biogeographic affinities. Three of these areas (Iona, Mocâmedes and Chimalavera) fall wholly within the South-west Arid Biome, three (Cangandala, Cameia and Luando) fall within the Brachystegia Biome, while the remainder lie in transition areas, between the South-west Arid Biome and the Escarpment Zone (Quicama) or between the South-west Arid and Brachystegia Biomes (Bicuar, Mupa and the Cuando-Cubango Coutadas). It will be noted that no conservation areas exist in the very important Guinea Forest, Guinea Savanna and Montane Forest Biomes. This aspect will be discussed later.

Parque Nacional de Iona

Iona is the largest and oldest park in Angola, 15 920 km² in area and established in 1937. The Park's limits, formed by the Cunene and Curoca rivers and the Atlantic coastline, are both natural and ecologically satisfactory. Approximately one fifth of the Park comprises mobile desert dunes which although virtually vegetationless have a diverse fauna. Moisture and vegetation conditions improve rapidly towards the east where perennial grasslands lead to *Acacia-Commiphora* arid savanna and *Colophospermum* savanna woodland.

The fauna is typical of the South-west Arid Biome, the most numerous larger mammals including Hartmann's zebra, Burchell's zebra, oryx and springbok. Other species of special interest include brown hyaena, black rhinoceros and black-faced impala.

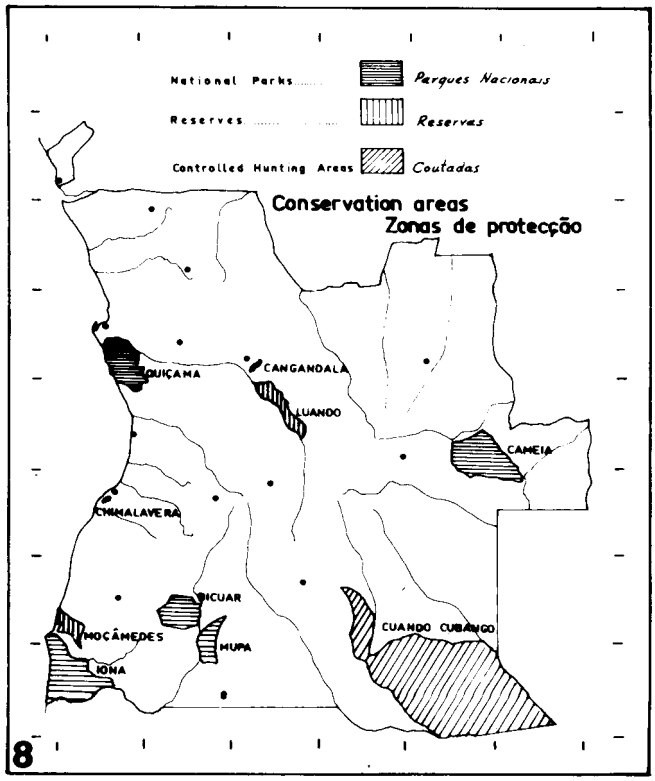

Fig. 8. Distribution of existing conservation areas in Angola.

Although not faced with the same magnitude of problems that exist in most other parks in Angola, the presence of several hundred nomadic pastoralists with over 3 000 head of livestock places a great strain on the water and forage supplies in this sensitive desert environment.

Reserva Parcial de Mocâmedes

This reserve was established in 1957, is 4 684 km² in area and has limits which are almost entirely unnatural. Both fauna and flora of this reserve are similar to that found in Parque Nacional de Iona, but are much poorer in numbers and variety. Ironically, this reserve, which has perhaps the least conservation interest of all the sanctuaries in Angola, also has no resident human population or related problems.

Reserva Regional da Chimalavera

Chimalavera is a small (160 km²) reserve recently proclaimed as a Regional Reserve and lies some 30 km south of Benguela. The vegetation is mainly *Acacia-Commiphora* arid savanna with Hartmann's zebra, greater kudu *(Tragelaphus strepsiceros),* springbok and dik-dik.

Parque Nacional da Quicama

Quicama was established as a game reserve in 1938 and proclaimed a national park in 1957. The Park has excellent ecological limits, formed by the Atlantic Ocean, Longa River, Cuanza River and a belt of dense tall thicket between the rivers. The 9 960 km² park includes a great variety of habitat types of which extensive mangroves, floodplains, grasslands, dry thickets and gallery forest are but a few examples.

Because of its location at the northern extreme of the South-west Arid Biome and the inclusion of a large area of the Escarpment Zone within its limits, the Park's faunistic composition is very diverse. The larger mammals have been severely reduced in numbers through excessive poaching which continued until very recently. Of those that remain elephant, eland *(Taurotragus oryx),* bushbuck, roan, reedbuck *(Redunca arundinum)* and red buffalo are the most abundant. Species of particular interest are West African manatee, talapoin and roan, and marine turtles which nest on the Park's 110 km of Atlantic coast.

Despite being the best known wildlife sanctuary in Angola, lying only 70 km south of the capital city of Luanda (pop: 470 000), Quicama has a long way to go before becoming a national park in fact as well as in name. Besides the long history of illegal hunting within its limits, Quicama is still occupied by a private cattle ranch of over 25 000 head, thousands of hectares of cotton fields, two oil companies in active production and prospecting, diamond prospecting, a military detention barracks and a resident indigenous population of over 3 000 persons.

Parque Nacional de Bicuar

Bicuar was declared a game reserve in 1938 and a national park in 1964. The Park, 7 900 km² in area, lies in the transition between the Brachystegia and the South-west Arid Biomes. The Cunene River forms its only natural limit, the other boundaries being entirely artificial.

Although once renowned for its vast game populations, virtually all larger mammals were annihilated during the free hunting period in 1950 - 52. The regeneration of herds has improved considerably in the last few years and today appreciable numbers of elephant, Burchell's zebra, eland, roan and blue wildebeest are to be found in the Park, besides 16 other species of larger mammals.

Parque Nacional da Mupa

Mupa was established in 1938 for the specific purpose of protecting the Angola sub-species of giraffe *(Giraffa camelopardalis angolensis).* In 1964 Mupa was raised to national park status.

Like Bicuar, Mupa lies on the transition between the Brachystegia and South-west Arid Biomes. About 40 percent of its 6 600 km² lies within the former biome where tall dense *Brachystegia* woodland with drainage-line grassland occurs. The southern portion of the Park lies on poorly drained clayey soils with well-developed *Colophospermum* woodland. The fauna of the southern section is richer and of greater interest than the northern and includes red hartebeest and black-faced impala. Recent reports indicate that the Park no longer has a resident giraffe population.

Mupa has no resident game rangers with the consequence that poaching continues unabated. Furthermore a large resident human population, migratory pastoralists and mineral prospecting add to the problems facing the Park's future.

Cuando-Cubango Coutadas

The controlled hunting areas of the Cuando-Cubango were created in 1957 and later extended to include the present total area of 91 500 km². The vegetation of this vast area is mainly *Baikiaea* woodland with extensive drainage-line grasslands and floodplain swamps in the south, with *Brachystegia* dominant in the northern areas. Although climatically a semi-arid zone, the internal drainage systems of the Cubango and Cuando rivers create moist habitats which are occupied by elephant, hippopotamus *(Hippopotamus amphibius),* sitatunga, lechwe *(Kobus leche)* and Cape buffalo. The drier woodlands have black rhinoceros, giraffe, sable *(Hippotragus n. niger),* blue wildebeest, tsessebe and impala *(Aepyceros m. melampus).*

Reserva Integral Natural do Luando

The Giant Sable Strict Nature Reserve was first established as a game reserve in 1938 and raised to its present status in 1955.

Luando is a narrow sigmoid-shaped reserve of some 8 280 km² bounded for over 240 km of its length by the Cuanza river and its tributary the Luando. The vegetation comprises typical *Brachystegia* woodland with drainage-line grasslands, while the Luando and parts of the Cuanza have extensive seasonally inundated floodplains on their margins. The Reserve contains more than 90 percent of the world's known giant sable *(Hippotragus niger variani)* population which possibly totals between 2 000 and 3 000 animals (Cabral 1970, Estes and Estes 1972). Other species of importance in Luando are puku, lechwe and sitatunga.

The future of Luando and the giant sable depends very largely on that of the 18 000 people living within this Strict Nature Reserve. The presence of 14 trading stores, extensive rice paddies and intensive diamond prospecting activities complicates the problem further.

Parque Nacional da Cangandala

Cangandala is Angola's smallest national park, established in 1963 to conserve a small population of giant sable discovered in the area. The 600 km² Park lies in an area of extensive *Brachystegia* woodland with several permanent streams forming its natural limits. About 150 giant sable are believed to exist in the Park, with small numbers of roan, reedbuck and grey duiker *(Sylvicapra grimmia)*. A large resident human population makes the re-definition of limits essential.

Parque Nacional da Cameia

Established as a game reserve in 1938 and proclaimed a national park in 1957, Cameia occupies 10 000 km² of the vast seasonally inundated plains of the Zambezi Basin.

Poaching has severely reduced its once immense herds of blue wildebeest, tsessebe, lechwe, reedbuck and roan. The present status of wildlife in the Park is unknown.

Wildlife outside conservation areas

The status of wildlife outside the country's national parks, reserves and controlled hunting areas is critical. In over 80 000 km of travel throughout Angola I have seen no more than three dik-dik, two klipspringer *(Oreotragus oreotragus)*, two impala and a few dozen monkeys and francolin outside the limits of conservation areas. The present hunting pressure will undoubtedly annihilate all larger mammals and game birds within the next decade. The urgency to establish strictly controlled conservation areas in all ecosystems not yet offered protection is abundantly clear.

The total area of national parks, reserves and controlled hunting areas in Angola exceeds 155 600 km². Of this 75 percent falls within the South-west Arid Biome and 23 percent within the Brachystegia Biome, with the Guinea Forest, Congo Savanna and Montane Forest Biomes being unrepresented in any conservation area. The need to establish Strict Nature Reserves in representative samples of these biomes has been appreciated, however, and recommendations for the creation of such reserves in the Maiombe Forest of Cabinda, gallery forest of Lunda and relic Montane forests of Huambo are in preparation. Other threatened habitats requiring attention are the breeding grounds of marine turtles, moist forests of the Escarpment Zone and riverine habitats of manatee, long-snouted crocodile *(Crocodylus cataphractus)* and the dwarf crocodile *(Osteolaemus tetraspis)*.

Wildlife utilization

The rational utilization of wildlife resources is a concept which is not yet understood in Angola. Thus far the only forms of organized utilization have been conventional tourism, hunting safaris and trade in hides and ivory. These fields have yet to be fully developed. The only national park with any tourist facilities, Quicama, is open for 6 months during the dry season and has a single hutted camp with accommodation for 30 persons. Visitors in 1971 and 1972 totalled 3 791 and 4 220 respectively.

Three private safari companies operate in the hunting concessions of the Cuando-Cubango. The number of foreign clients received by these groups is obviously small; only 67 non-resident hunting licences were issued in 1972. In contrast a total of 16 899 licences was issued to Angolan residents in the same year. Direct income from all hunting licences issued in 1972 amounted to R125 000.

In terms of income accrued by private persons from wildlife utilization, the greatest source is undoubtedly through illegal trade in hides, ivory and rhinoceros horn. The magnitude of this trade can be judged from the number of contraband hides, tusks and horns presented for registration during a period of amnesty granted in March 1973. In the district of Huila alone, no fewer than 3 400 zebra, 363 black-faced impala, 279 springbok, 180 leopard *(Panthera pardus)* and cheetah *(Acinonyx jubatus)*, 129 dik-dik and over 1 500 hides of 30 other species, plus 242 elephant tusks and 126 rhinoceros horns, were brought in for legalization by persons who had obviously acquired them without licences. One syndicate of these dealers has over a dozen armed hunters in operation on the borders of Parque Nacional de Iona, yet none has been successfully prosecuted to date.

Game ranching has tremendous potential over large areas of the South-west Arid and Brachystegia Biomes, but has not yet been investigated. Much of the former biome experiences erratic drought which render conventional stock farming systems uneconomic while tsetse-fly *(Glossina morsitans, G. palpalis, G. schwetzi* and *G. fuscipes)* occur over wide areas of the Brachystegia and Congo Savanna Biomes. Due to the virtual extermination of game over most of Angola, rapid returns such as those obtained through rational game cropping in countries such as Rhodesia and Zambia cannot be expected. Even in the best game areas of the South-west Biome at least 5 to 10 years' rest would be needed for herds to recuperate before cropping could begin. As a long-term form of land usage, however, investment in scientifically planned game ranching has considerable promise over much of Angola.

Soil conservation

Man's impact on his environment in Angola has been expressed mainly in the drastic reduction of wild animal populations, rather than the destruction of the vegetation and soil mantles. But all signs indicate that the status of both vegetation and soils in Angola is rapidly downgrading. This trend is especially recognizable on the densely settled Highland Plateau where the vegetation physiognomy has changed from closed *Brachystegia* woodland to induced savanna and grassland. Fire and shifting cultivation have played a major rôle in this transformation and unless controlled, will soon result in the spread of presently restricted areas of incipient erosion over vast regions. There is tragic irony in the knowledge that, although the present trends are still reversible in Angola, Man's complacency in the midst of a seemingly inexhaustible resource will result in the situation's deterioration to an irreversible state within the present decade.

THE FUTURE OUTLOOK

Conservation consciousness

The abundance of game that existed in Angola until as recently as the 1950's possibly accounts for the rather casual attitude which has existed towards its exploitation. In the past even the department responsible for wildlife preservation was orientated more towards

hunting than towards conservation. National parks were, and in many cases still are, referred to as "reserves da caça", or hunting reserves, while even the wildlife conservation ordinance is termed the "Regulamento de Caça" or hunting regulations. But the decline in the larger mammal population has been drastic over the last decade and increasingly more Angolans are realizing that conservation must replace exploitation.

Conflicts between vested interests and conservation have been brought to the attention of the public over the last few years, and considerable controversy has raged in the press and on the radio. The examples of Gorongosa, Kruger and Etosha national parks have led many senior government officials to reassess the value of conservation in the wider fields of tourism, recreation and education. This new awakening reached a climax in 1972 when a government-sponsored conference on nature conservation problems in Portuguese Africa drew over 100 delegates to Sá da Bandeira. After a fortnight of meetings and visits to conservation areas, the results of the conference were summarized in 25 conclusions and 53 resolutions which were submitted to the central government in Lisbon and accepted without reservation. This conference has resulted in a very much wider interest in conservation throughout Angola and has initiated a completely new and dynamic chapter in the history of nature conservation in the country.

Conservation policy

The discussions of the Sá da Bandeira Conference drew attention to the urgent need for the revision and consolidation of wildlife conservation policy in Angola. A complete re-organization of the administrative structure was called for and the foundation laid for drastic improvements in the status of existing national parks and reserves. Priority will be given to the expropriation of all disturbing elements within conservation areas and the creation of a strong administrative force within each park.

The concept of peripheral development of tourist facilities was adopted and the participation of private interests in this field approved.

The vast field of wildlife research awaiting study in Angola cannot be undertaken by the personnel presently available and the creation of an Ecological Survey Unit has been recommended. The collaboration of visiting research workers is to be encouraged and the financial assistance of international conservation organizations sought to sponsor studies of aspects of critical importance. In this respect a grant has already been received from the Southern African Nature Foundation towards the costs of aerial surveys in Quicama and Iona national parks. Further support will be sought for surveys of the status of primates in Angola, in particular the gorilla and chimpanzee populations of Cabinda; the conservation of montane forest ecosystems; aquatic habitats (manatee, long-snouted and dwarf crocodile), marine turtles and a survey of the wildlife utilization potential of the Cuando-Cubango.

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REFERENCES

ANONYMOUS. 1968. Carta generalizada dos Solos de Angola. 3rd Aprox. *Mems Jta Invest. Ultramar*, 2nd Ser. 56:1-277.

BARBOSA, L.A.G. 1970. Carta fitogeográfica de Angola I.I.C.A., Luanda. 323 pp.

BENSON, C.W. and M.P.S. IRWIN. 1966. The Brachystegia avifauna, *Ostrich*, Suppl. 6:297-321.

CABRAL, J.C. 1966. Some new data on Angolan Muridae. *Zool. Afr.* 2:193-203.

———— 1970. Alguns aspectos da ecologia da Palanca Real. *Bol. Inst. Invest. Cient. Angola* 7(1):5-38.

CHAPIN, J.P. 1932. The birds of the Belgian Congo. Part 1. *Bull. Am. Mus. nat. Hist.* 65:756 pp.

DORST, J. and P. DANDELOT. 1970. A field guide to the larger mammals of Africa. Collins, London. 287 pp.

ESTES, R.D. and R.K. ESTES. 1972. The giant sable antelope. Summary report and recommendations. Unpubl. Ms.

GOVERNO GENERAL. 1957. Regulamento de Caca. Imprensa Nacional de Angola, Luanda. 195 pp.

HALL, B.P. 1960 a. The faunistic importance of the scarp in Angola. *Ibis* 102:420-442.

———— 1960 b. The ecology and taxonomy of some Angolan birds. *Bull. Br. Mus. nat. Hist.* 6:369-453.

———— and R.A. MOREAU. 1962. A study of the rare birds of Africa. *Bull. Br. Mus. nat. Hist.* 8:315-377.

HILL, J.E. and T.D. CARTER. 1941. The mammals of Angola, Africa. *Bull. Am. Mus. nat. Hist.* 78:1-211.

HUGHES, G.R., B.J. HUNTLEY and D. WEARNE. 1973 Sea turtles in Angola. *Biol. Conserv.* 5:58-59.

KING, L.D. 1963. South African Scenery. 3rd Ed. Oliver & Boyd, London.

KOCH, C. 1962. The Tenebrionidae of Southern Africa. XXXI. Comprehensive notes on the Tenebrionid fauna of the Namib Desert. *Ann. Transv. Mus.* 24:61-106.

MACHADO, A. de B. 1969. Mamiferes de Angola ainda nao citados ou pouco conhecides. *Publ. Cult. Co. Diam. Ang.* 46:93-232.

NETO, M.G.M. 1964. O Sedimentar Costeira de Angola. D.P.S.G.M., Luanda. Cyclostyled Ms.

PAISANA, F.D. and A.J. ROSINHA. 1972. Inventariacao dos Problemas Relacionados com a proteccao da fauna e seu aproveitamento racional. Unpubl. Ms. 163 pp.

PINTO, A.A. da R. 1960. Endemismos ornitológicos raros de Angola. *Bol. Cult. Mus. Angola* 2:10-17.

SILVEIRA, M. de M. 1967. Climas de Angola. S.M.A., Luanda. 42 pp.

TRAYLOR, M.A. 1963. Checklist of Angolan birds. *Publ. cult. Co. Diam. Ang.* 61:1-250.

VEATCH, A.C. 1935. Evolution of Congo Basin. *Mem. geol Soc. Am.* 3.

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