DRAFT

Environmental Profile

of

GUINEA

Prepared by the

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- Robert G. Varady, Compiler -

THE UNITED STATES NATIONAL COMMITTEE FOR MAN AND THE BIOSPHERE
Department of State, IO/UCS
WASHINGTON, D. C. 20520

An Introductory Note on Draft Environmental Profiles:

The attached draft environmental report has been prepared under a contract between the U.S. Agency for International Development (AID), Office of Forestry, Environment, and Natural Resources (ST/FNR) and the U.S. Man and the Biosphere (MAB) Program. It is a preliminary review of information available in the United States on the status of the environment and the natural resources of the identified country and is one of a series of similar studies on countries which receive U.S. bilateral assistance.

This report is the first step in a process to develop better information for the AID Mission, for host country officials, and others on the environmental situation in specific countries and begins to identify the most critical areas of concern. A more comprehensive study may be undertaken in each country by Regional Bureaus and/or AID Missions. These would involve local scientists in a more detailed examination of the actual situations as well as a better definition of issues, problems and priorities. Such "Phase II" studies would provide substance for the Agency's Country Development Strategy Statements as well as justifications for program initiatives in the areas of environment and natural resources.

Comments on the attached draft report would be welcomed by USMAB and ST/FNR and should be addressed to:

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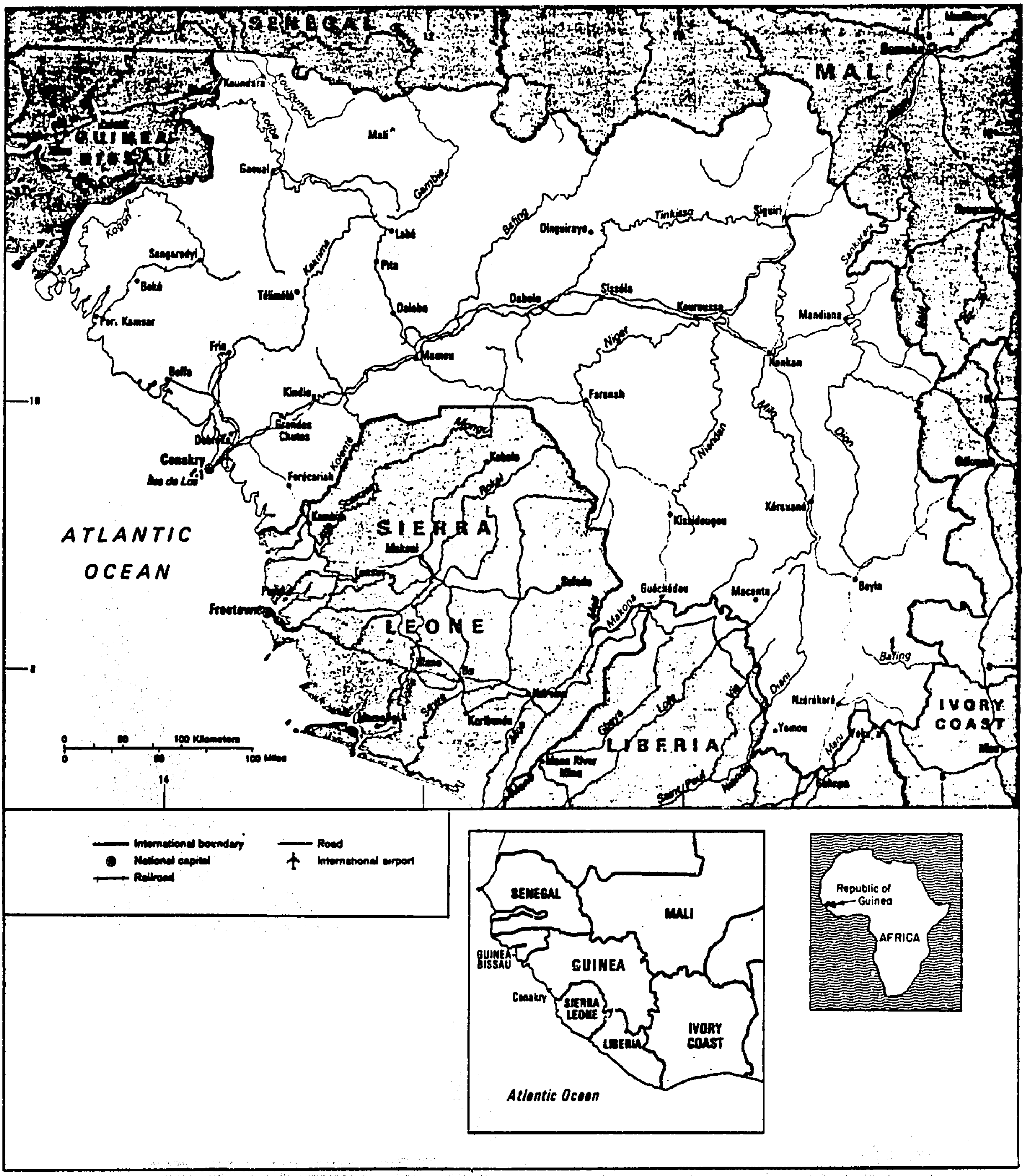
Guinea



SENEGAL
MALI
GUINEA-BISSAU
Koundara
Gaoual
Mali
Labé
Pita
Dalaba
Télimélé
Boké
Sangaredyi
Port Kamsar
Fria
Boffa
Kindia
Mamou
Grandes Chutes
Dubréka
Conakry
Îles de Los
Forécariah
Dinguiraye
Siguiri
Tinkisso
Dabola
Kouroussa
Mandiana
Kankan
Faranah
Niger
Milo
Dion
Niandan
Kissidougou
Kérouané
Beyla
Guéckédou
Macenta
Nzérékoré
Yomou
ATLANTIC OCEAN
SIERRA LEONE
Freetown
LIBERIA
IVORY COAST
Bamako
Sankarani
International boundary
National capital
Railroad
Road
International airport
SENEGAL
MALI
GUINEA BISSAU
GUINEA
Conakry
SIERRA LEONE
LIBERIA
IVORY COAST
Atlantic Ocean
Republic of Guinea
AFRICA

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SUMMARY

The People's Revolutionary Republic of Guinea, situated on Africa's northwestern coast, is one of the continent's smallest nations in area (about a quarter million square kilometers). Its population of five and a half million persons, growing at nearly three percent annually, makes Guinea one of Africa's most densely populated countries. The capital, Conakry, has grown especially rapidly, swelling to more than a half a million inhabitants by the early 1970s. The population density in the area surrounding the capital now approaches 2,000 residents per square kilometer; approximately ten percent of Guinea's otherwise predominantly rural population now lives in and around the capital.

As in surrounding countries and elsewhere in Africa, the rapidly increasing population and the associated trend toward urbanization are responsible for many of Guinea's environmental problems. In the past these problems have been exacerbated by the government's reluctance to open the country to external influences--technical, financial, or cultural. After two decades of relative isolation, Guinea is beginning to solicit foreign advice, investment, and trade.

Because the country is situated in a benign climatic zone and generously endowed with natural resources (it is believed to possess the world's largest bauxite reserves), its environmental problems are perhaps less immediate and less threatening than those of its northern neighbors. With Guinea's population maintaining its current rate of growth, it is particularly important that the nation embark upon a cautious plan of mineral exploitation and agricultural development. The country's promising potential and its relatively low level of exploitation have thrust Guinea toward a critical period in its development. Future policies therefore should aim to provide for economic self-sufficiency without producing irreversible damage to the environment.

In decreasing order of importance, Guinea's principal environmental concerns include:

Isolationism and Lack of Information. For more than twenty years following its independence from France in 1958, Guinea deliberately steered an isolationist course. During this period the nation withdrew not only from global politics and foreign markets, but from regional development associations, scientific forums, and international educational exchanges. Although there have been numerous signs over the past few years that Guinea is about to cautiously shed its isolationism, twenty years of withdrawal have left serious gaps in knowledge of the nation's environmental resources and problems. As a result, few scientific studies have been conducted, insufficient cadres of indigenous researchers and resource managers have been trained, and inadequate funds have been available for assessing, preventing, and remedying environmental problems. Because this isolationism and paucity of information affects all aspects of environmental policy and coordination, this problem has been ranked first.

Environmental Disease. Although Guinea's climate is generally favorable for human habitation, the country nevertheless experiences numerous serious public health problems. Poor availability of safe drinking water (only 10 percent of the population), malnutrition due to food shortages stemming from low agricultural productivity (Guinea ranks just 87th in world per capita food consumption), prevalence of infectious disease, insufficient medical personnel and facilities (Guinea is 123rd in the world in availability of medical personnel), and low budgetary priority for public health sector expenditures (only about 10 percent of total expenditures) combine to produce a markedly low level of public health. Rapid population growth, particularly in the few urban areas exacerbates many of the above problems.

Most of Guinea's diseases can be considered to originate in, or be transmitted by the environment. Some are direct consequences of the climate (dehydration; heat stroke; circulatory malfunctions; wind-spread conjunctivitis, meningitis, and respiratory diseases). Other diseases are transmitted vectorially. Among the most common and serious such ailments are: trypanosomiasis (sleeping sickness), malaria, schistosomiasis, filariasis (elephantiasis), and onchocerciasis (river blindness). Additionally, numerous diseases are spread by stagnant waters; parasitic, bacterial, and viral infections all abound. Intestinal ailments. breathing disorders, and venereal diseases are the most common of those diseases.

Misuse of Land. In the absence of conclusive data, it is difficult to assess the level of intensity of this problem in Guinea. It is safe to state, however, that Guinea like its neighbors, is prone to certain abusive practices. Mining, forestry, livestock herding, and disease eradication measures all contribute to a gradual degradation of the nation's land. In Guinea pollution, depletion, and erosion of fertile soil; degeneration of vegetative cover; encroachment of desertified terrain; and pollution of scarce groundwater resources have all been observed, if insufficiently documented. Population pressure and other human action are responsible for most of these problems. Agriculture (particularly shifting cultivation within foreshortened cycles--a common practice), overgrazing, forest exploitation, mining (of bauxite, especially), construction and road building, and hdyroelectric development all take a serious toll in soil resources. In areas where any of these activities have occurred, topsoil has been lost irretrievably, giving way to infertile laterite. In addition, fuel shortages have encouraged indiscriminate tree felling. And while Guinea's deforestation rate is less serious than that of neighboring countries, the problem could become more threatening unless preventive measures are instituted.

1.0 Introduction

This draft environmental profile summarizes information available in the United States on the natural resources and environment of the People's Revolutionary Republic of Guinea. The report reviews the major environmental problems of Guinea and the impact of the development process upon resources and the environment. This draft report represents the first step in developing an environmental profile for use by the U.S. Agency for International Development (USAID) and Guinea government officials. The next step in this process should be a field study to evaluate the information presented here, obtain additional information, and define the issues, problems, and priorities in greater detail. This entire process should help provide direction in future efforts to deal with the management, conservation, and rehabilitation of the environment and natural resources.

The information and interpretations in this report are preliminary and are not intended to attain the detail and accuracy required for development planning. The report represents a cooperative effort by the Man and the Biosphere (MAB) project staff of the Arid Lands Information Center (ALIC). The primary research, writing and analysis of the Guinea profile were done by Robert G. Varady through the resources of ALIC and the University of Arizona Library. The cooperation of AID personnel is gratefully acknowledged.

2.0 General Description

2.1 Geography and Climate

2.1.1 Boundaries and Administrative Divisions 1/

The People's Revolutionary Republic of Guinea (officially, République Populaire et Révolutionaire de Guinée--hereafter, simply the Republic of Guinea, or Guinea) is situated within the southwestern portion of Western Africa. Arcing southeastward from its Atlantic coastline, the country lies within north latitudes 7°13' and 12°40', and between west longitudes 7°38' and 15°6'. The maximum distance is approximately 835 km, from the northwestern to southeastern corners; the minimum width is 218 km. Guinea's 352 km coastline extends in a northwest to southeast direction from Guinea-Bissau to Sierra Leone.

Its territory of 245,857 sq km, an area the size of the United Kingdom, or slightly smaller than Oregon, borders on six nations. Guinea-Bissau (formerly Portuguese Guinea), and Senegal and Mali (formerly within French West Africa) flank Guinea on the north; Mali and the Ivory Coast are to the east; and Liberia and Sierra Leone lie to the south. Of these, the longest frontier (932 km) is with Mali (Fig. 1). Although small portions of the border are defined by rivers, most of the delineation is the result of political events, rather than physical features or traditional cultural zones.

The country itself is divided into four large regions whose contours essentially mirror the various geographic provinces (Table 1). These units provide little of the infrastructural or administrative framework, however. Instead, the 1958 Constitution designates 29 entities called "administrative regions" within which actual governmental functions are carried out. Ranging in size from the small region comprising the capital, Conakry (just 308 sq km), to Kankan (27,488 sq km), a Maryland-sized region in eastern Guinea, these units average approximately 8,500 sq km in area. The population is unevenly

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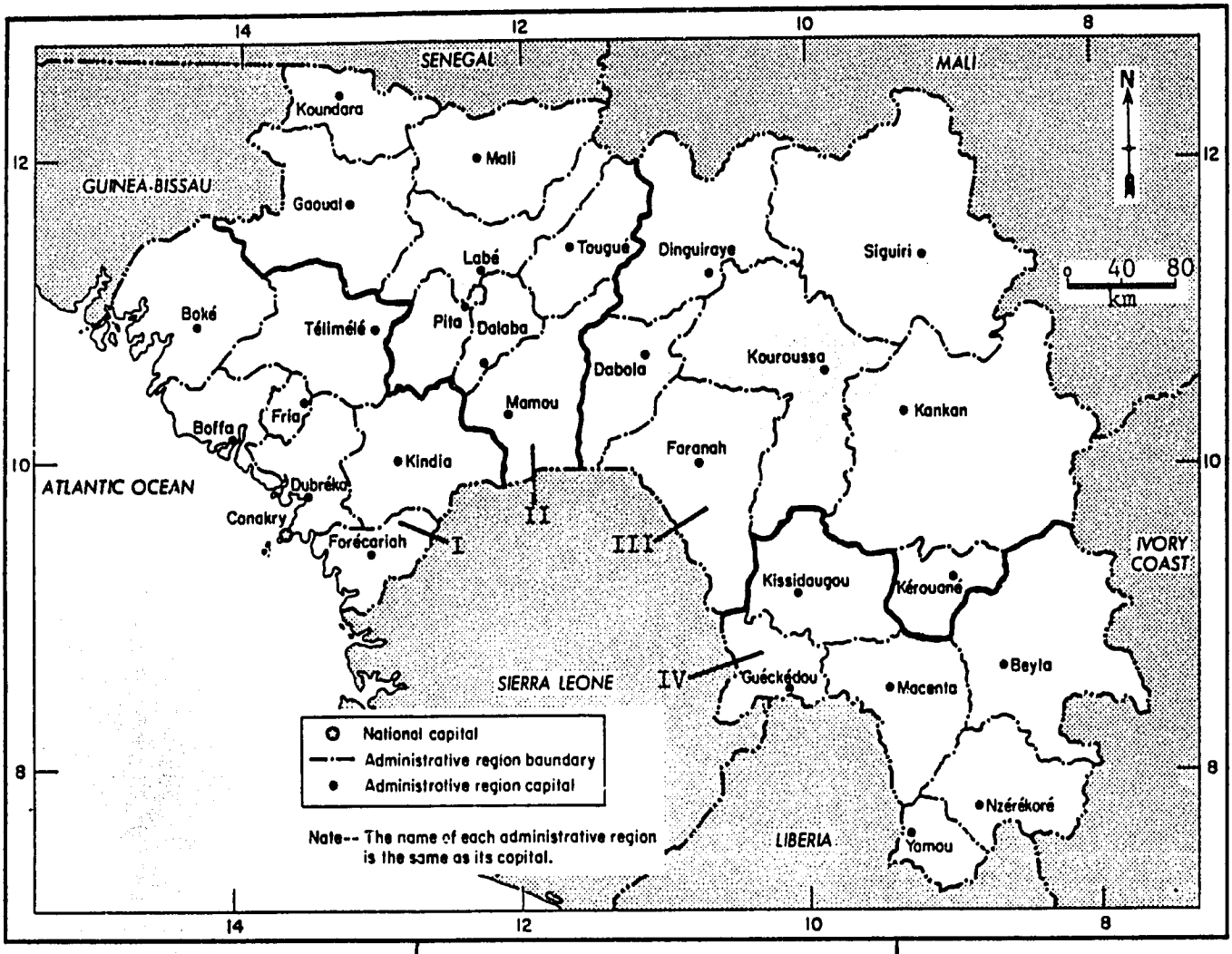
1/ Sources: Europa. 1981b.
Harrison Church. 1980a.
-----. 1980b.
-----. 1981.
Kurian. 1982.
Nelson, et al. 1975.
Pritchard. 1971.
U.S. Dept. State. 1980.



I	Lower Guinea
II	Middle Guinea
III	Upper Guinea
IV	Forest Region

Figure 1. Administrative Regions

Source: Adapted from Nelson, et al. (1975).

Table 1. Administrative Regions, Areas, Populations, and Densities 2/

Geographic region/ Administrative region[a]	Area (sq km)	1972 Population[b] (1,000s)	Population density (per sq km)
Lower Guinea			
Conakry[c]	308	525.7	1,707
Boffa	6,003	121.1	20
Boké	11,053	178.6	16
Dubreka[d]	5,676	145.3	35
Fria[d]	--	54.4	--
Forécariah	4,625	132.2	29
Kindia	8,828	224.4	25
Télimélé	8,055	191.0	23
Total for Lower Guinea	44,548	1,572.7	35
w.o. Conakry	44,240	1,047.0	24
Middle Guinea			
Dalaba	5,750	149.7	26
Gaoual	11,503	129.7	11
Koundara	5,500	88.4	16
Labé	7,729	418.6	54
Mali	8,858	194.0	22
Mamou	6,159	184.6	30
Pita	4,100	206.1	50
Tougué	6,000	112.3	19
Total for Middle Guinea	55,599	1,483.4	27
Upper Guinea			
Dabola	9,000	83.1	9
Dinguiraye	7,297	109.2	15
Faranah	13,100	135.5	10
Kankan	27,488	264.7	11
Kérouané[e]	--	44.9	--
Kouroussa	16,405	121.3	7
Siguiri	23,377	253.8	11
Total for Upper Guinea	96,667	1,012.39	10

2/ Sources: Nelson et al. 1975.
Voss. 1968.

Table 1. Administrative Regions, Areas, Populations, and Densities (cont.)

Geographic region/ Administrative region[a]	Area (sq km)	1972 Population[b] (1,000s)	Population density (per sq km)
Forest Region			
Beyla[e]	17,452	192.2	11
Gueckédou	4,157	173.9	42
Kissidougou	8,872	177.6	20
Macenta	8,710	167.7	19
Nzérékoré[f]	10,183	290.7	36
Yomouf	--	72.7	
Total for Forest Region	49,374	1,074.9	22
National total	246,188	5,143.3	21

Notes:

[a] Capital of each region bears the same name as the region.
[b] From census, but not known whether figures represent defacto or dejuse population.
[c] National capital.
[d] Area of Fria region included in Dubreka (formerly a single region).
[e] Area of Kérouané region included in Beyla (formerly a single region).
[f] Area of Yomou region included in Nzérékoré (formerly a single region).

distributed (see 2.2.3 below), varying from 45,000 persons in the recently created region of Kérouané in Upper Guinea, to more than a half-million in the densely populated capital (Table 1).

2.1.2 Geographic Features 3/

Most observers, and the government itself, consider Guinea to be characterized by four distinct geographical zones. Moving eastward and then southward across the arc-shaped country, there are: (1) Lower Guinea, or Maritime Guinea (Basse-Guinée, or Guinée Maritime, officially); (2) Middle Guinea (Moyenne-Guinée); (3) Upper Guinea (Haute Guinée); and the Forest Region (Guinée forestière). Figure 2 presents the general outlines of these four regions along with some of the major topographic features. The regions also appear as administrative divisions in Figure 1.

Lower Guinea. Forming a belt some 130 km wide, Lower Guinea includes two contiguous zones--a narrow stretch of coastal swampland, and an extended coastal plain. The coastal swamps surround the insets of several dozen rivers, many of which are drowned (submerged). The coastline is, in fact, continuing to change as the muddy estuaries alter their courses before merging with the sea. Just off the coast, a number of island chains represent the unsubmerged remnants of what was once part of the mainland. Conakry itself is situated on such an island, Tombo Island, and is linked to the mainland by a causeway. Just beyond Conakry lie the Los Islands, a mineral rich archipelago consisting of granite and other intrusive rock formations. The swampland band rarely exceeds 25 km in width (Fig. 3). Because tidewaters are high, water is brackish throughout. Mangroves grow readily along the borders of the estuaries; sandbars and lagoons occur infrequently.

Beyond the coastal swamplands the terrain slopes gently upward toward the highlands of the Fouta Djallon (Fig. 3). Ranging from 50 to 80 km in width, this region includes the numerous rivers originating in the mountains (Fig. 4). The alluvial plain thus created is comprised of sandstone

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3/ Sources: Harrison Church. 1980a.
-----. 1980b.
-----. 1981.
Kurian. 1982.
May and McLellan. 1968.
Nelson, et al. 1975.
Pritchard. 1971.
Suret-Canale. 1970.
U.S. Dept. State. 1980.
Voss. 1968.

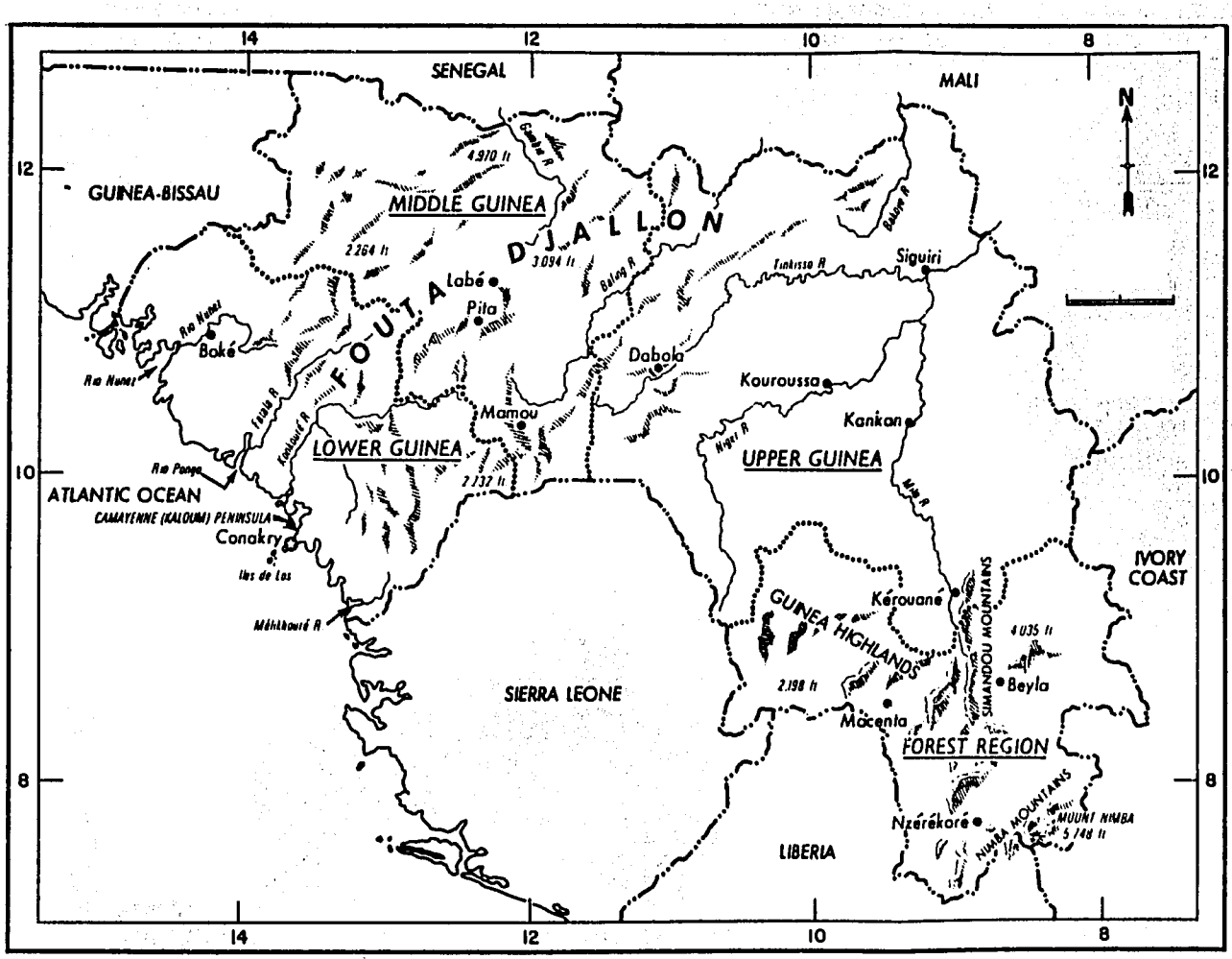

Figure 2. Geographic Regions

Source: Nelson, et al. 1975.

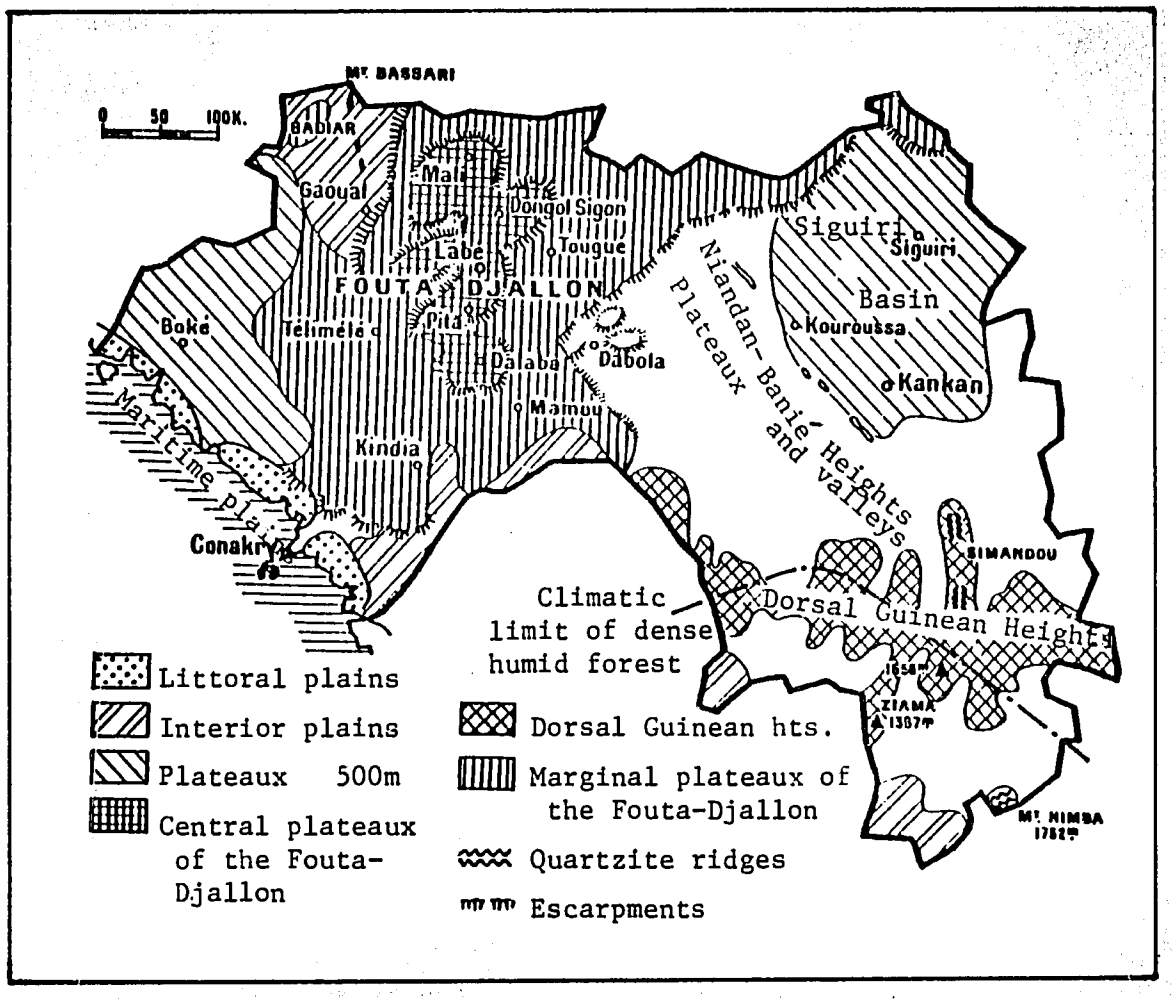

Figure 3. Geomorphologic Features

Source: Adapted from Suret-Canale (1970).

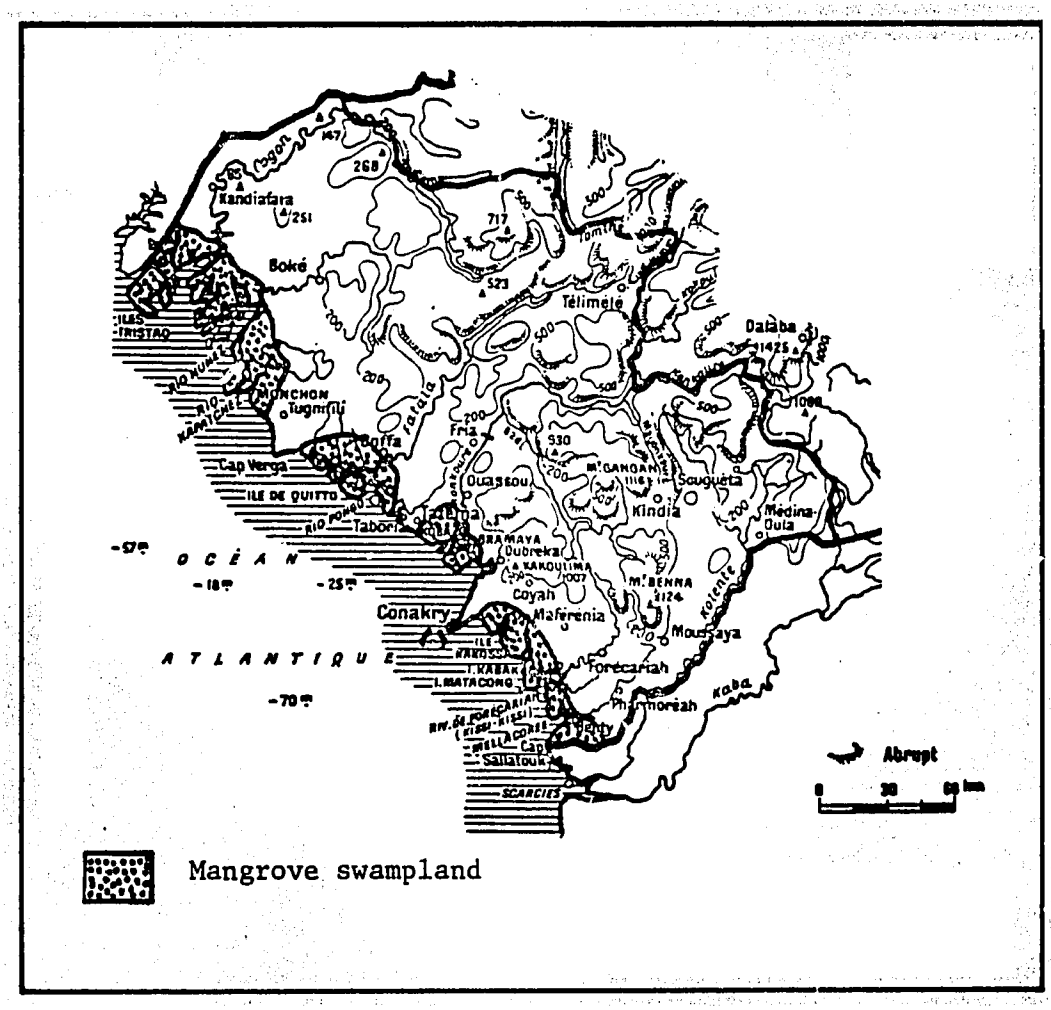

Figure 4. Lower Guinea, Topography

Source: Adapted from Suret-Canale (1970).

gravels lying above a rocky substratum. Although the eastern parts of Lower Guinea include the foothills of the Fouta Djallon, elevations are generally low, rarely exceeding 300 m. Only in the southernmost corner bordering on Sierra Leone, in Kindia administrative region do elevations attain moderate heights (up to 1,124 m).

Middle Guinea. The region known as Middle Guinea is principally defined by the Fouta Djallon mountain range which stretches across most of the province (Figs. 2, 3, and 5). The range traverses Middle Guinea in a north-south direction, rising steeply from the west and gently from the east. The peaks are not exceptionally high; the highest, just north of Mali, exceeds 1,500 m, while a few others attain 1,200 m (Fig. 5). Virtually the entire region is mountainous, and a quarter of the area (13,000 sq km) lies above 900 m.

Although the terrain is frequently rugged, rising out of precipitous faults, the region is relatively densely populated. Middle Guinea's density of 27 persons per sq km is, the highest of the four regions (if Conakry is excluded from Lower Guinea; see Table 1). In addition, it is the most elevated areas that are the most densely populated. Not surprisingly this phenomenon is mainly attributable to the climate which is more favorable than in the lowlands.

The Fouta Djallon range is composed almost entirely of sandstones, which provide rich but easily eroded soils. The hills contain prodigious deposits of bauxite--perhaps the world's richest. Other minerals may also be contained, but to date exploitation has been limited (see 3.1.3 below for a more complete discussion of Guinea's mineral resources).

Upper Guinea. At about 11° west longitude, in an imaginary line through Dabola, the Fouta Djallon mountains begin to descend eastward. A few spurs of the range extend beyond this limit, particularly along the northern border with Mali (Figs. 3 and 6). Most of the region defined as Upper Guinea differs significantly from Middle Guinea. The average elevation of this zone--a combination of plateaux and river basins--is considerably lower, about 300 m; the bedrock is no longer sandstone, but granite; and the natural vegetative cover becomes Sudanian savanna (tall grass and brush) mixed with occasional clear forest, instead of the moist savanna and upland evergreen forest of Middle Guinea. The region is Guinea's least densely populated, supporting just ten persons per sq km (Table 1), most persons residing in river valley settlements. Among the rivers flowing through Upper Guinea are the Bafing and

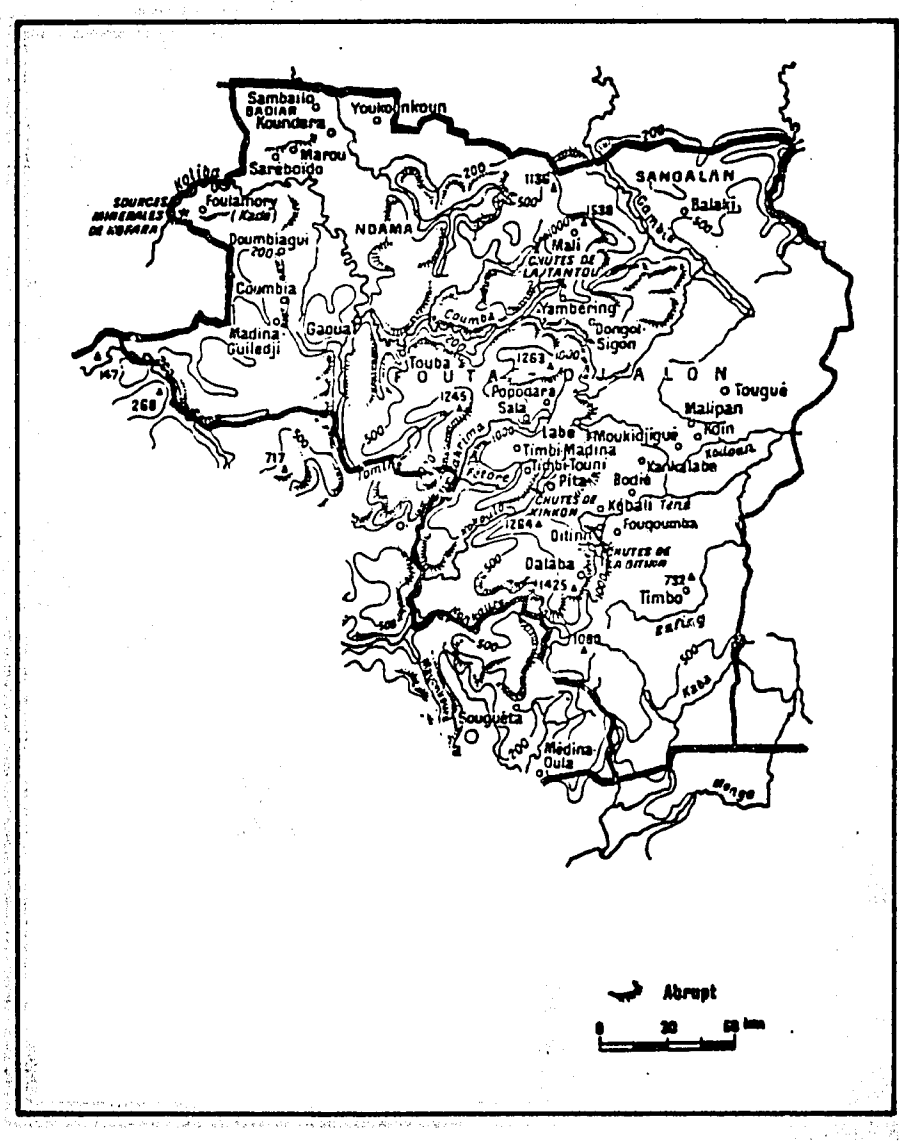

Figure 5. Middle Guinea, Topography

Source: Adapted from Suret-Canale (1970).

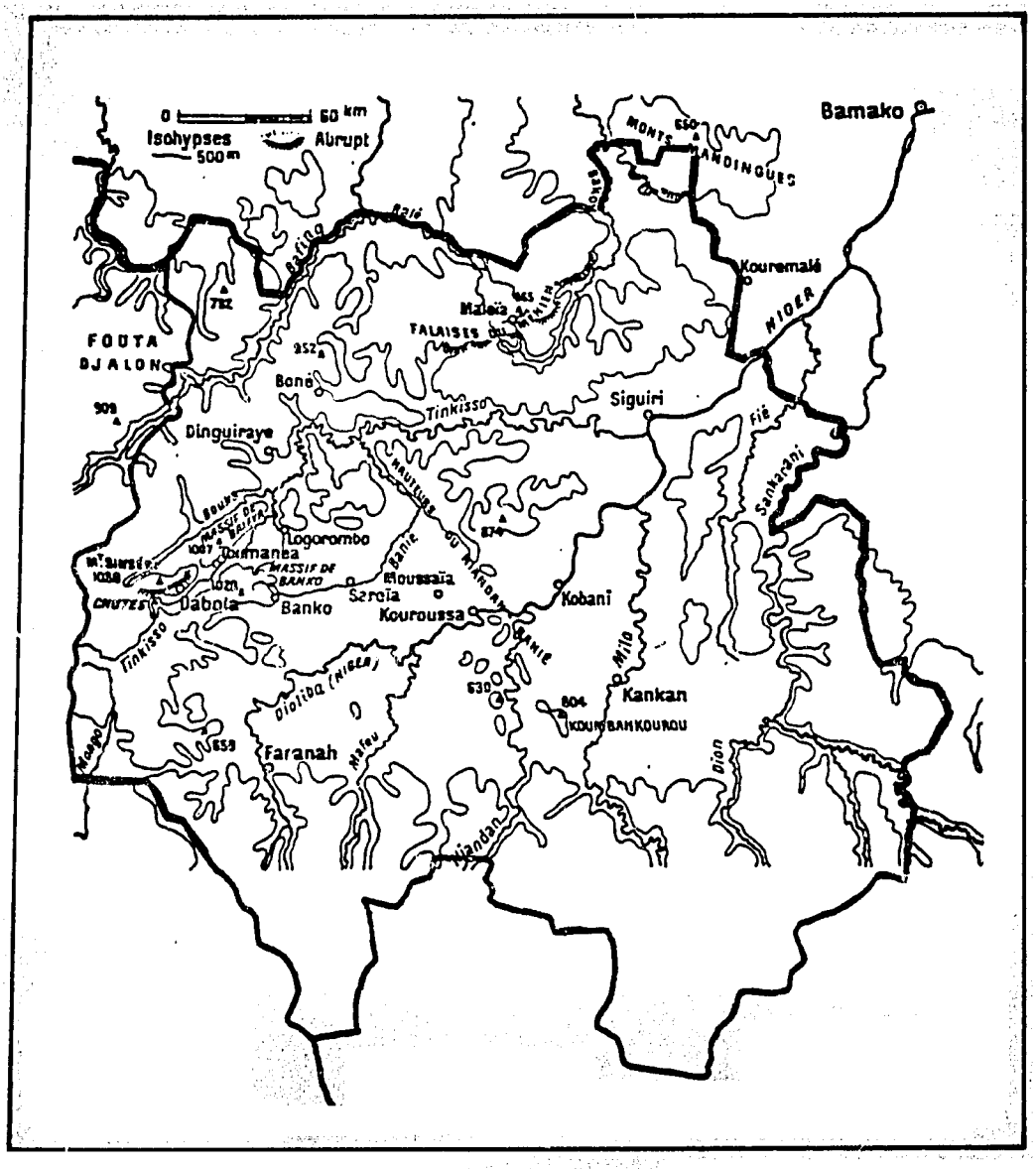

Figure 6. Upper Guinea, Topography

Source: Adapted from Suret-Canale (1970).

Bakoye (tributaries of the Senegal River); and the Tinkisso, Milo, and Niger (all components of the Niger river system; the Niger itself arises in the southwestern corner of the province on the border with Sierra Leone).

Forest Region. Extending southward from Upper Guinea, the Forest Region begins at the northern edge of the Dorsal Guinean Heights, also known as the Guinean Highlands. The province is characterized by these highlands, but also includes several interior plains covered by savanna. The largest of these lie west of Guéckédou, around Nzérékoré, in the vicinity of Beyla, and near Kissidougou (Figs. 3 and 7).

The Guinean Highlands themselves are slightly more elevated than the plateaux of the Fouta Djallon. Altitudes vary from 500 m to nearly 1,000 m. The highest points are Mt. Nimba, Guinea's highest (1,752 m), Pic de Fon (1,656 m), Pic de Tibe (1,504 m), and Mt. Ziama (1,387 m). Figure 7 shows the locations of these peaks. The Guinean Highlands are not as sharply dissected as the Fouta Djallon. Although some of the foothills rise along steep escarpments, the Highlands themselves ascend more gently, culminating in rounded, domed hills. The mountains consist of hard bedrock--granite, gneiss, schist, or quartzite. Mt. Nimba, in the southeast corner, is a quartzite ridge. Because the entire region lies below the climatic limit of dense humid forest (Fig. 3), the mountaintops are generally covered by dense tropical rain forest, this feature lending its name to the province.

2.1.3 Climate [4/]

Lying at an average latitude of ten degrees north of the equator, Guinea possesses a tropical climate. Seasonal climatic variation results predominantly from the movement and behavior of two important air masses--the Tropical Continental Air mass and the Tropical (or Equatorial) Maritime Air mass. The former system is associated with dry northeasterly winds, the latter with moist southwesterly winds. Separating these two masses is a discontinuous front known as the Inter-Tropical Convergence

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[4/] Sources: Harrison Church. 1980a.
Kurian. 1982.
Nelson, et al. 1975.
Suret-Canale. 1970.
Voss. 1968.
Wernstedt. 1972.
White and Gleave. 1971.

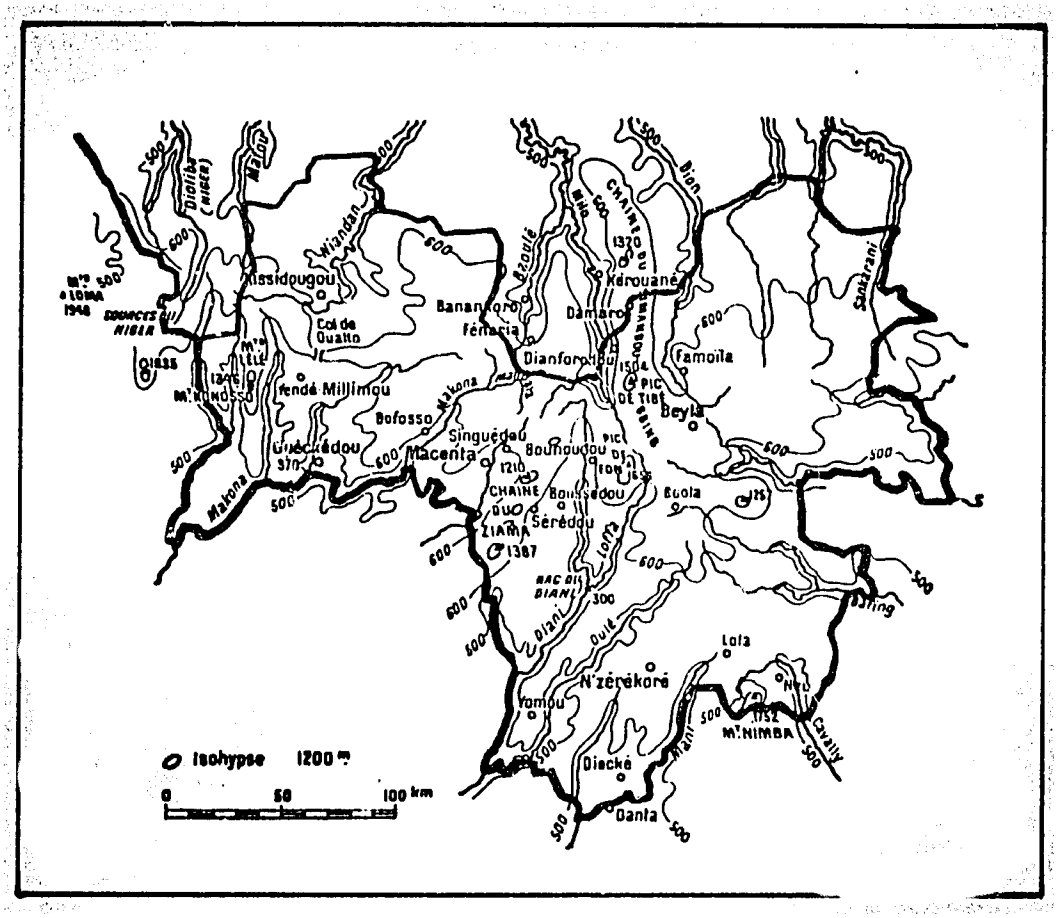

Figure 7. Forest Region, Topography

Source: Adapted from Suret-Canale (1970).

Zone (ITCZ). Remaining north of the equator, the ITCZ acts as a major determinant of weather patterns throughout the African continent in general, and in Guinea in particular.

The nation's varied topography modifies the climatic effects of the ITCZ. Thus, the elevated ranges of the Fouta Djallon and the Guinean Highlands attract exceptionally high rainfall while reducing temperatures. Finally, ocean currents contribute to Guinea's climate. The nation's coast is subjected to the eastward-flowing Guinea current. This is a warm current and therefore strengthens the warming effects of the humid Tropical Maritime Air mass, when that system predominates during the wet summer months. Together, the Guinea current and the Tropical Maritime Air mass combine to generate the seasonal tropical maritime monsoon winds that drench much of West Africa between May and September.

2.1.3.1 Rainfall

Guinea's arc-shaped contour places the country astride two diverse ecological zones, the Soudanian and Guinean (Fig. 8). Consequently, the climate--and particularly rainfall--varies considerably from one point of Guinea to another. Figure 9 vividly shows the nation's climatic variety. According to one observer (Harrison Church 1980a), no fewer than seven distinct climatic zones divide Guinea. Five of these--the Southwest Coast Monsoonal, Foutanian, Southern (West African) Savannah, Guinea Foothills, and Guinea Highlands--account for nearly all of the country's climates; the other two occur only at the peripheries and extremes. In each of these zones there are typical patterns of rainfall, humidity, and temperature regimes. Table 2 summarizes the main features of each zone.

In general, all regions share similar gross seasonal characteristics: the wet season occurs between April and November, while the remainder of the year is typically dry. Along the southern coast and in the Forest Region, heavy rains may begin as early as February; to the north, in Upper Guinea, by contrast, the onset of the rainy season may be delayed until June.

Figure 10 indicates that the entire country lies within the 1,000 mm annual rainfall isohyet. Most of Guinea, in fact, receives in excess of 1,400 mm of precipitation in an average year. The coastal strip is far wetter, most of it obtaining more than 3,200 mm of rainfall each year. Except for Guinea's rainforest areas in the western part of the Forest Region, Figure 10 shows that total annual rainfall typically decreases as one moves northeastwards. Similarily, the entire west African subcontinent may be subdivided into a series of east-west belts reflecting relative seasonal concentrations of rainfall. In such a scheme, as Figure 11 indicates, most of Guinea lies in a

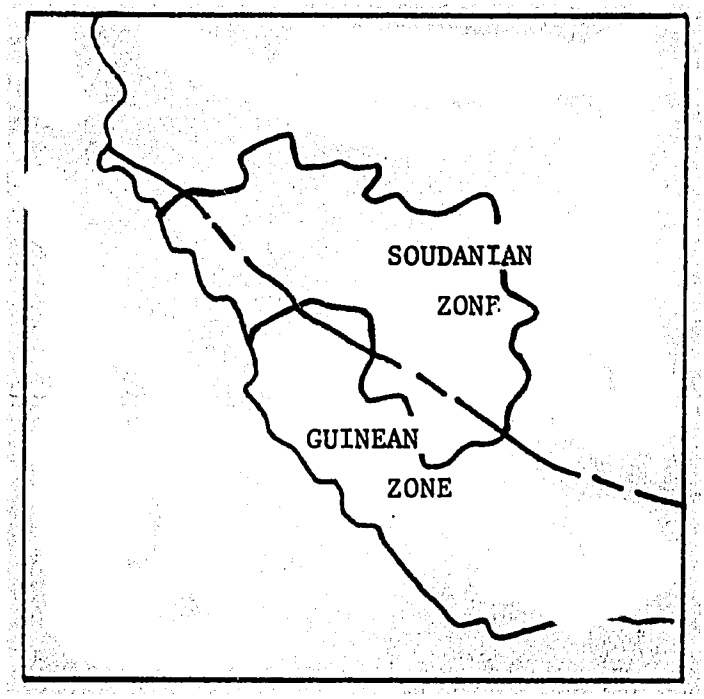

Figure 8. Ecological Zones

Source: Adapted from de Vos (1975)

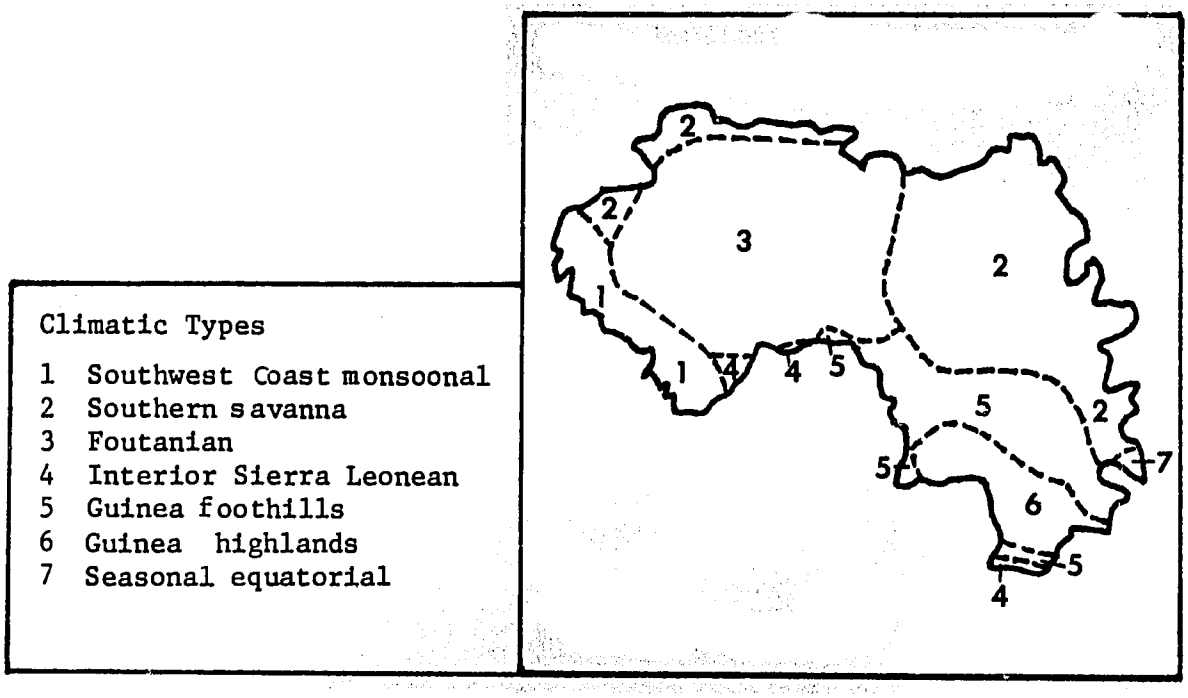

Figure 9. Climatic Zones

Source: Adapted from Harrison Church (1980a)

Table 2. Climatic Zones

Zone no.	Climatic type (Fig. 9)	Characteristic features
1.	Southwest coast monsoonal	
3.	Foutanian	
4.	Interior Sierra Leonean	Dry season followed by a long and very wet one.
5.	Guinea foothills	
6.	Guinea highlands	
2.	Southern savannah	One rainfall maximum, becoming shorter inland.
7.	Seasonal equatorial but with two maxima.	Up to four dry months, or low total rainfall,

Source: Harrison Church. 1980a

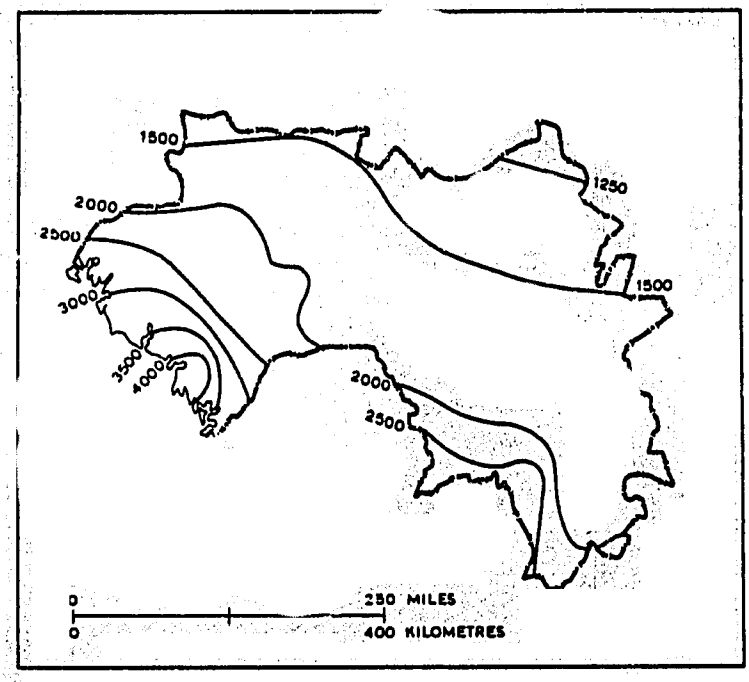

Figure 10. Isohyets (mm)

Source: Brasseur. 1976.

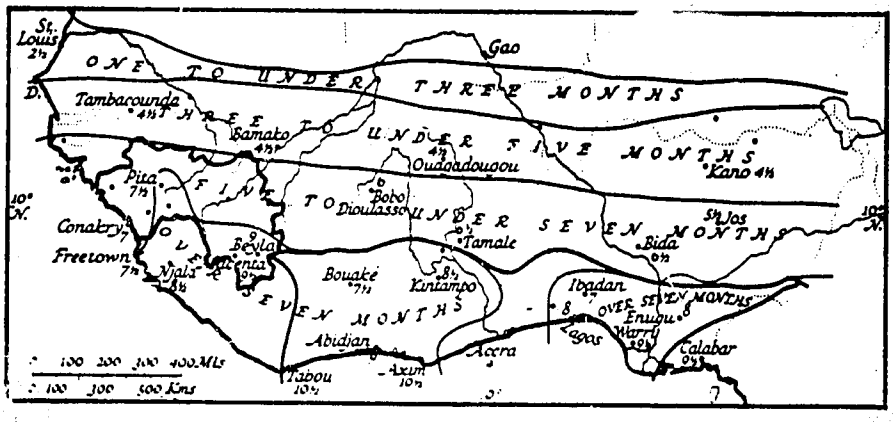

Figure 11. Number of Months with at least 100 mm of Rainfall[a]

[a] The heavy line indicates the northern limit of the double maximum of rainfall.

Source: Adapted from Harrison Church (1980a).

zone characterized by five to seven months of rainfall in excess of 100 mm of monthly precipitation. The remainder of the country receives at least that amount of rain for more than seven months per year.

Figure 12 provides greater detail of monthly variations in rainfall. December through February are clearly the driest months throughout Guinea, most of the country receiving no rain at all during that period. Overall, August is the wettest month. Most of the eastern portion of the nation gets an average of more than 300 mm of rain in that month alone. Table 3 lists average monthly and yearly precipitation at 24 selected sites (locations are shown on Fig. 1).

2.1.3.2 Temperature and Humidity

Despite the numerous regional climatic variations, Guinea's overall climate is considered tropical. As a result, temperatures do not vary greatly throughout the year, remaining moderate (24°C) to hot (30°C). The lowest temperatures are experienced in the northern Foutanian highlands, near Mali. Average temperatures there rarely exceed 21°C, rising to 27°C only at the onset of the wet season in April. The warmest average temperatures occur along the foothills of the Fouta Djallon, both east and west of the central Foutanian plateau. In April and May, average temperatures there may exceed 32°C. In Conakry, on the coast, the maximum temperatures are attained between February and May (31.7° to 32.1°C), while minima occur uniformly throughout the year (22.6° to 24.5°).

Nowhere in Guinea do average monthly temperatures vary by more than about 11 or 12 percent (Wernstedt 1972). There are nevertheless places, particularly in the highlands, where daily temperature fluctuations may be notable. In Mamou, for example, January temperatures vary from daytime maxima near 32°C to nightime lows of 12.4°C. Table 4 lists mean monthly temperatures (4a), and extreme temperatures (4b) at a dozen selected sites scattered over five of Guinea's eight climatic zones. Figure 13 shows mean daily temperature isolines for January, April, July, and October.

In general, since all of Guinea's climates are essentially tropical, relative humidity tends to be high for much of the year. Only along the coast is the humidity above 70 percent throughout the entire region (Table 5). Inland, and especially on the plateaux, evening humidities dip to 30 percent and less during dry winter evenings. To the north, near the border with Mali, even daytime humidities may remain beneath 50 percent between November and March (Harrison Church 1980a). During the extended wet season, relative humidity hovers above 80 percent nearly everywhere, day and night.

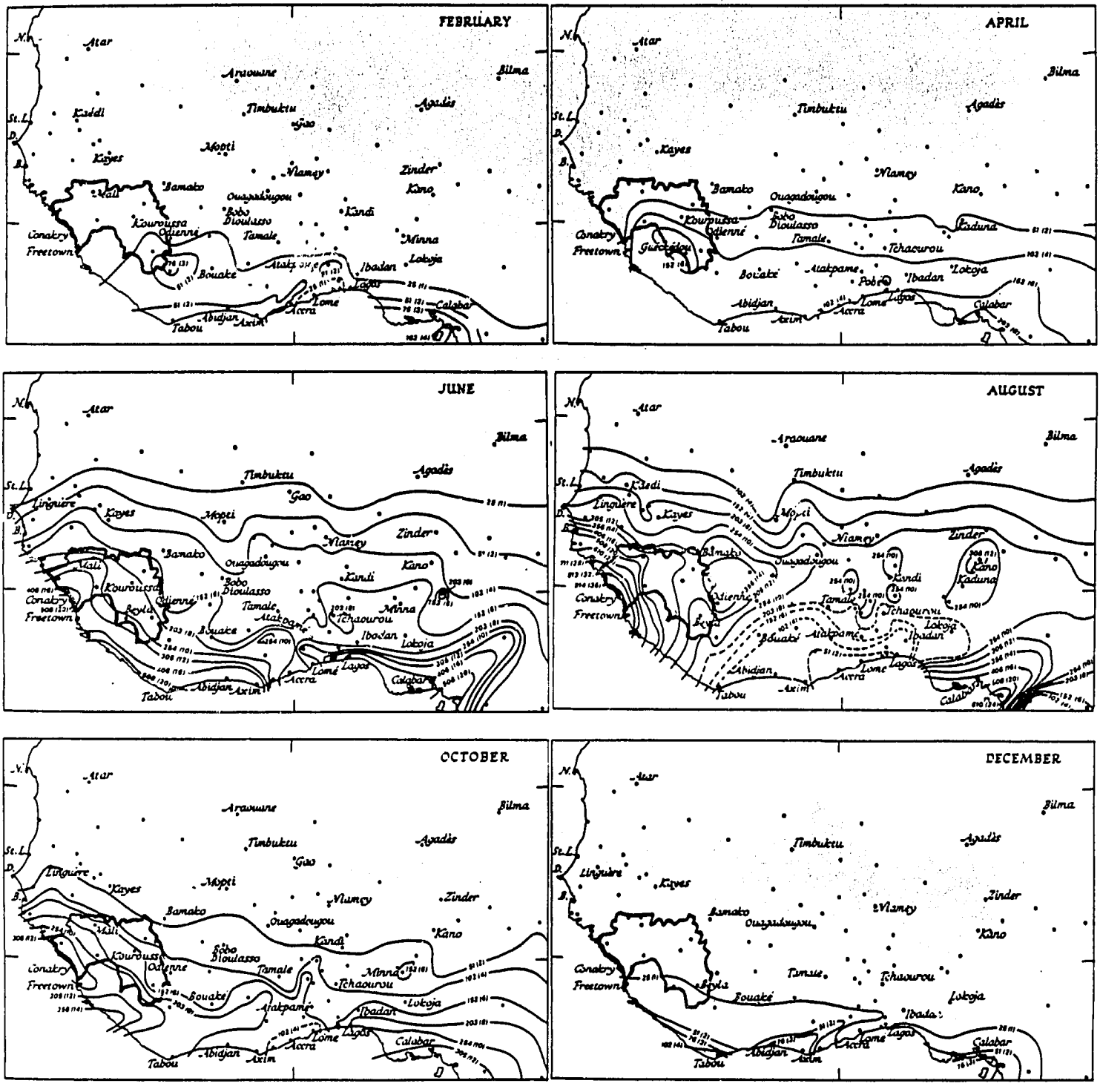

Figure 12. Mean Monthly Rainfall

Source: Adapted from Harrison Church (1980a).

Table 3. Monthly Rainfall at Selected Sites

Climatic zone no. (Fig. 9)	Site	Elev. (m)	Location				Rainfall (mm)											
			Lat. N		Long. E		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
			deg.	min.	deg.	min.													
5	Beyla	695	8	41	8	39	8.6	38.3	117.5	156.3	186.8	217.2	233.2	263.9	286.2	177.6	85.0	25.6	1,796.7
1	Boffa	30	10	12	14	00	0.8	0.0	2.5	14.4	97.2	336.0	907.6	1078.4	504.0	280.4	69.3	8.1	3,299.0
1	Boke	69	10	56	14	19	0.0	0.0	1.0	15.0	102.0	312.7	543.6	835.5	511.7	401.8	87.8	7.1	2,818.2
1	Conakry	46	9	30	13	43	1.0	2.0	4.0	23.1	164.0	587.6	1336.0	1072.1	699.5	323.8	120.8	14.0	4,348.0
3	Dabola	438	10	55	11	07	3.0	1.3	14.7	54.6	149.2	215.2	260.9	392.4	298.7	174.1	23.8	2.5	1,598.6
3	Dalaba	1,202	10	43	12	16	3.0	0.0	27.1	82.4	1340.0	240.0	374.6	557.9	348.0	185.7	46.4	14.0	2,012.9
1	Dubreka	15	9	47	13	31	0.0	.5	4.3	27.6	134.3	368.3	956.1	1301.3	660.1	310.1	124.6	6.8	3,894.2
5	Faranah	340	10	02	10	42	3.3	7.4	18.0	85.5	131.7	237.8	231.2	301.5	337.3	211.1	46.9	4.6	1,616.5
1	Forecariah	47	9	26	13	05	2.3	1.8	11.4	46.4	171.1	355.6	721.6	904.3	577.7	346.4	90.9	12.2	3,241.6
3	Gaoual	99	11	47	13	04	0.2	0.0	0.2	13.7	101.5	236.0	379.7	499.7	386.3	247.2	43.9	5.3	1,915.5
5	Gueckedou	435	8	33	10	09	10.9	25.6	118.0	165.0	254.6	275.6	277.7	370.0	367.3	278.2	147.5	33.8	2,349.5
2	Kankan	377	10	23	9	18	3.0	11.9	23.1	82.0	133.0	214.0	299.7	377.7	350.8	166.7	27.9	3.0	1,692.9
3	Kindia	458	10	02	12	46	4.1	5.1	18.0	62.9	152.8	257.9	390.6	495.7	376.6	254.8	61.9	8.9	2,089.3
6	Kissidougou	450	9	14	10	04	11.9	20.3	78.9	139.1	225.6	296.2	271.1	322.3	376.7	276.4	116.5	16.2	2,151.3
2	Kouroussa	372	10	39	9	53	1.8	5.6	20.0	63.2	119.5	206.3	264.7	335.0	341.6	152.5	25.4	4.1	1,539.8
3	Labe	1,025	11	21	12	12	2.0	2.0	10.9	43.9	137.8	258.9	348.7	369.8	297.7	185.8	35.0	10.9	1,703.5
6	Macenta	543	8	34	9	23	12.9	56.8	145.9	167.6	268.8	268.8	497.7	548.5	401.8	265.7	164.0	49.0	2,785.8
3	Mali	1,464	12	08	12	18	0.5	0.2	5.0	22.3	79.9	241.6	349.2	503.0	359.6	177.6	16.7	1.0	1,757.1
3	Mamou	782	10	22	12	05	5.0	6.1	31.0	103.4	170.8	235.8	296.7	433.8	369.8	227.9	55.8	8.9	1,944.7
6	Nzerekore	520	7	45	8	47	19.3	40.9	126.4	148.7	177.7	202.0	224.1	196.7	338.8	226.6	86.8	30.7	1,918.8
3	Pita	965	11	03	12	24	3.0	3.0	14.0	73.9	167.5	241.9	359.6	427.2	321.1	169.8	49.0	11.9	1,841.9
2	Siguiri	362	11	27	9	08	1.0	2.0	8.1	33.0	91.9	188.8	258.9	349.7	269.8	115.0	21.1	2.0	1,341.4
3	Telimele	650	10	58	13	00	1.5	1.5	12.9	67.0	165.7	252.3	455.6	580.7	371.3	270.3	83.8	7.6	2,270.3
3	Tougue	868	11	26	11	40	4.6	1.0	8.4	31.0	95.2	202.3	319.5	465.2	289.3	134.5	29.4	5.3	1,585.8

Source: Adapted from Wernstedt (1972).

Table 3. Monthly Rainfall at Selected Sites

Climatic zone no. (Fig. 9)	Site	Elev. (m)	Location Lat. N deg.	Lat. N min.	Long. E deg.	Long. E min.	Rainfall (mm) Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
5	Beyla	695	8	41	8	39	8.6	38.3	117.5	156.3	186.8	217.2	233.2	263.9	286.2	177.6	85.0	25.6	1,796.7
1	Boffa	30	10	12	14	00	0.8	0.0	2.5	14.4	97.2	336.0	907.6	1078.4	504.0	280.4	69.3	8.1	3,299.0
1	Boke	69	10	56	14	19	0.0	0.0	1.0	15.0	102.0	312.7	543.6	835.5	511.7	401.8	87.8	7.1	2,818.2
1	Conakry	46	9	30	13	43	1.0	2.0	4.0	23.1	164.0	587.6	1336.0	1072.1	699.5	323.8	120.8	14.0	4,348.0
3	Dabola	438	10	55	11	07	3.0	1.3	14.7	54.6	149.2	215.2	260.9	392.4	298.7	174.1	23.8	2.5	1,598.6
3	Dalaba	1,202	10	43	12	16	3.0	0.0	27.1	82.4	1340.0	240.0	374.6	557.9	348.0	185.7	46.4	14.0	2,012.9
1	Dubreka	15	9	47	13	31	0.0	.5	4.3	27.6	134.3	368.3	956.1	1301.3	660.1	310.1	124.6	6.8	3,894.2
5	Faranah	340	10	02	10	42	3.3	7.4	18.0	85.5	131.7	237.8	231.2	301.5	337.3	211.1	46.9	4.6	1,616.5
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3	Gaoual	99	11	47	13	04	0.2	0.0	0.2	13.7	101.5	236.0	379.7	499.7	386.3	247.2	43.9	5.3	1,915.5
5	Gueckedou	435	8	33	10	09	10.9	25.6	118.0	165.0	254.6	275.6	277.7	370.0	367.3	278.2	147.5	33.8	2,349.5
2	Kankan	377	10	23	9	18	3.0	11.9	23.1	82.0	133.0	214.0	299.7	377.7	350.8	166.7	27.9	3.0	1,692.9
3	Kindia	458	10	02	12	46	4.1	5.1	18.0	62.9	152.8	257.9	390.6	495.7	376.6	254.8	61.9	8.9	2,089.3
6	Kissidougou	450	9	14	10	04	11.9	20.3	78.9	139.1	225.6	296.2	271.1	322.3	376.7	276.4	116.5	16.2	2,151.3
2	Kouroussa	372	10	39	9	53	1.8	5.6	20.0	63.2	119.5	206.3	264.7	335.0	341.6	152.5	25.4	4.1	1,539.8
3	Labe	1,025	11	21	12	12	2.0	2.0	10.9	43.9	137.8	258.9	348.7	369.8	297.7	185.8	35.0	10.9	1,703.5
6	Macenta	543	8	34	9	23	12.9	56.8	145.9	167.8	268.8	268.8	497.7	548.5	401.8	265.7	164.0	49.0	2,785.8
3	Mali	1,464	12	08	12	18	0.5	0.2	5.0	22.3	79.9	241.6	349.2	503.0	359.6	177.6	16.7	1.0	1,757.1
3	Mamou	782	10	22	12	05	5.0	6.1	31.0	103.4	170.8	235.8	296.7	433.8	369.8	227.9	55.8	8.9	1,944.7
6	Nzerekore	520	7	45	8	47	19.3	40.9	126.4	148.7	177.7	202.0	224.1	196.7	338.8	226.6	86.8	30.7	1,918.8
3	Pita	965	11	03	12	24	3.0	3.0	14.0	73.9	167.5	241.9	359.6	427.2	321.1	169.8	49.0	11.9	1,841.9
2	Siguiri	362	11	27	9	08	1.0	2.0	8.1	33.0	91.9	188.8	258.9	349.7	269.8	115.0	21.1	2.0	1,341.4
3	Telimele	650	10	58	13	00	1.5	1.5	12.9	67.0	165.7	252.3	455.6	580.7	371.3	270.3	83.8	7.6	2,270.3
3	Tougue	868	11	26	11	40	4.6	1.0	8.4	31.0	95.2	202.3	319.5	465.2	289.3	134.5	29.4	5.3	1,585.8

Source: Adapted from Wernstedt (1972).

Table 4. Monthly Temperatures at Selected Sites

a. Mean temperatures

Zone no. (Fig. 9)	Location	Mean temperature (°C)												
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1	Boffa	26.2	27.6	28.9	29.5	28.9	27.1	25.8	25.2	26.1	26.7	27.0	26.0	27.1
1	Boke	26.6	26.9	27.2	27.8	27.4	25.5	25.0	24.8	25.6	26.2	26.8	26.9	26.4
5	Gueckedou	24.0	26.8	28.9	29.0	27.8	25.9	24.3	24.5	25.2	25.8	25.8	23.7	25.9
2	Kankan	25.8	26.9	27.7	27.5	26.3	24.6	23.3	23.0	23.9	24.5	25.2	25.3	25.3
2	Kouroussa	20.8	22.0	24.0	24.9	24.4	22.6	22.2	21.4	21.6	21.8	21.3	20.4	24.3
3	Labe	23.1	24.4	25.3	25.3	25.3	24.6	23.4	23.2	24.3	24.4	24.3	23.2	24.2
3	Mali	23.1	24.8	25.8	25.9	24.7	23.2	21.6	21.8	22.6	22.9	23.2	22.5	23.5
3	Pita	24.9	27.4	29.6	30.6	29.4	26.7	25.3	25.1	25.6	26.3	26.1	24.5	26.8

b. Extreme temperatures

Zone no. (Fig. 9)	Location		Extreme temperatures (°C)												
			Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
5	Beyla	Max.	30.9	31.8	31.7	30.1	28.8	28.0	26.0	26.8	28.3	28.9	29.4	31.0	29.3
		Min.	14.9	18.6	19.5	19.5	19.0	18.7	18.0	18.2	18.8	18.8	18.3	15.0	18.1
1	Conakry	Max.	31.3	31.7	31.9	32.1	31.7	30.4	28.6	27.8	29.1	30.1	30.7	31.3	30.6
		Min.	22.6	23.4	24.0	24.2	24.5	23.7	23.0	23.0	23.3	23.2	24.1	23.7	23.6
2	Kouroussa	Max.	33.6	35.8	37.2	36.9	34.6	31.7	30.1	29.5	30.4	31.9	32.9	32.7	33.1
		Min.	13.8	17.1	21.7	23.0	22.8	21.6	20.9	20.9	20.8	20.6	18.9	14.4	19.6
3	Mamou	Max.	32.6	33.8	34.5	33.8	30.9	28.9	26.7	26.2	27.6	28.3	29.7	31.0	30.3
		Min.	12.4	14.9	17.9	18.9	19.5	18.2	18.6	18.4	18.4	17.9	16.6	13.3	17.1

Sources: Harrison Church. 1980a.
Wernstedt. 1972.

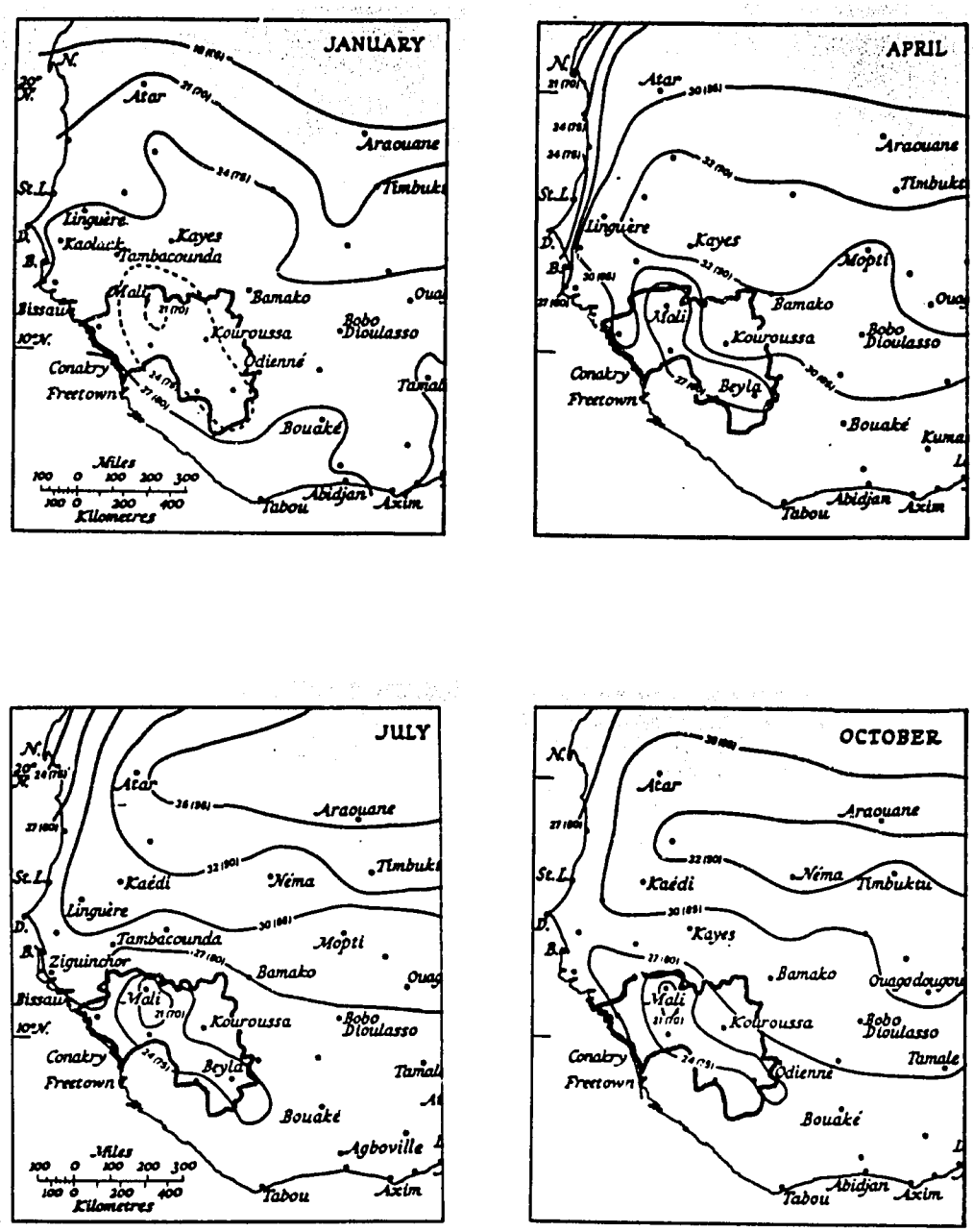

Figure 13. Mean Monthly Temperatures

Source: Adapted from Harrison Church (1980a).

Table 5. Relative Humidity at Selected Sites

Location	Mean relative humidity (%)			
	January		July	
	a.m.	p.m.	a.m.	p.m.
Conakry	85	71	92	85
Beyla	68	31	94	84

Source: Harrison Chruch. 1980a.

2.2 Population

2.2.1 Historical and Cultural Background 5/

Precolonial Period. Guinea, like all of its West African neighbors, owes its entity neither to ancient settlement patterns nor to natural geographic features, but rather to nineteenth century colonial activities. Although the region now comprising Guinea has been continuously inhabited since at least Neolithic times, it was settled by ancestors of its present populace only recently--at approximately the beginning of the present millenium. Because archaelogical exploration of the area has remained scanty, little is known about the intervening cultures, their social and political organizations, or their economies. The few remains which have been found and studied suggest that the Stone Age inhabitants were sedentary and migratory agriculturalists. While definitive dates for the origins of cultivation practices remain elusive, observers currently believe that the savannas may have spawned the earliest agriculture in the region, perhaps about 2000 B.C. (Clark 1970).

Alongside farming, animal husbandry was an established activity among early residents. Most experts believe that the practice of livestock raising was introduced into the savanna by Saharan pastoralists from the north. While the origins of such transhumance in the Sahara date to perhaps 5000 B.C., it is not known when this custom took hold further south.

Fishing, a third mode of existence, developed early among coastal and river valley peoples. Again, lack of evidence precludes any estimate of the earliest instances of exploitation of the Gulf of Guinea or of the major inland watercourses. Finally, hunting and gathering societies are known to have inhabited the forests and savannas from the earliest times.

By approximately A.D. 1000, after innumerable migrations resulting partly from ecological changes further north (principally a long-term warming of the climate accompanied

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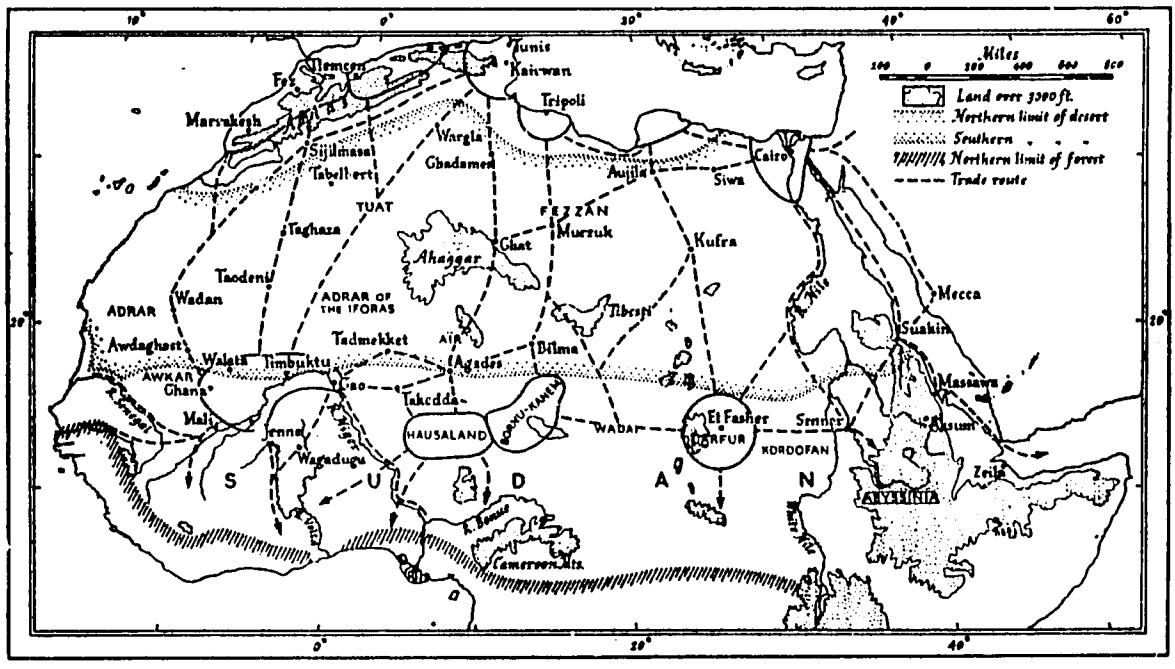
5/ Sources: Ade Ajayi, and Espie. 1967.
Ballard. 1967.
Camara. 1976.
Crowder. 1977.
Derman. 1973.
Harrison Church. 1980b.
Hopkins. 1973.
Johnson. 1978.
Nelson, et al. 1975.
Riviere. 1977.
Rodney. 1970.
Suret-Canale. 1970.
Synge. 1981.

by gradual desertification), the population began to stabilize. Incursions from the dry north and from the forested southeast brought Mande-speaking settlers, and commercial and military contacts with Islam. By the 11th century recently established political entities such as the Hausa States, ancient Ghana, Tekrur, Mali, and numerous others began shaping the cultural profile of modern Guinea (Fig. 14).

Among the regional states, the kingdom of Mali--at its apogee in the mid-14th century--comprised much of present Guinea (Fig. 15). The Malinké peoples who dominated this empire exerted strong influence on the neighboring areas, and have remained an important component of Guinea's present population. After the 14th century other groups, principally the Songhai, the Berber, and the Peul (also known as Foulah, Fulani, or Fulbe) controlled the western Sudan region. The latter, newly-converted Muslims, established a theocracy centered in the mountainous Fouta-Djallon. This state, though surrounded by dozens of smaller competing entities (Fig. 16), was perhaps the most powerful in the region. It survived until conquered by the French in the 19th century.

Colonial Period. European presence in West Africa can be dated to the early 15th century. Portuguese maritime adventurers began exploring the Guinea coast in the 1440s. The first European settlements, however, were established much later, in the 16th century. The French presence in this region is generally traced to 1659 when a trading enclave dubbed St. Louis was founded at the mouth of the Senegal River. In Guinea proper, French colonial power was not felt until the mid-19th century. Protracted maneuvering by French military officers was concentrated further north, in present Senegal, until the 1880s. A decade-long conflict with the local ruler, Samory Touré, a Malinké, resulted in an eventual French victory in 1898. Through this war and by means of individual friendship treaties with local authorities, the French managed to exert their authority throughout most of present Guinea. As Figure 17 illustrates, the region was colonized in stages, the southernmost province annexed only in 1911. Figure 18 shows Guinea in relation to the rest of French West Africa.

After consolidating its holdings in Guinea and West Africa, the French government devised a colonial policy and established a colonial administration. This policy, articulated in its simplest terms, consisted of two principles: (a) to exploit available natural resources, chiefly through the instrument of private enterprise; and (b) to instill in the populace the ideals and benefits of French culture.



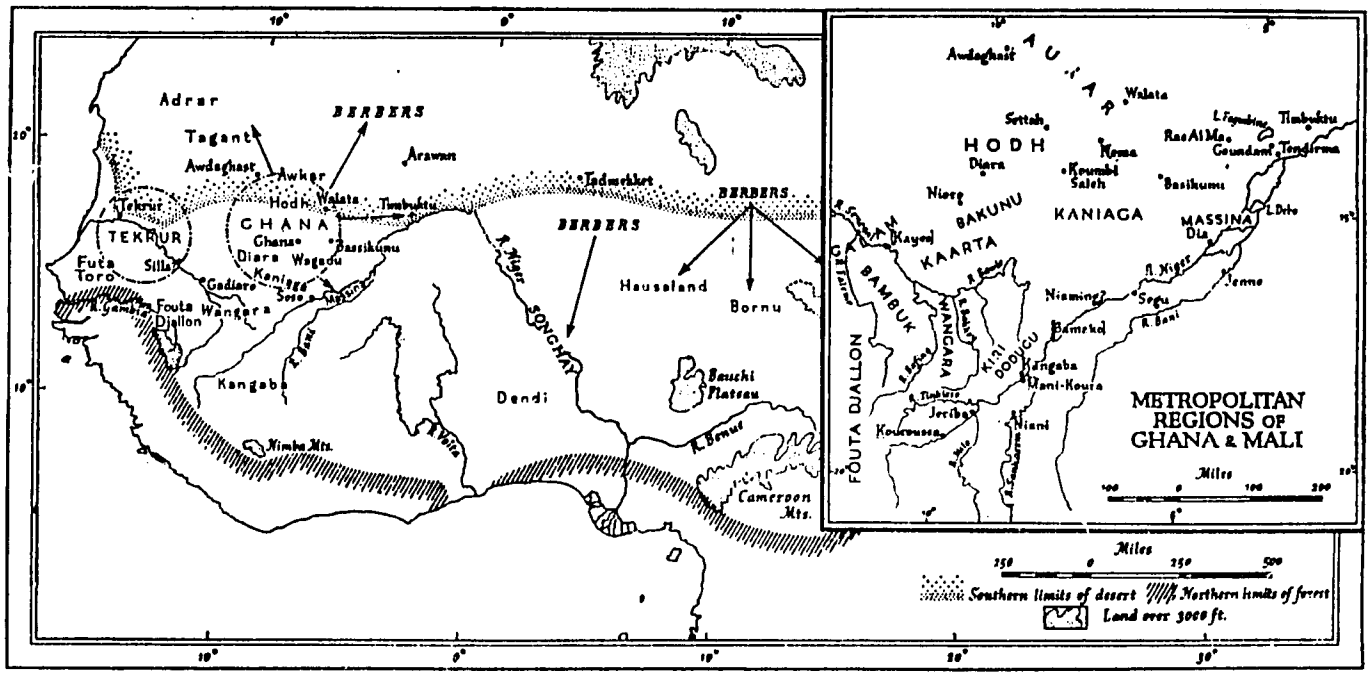


Figure 14. West Africa during the 5th (above) and 11th (below) Centuries

Source: Ifemesia. 1967.

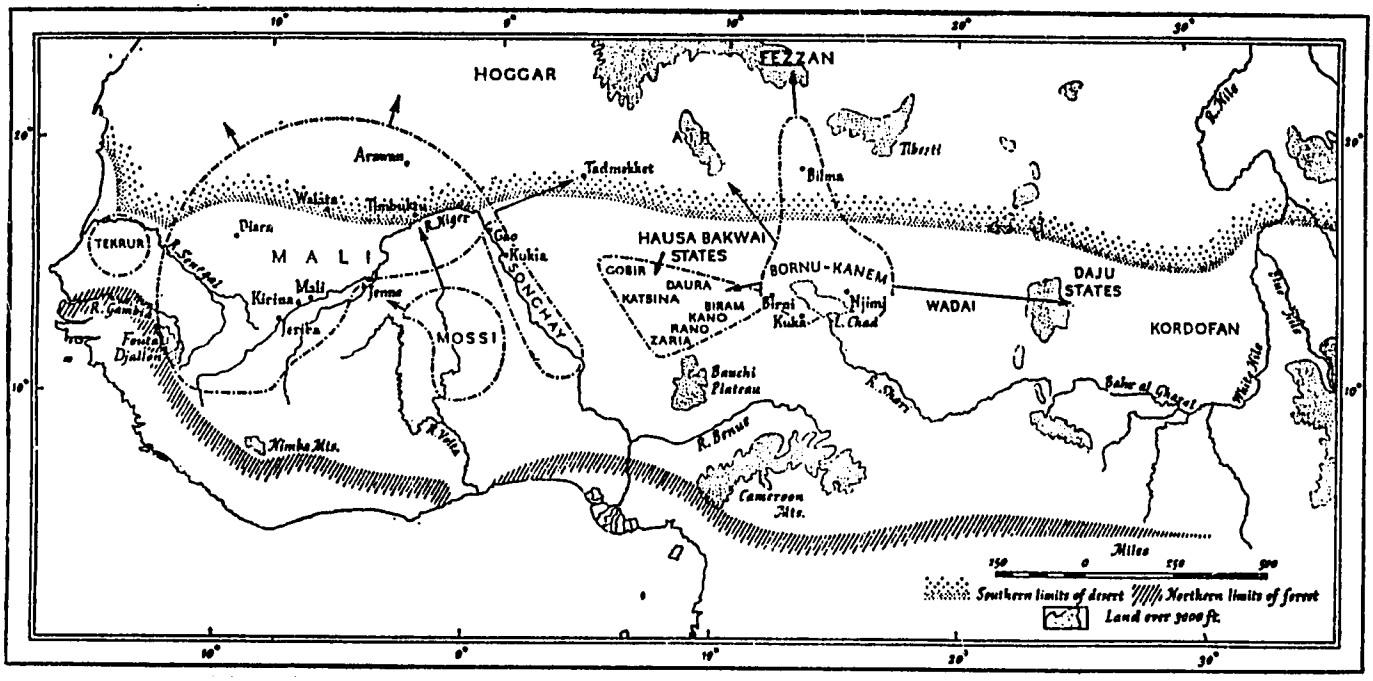


Figure 15. West Africa during the mid-14th Century

Source: Awe. 1967.

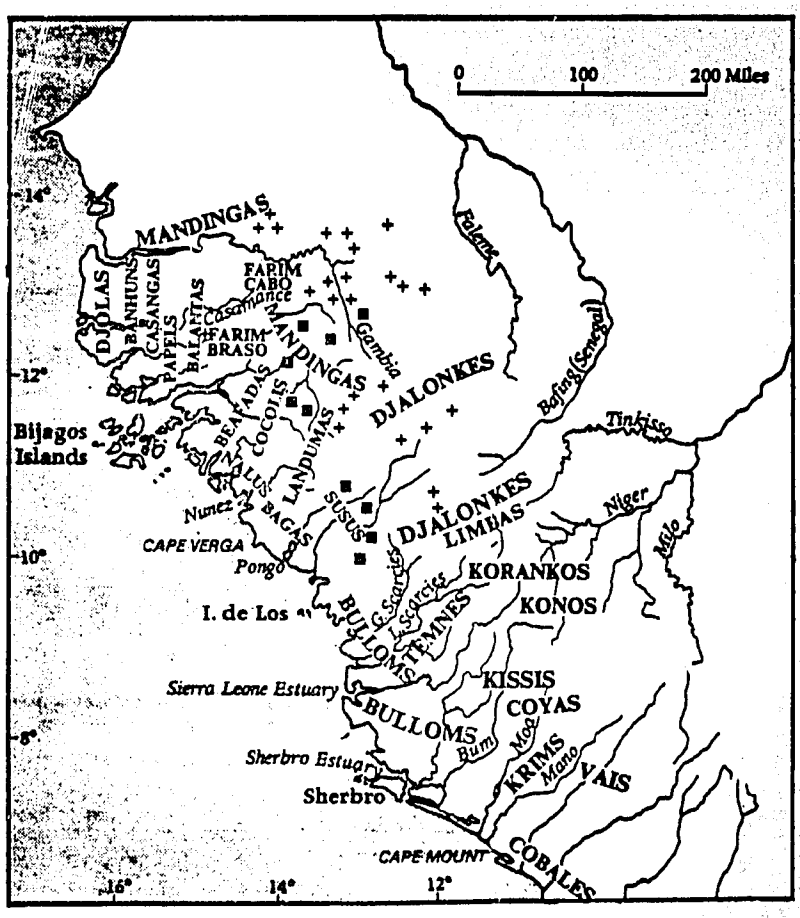


Figure 16. The Guinean Ccast during the mid-16th Century

Source: Rodney. 1970.

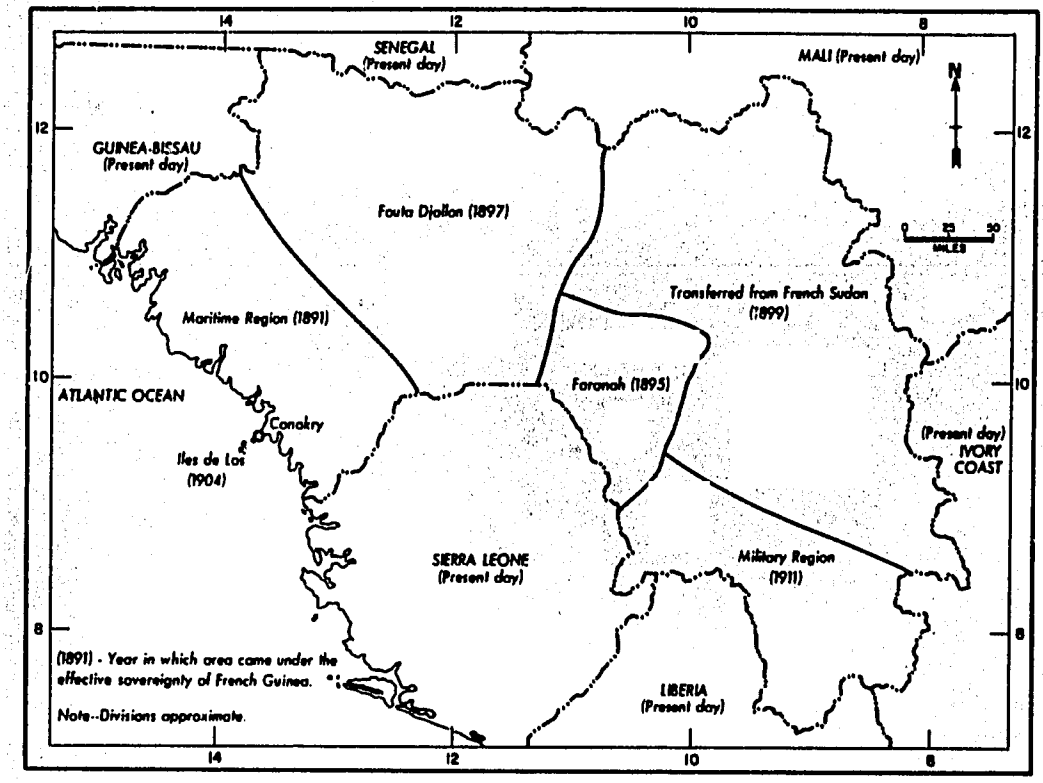


Figure 17. Stages of French Colonization

Source: Nelson, et al. 1975.

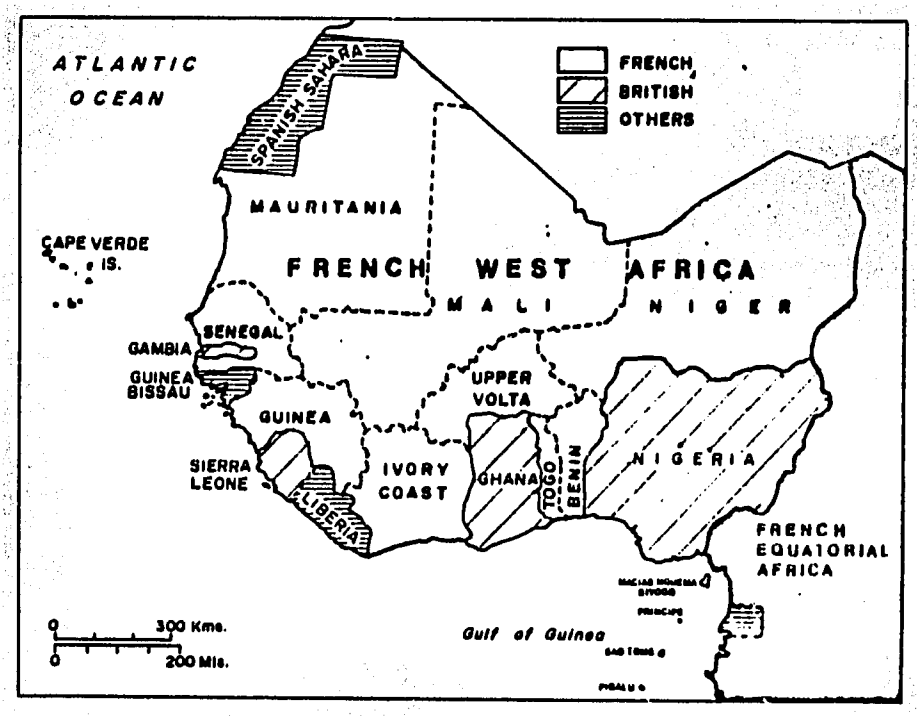


Figure 18. French West Africa, 1956

Source: Adapted from Boateng (1978).

Initially the administrative mechanism designed to effect this policy was strongly centralized. A Governor-General, seated first in St. Louis, later in Dakar, was given nearly autocratic power over the entire colonial empire known as French West Africa (Afrique Occidentale Française). His authority devolved to Lieutenant-Governors, vested with similar powers over individual colonies (such as Guinea). By the 1910s, however, it had become evident to the Ministry of Colonies in Paris that further decentralization was required. Accordingly, a hierarchy was developed. Beneath the Lieutenant-Governors were: Commandants de cercle (the equivalents of district commissioners in the British colonies); Chefs de subdividions (local French administrators); and African chiefs or headmen, the latter sometimes appointed by the administration, sometimes through legitimate hereditary succession.

Through this administrative system, the population was to "assimilate" French cultural values. Not surprisingly, this ideal remained largely unattainable. Although the French sought to impose their own standards of legalism, indigenous jurisdiction nevertheless persisted at the local level, sometimes clandestinely.

With a brief interlude from 1940 to 1942 under the collaborationist Vichy government, the administration of Guinea continued through the 1950s. In 1956 the Fourth Republic decreed the loi cadre, establishing local governments in each of the West African colonies. Two years later the new government of Charles de Gaulle proposed a federated Franco-African Community with limited autonomy for each of the constituent colonies. In a celebrated referendum, Guinea, under the leadership of Ahmed Sékou Touré, became the only African territory to reject the confederation. The consequence of this vote was immediate and total independence from France--achieved on October 2, 1958--without any of the economic benefits promised to signators. Only recently, after more than two decades of alienation from France, has Guinea entered into limited rapprochement with its former colonial master (Africa Diary 1982).

Independent Period. Guinea's decision not to participate in France's postcolonial experiment in cooperation propelled the nation into what has been termed a "cocoon of secretive isolation" (New African 1978). Pursuing an indigenous form of socialism, the country has been guided since independence by the only legal organized political party, the Party Democratique de Guinée (PDG, or Guinean Democratic Party), under the continuous leadership of President Ahmed Sékou Touré. Throughout the early 1960s Guinea aspired to a leadership role among emerging independent African states. The Guinean model of socialist self-sufficiency was promoted among neighboring states.

The country's refusal to participate in the western world economy led to increasing isolation, however. Eventually, Guinea turned to the Eastern Bloc for economic assistance and commerce. Nevertheless, the nation sought meticulously to preserve its neutrality and its own path to economic and social development. Although most observers believe that the PDG has achieved only moderate success in implementing its goals for Guinean prosperity, the policies devised in 1958 generally were adhered to until the late 1970s.

In 1978, after twenty years of ideological consistency, the government began to pursue a more pragmatic approach to international relations, regional cooperation, and economic development. A new sense of liberalism and a willingness to open previously closed dialogues became apparent as the President signaled his intention to reconsider Guinea's future direction (New African 1978). This recent policy shift is manifest in the numerous contracts entered into by Guinean agencies and government corporations with foreign (principally Western) industrial and agricultural firms (Africa Research Bulletin 1980-82).

2.2.2 Ethnicity and Language 6/

Ethnicity. Guinea's population is ethnically diverse, but not as varied as that of some neighboring states. In the broadest sense, the population consists of two primary groups of approximately equal social significance and size (Malinké and Peul) and two secondary groups also of roughly equal importance (Susu and "forest people"). Table 6 summarizes the chief characteristics of these four ethnic communities.

In addition to these four groups, some twenty others account for the remainder of Guinea's population. Generally, these communities are associated with distinct regions within the country. As Figure 19 illustrates, the Susu (Soussou) primarily inhabit southern Lower Guinea; the Peul, the Fouta Djallon in Middle Guinea; the Malinké, the savanna highlands of Upper Guinea; the various forest people, the southeastern Forest Region; and the twenty or so other societies are distributed throughout the country (Rivière 1977; Kurian 1982).

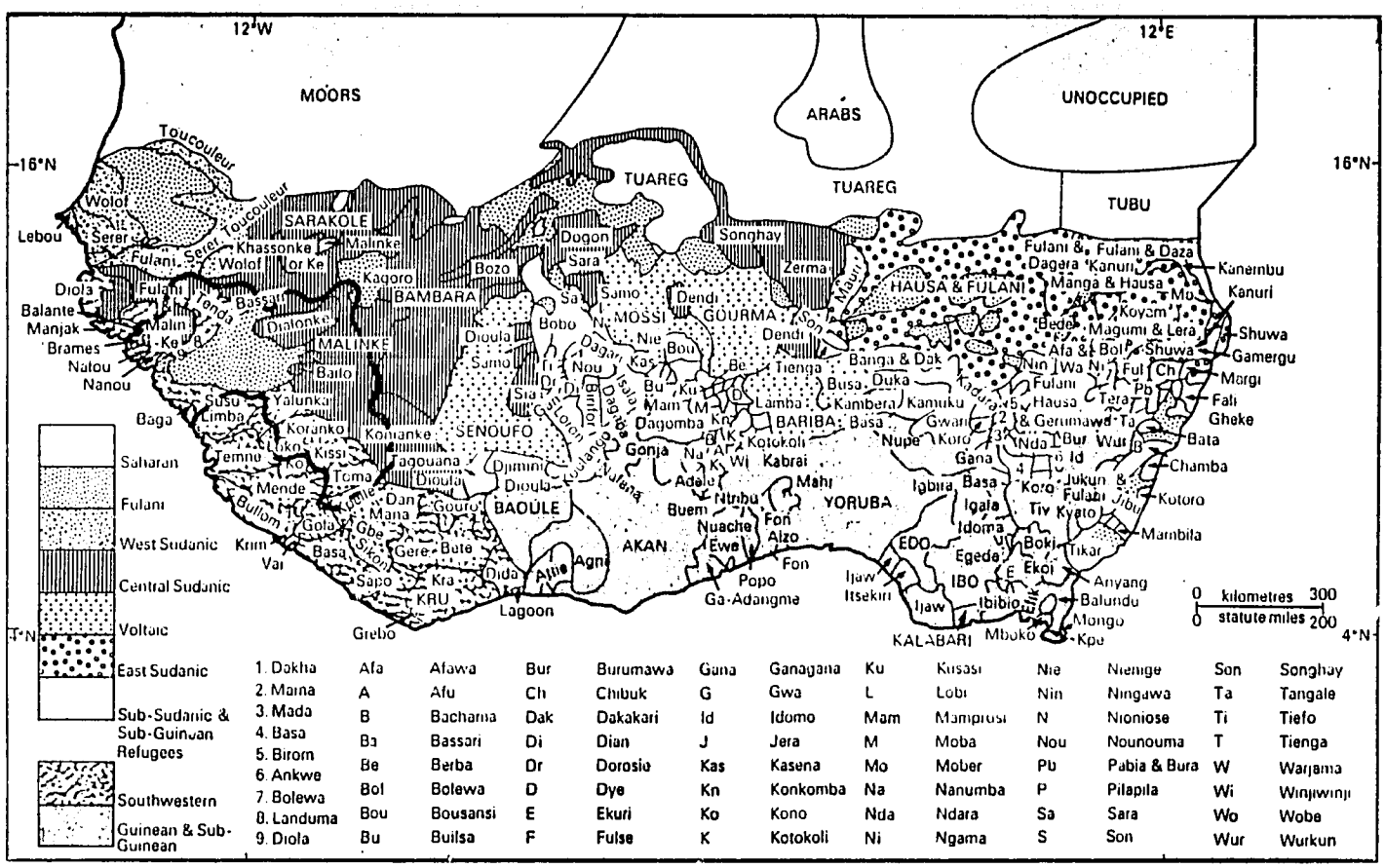
6/ Sources: Derman. 1973.
GNCU. 1979.
Hopkins. 1973.
Kurian. 1982.
Nelson, et al. 1975.
Rivière. 1974.
Rivière. 1977.
Suret-Canale. 1970.

Table 6. Sociocultural Characteristics of Selected Guinean Peoples

Characteristics	Ethnic groups (percentage of total population)*			
	Peul (30%)	Malinké (30%)	Susu (16%)	Forest peoples (18%)
General psychological characteristics	Devoted to cattle; of noble character; respectful of chief's authority; suspicious; discreet; individualistic	Trading ability; ingenuity; leadership qualities; accustomed to farming and mining	Adaptable; conciliatory but at times belligerent; exuberant; garrulous; indolent	Hard-working; morally upright; true to ancestral customs; crude in manner; terrified of the supernatural
Social stratification	Society strongly hierarchized into nobles, freemen, craftsmen, and serfs	Distinctions based on occupations as farmers, traders, and artisans, and according to generations	Accessible to outside influences; no strong traditional divisions; adapt easily to modern economy	Democratic institutions; important roles played by hunters, sorcerers, secret societies
Family structure	Patriarchal, albeit allowing women relative independence; considerable inbreeding	Patriarchal; families customarily submissive to their chiefs	Intense community feeling; frequent crossbreeding; lax sexual morality	Age-oriented, domination by elderly; matrilinear traces; important role of maternal uncle
Village organization	Loose-knit; villages of freemen and of slaves, economically interdependent	Descendants of original inhabitants hold highest rank	Strong solidarity; open-minded; cooperative	Integrated, but within narrow framework of village and family
Major occupations	Seminomadic herding; cultivation of *tapades* (small gardens)	Food-crop farming; plantation agriculture, using draught animals; trading	Food-crop and plantation agriculture (bananas, pineapples, palm kernels); sea and river fishing; wild-produce gathering	Farming in forest clearings by slash-and-burn method; coffee culture; gathering of wild palm kernels and colas
Principal crafts	Leatherworking; woodworking; embroidery	Blacksmith work; jewelry manufacture; pottery; weaving	Dyeing; basketry; crafts such as cabinet-making, mechanics, upholstering	Basketry; weaving, on vertical looms; arms manufacture
Nourishment	Meager; *fonio*, curdled milk, honey, sweet potatoes	Average; rice, millet, corn, shea butter	Varied; rice, fish, cassava, palm oil	Varied; yams, corn, rice, tubers, caterpillars, game
Housing	Scattered dwellings despite fairly dense population; family compounds, with small, separated, circular houses; shepherds' huts	Big villages composed of family compounds of spacious fenced-in houses	Large communal barracks open to countryside; small villages dotted along roads; good household equipment	Tiny villages dispersed in forest, off beaten track; separated according to clans; small round huts of clay and straw; grain storage under thatched roofs
Aesthetics	Women style-conscious—special hair style, skin incisions at outer eye corners	Highly developed musical art; instruments are *balafon* and *cora* (lute); many *griots* (minstrels)	Important expensive ritual festivities of baptism and marriage, with dancing	Drumming and whistling style of guttural communication, more rhythmic than melodic in sound; fetishist initiation rites in sacred forest; masks
Language	Poular, with one vocabulary of respect, the other for ordinary speech	Mandé-tan	Mandé-fu; poorer vocabulary and simpler grammar than Mandé-tan	Various paleonegritic languages; some similarities to Mandé-fu
Predominant religion	Islam widespread; main brotherhoods Tidjaniya, Qadrya Bekkaya near Touba; many Koranic schools	Archaic form of Islam; Qadrya and Tidjaniya brotherhoods; influence of Kankan; vestiges of fetishism	Modern Islam; mainly Qadrya Bekkaya brotherhood; lax religious practices; fetishist residue	Fetishism diluted by Islam and even more by Christianity

* According to Kurian (1982).

Source: Rivière. 1977.



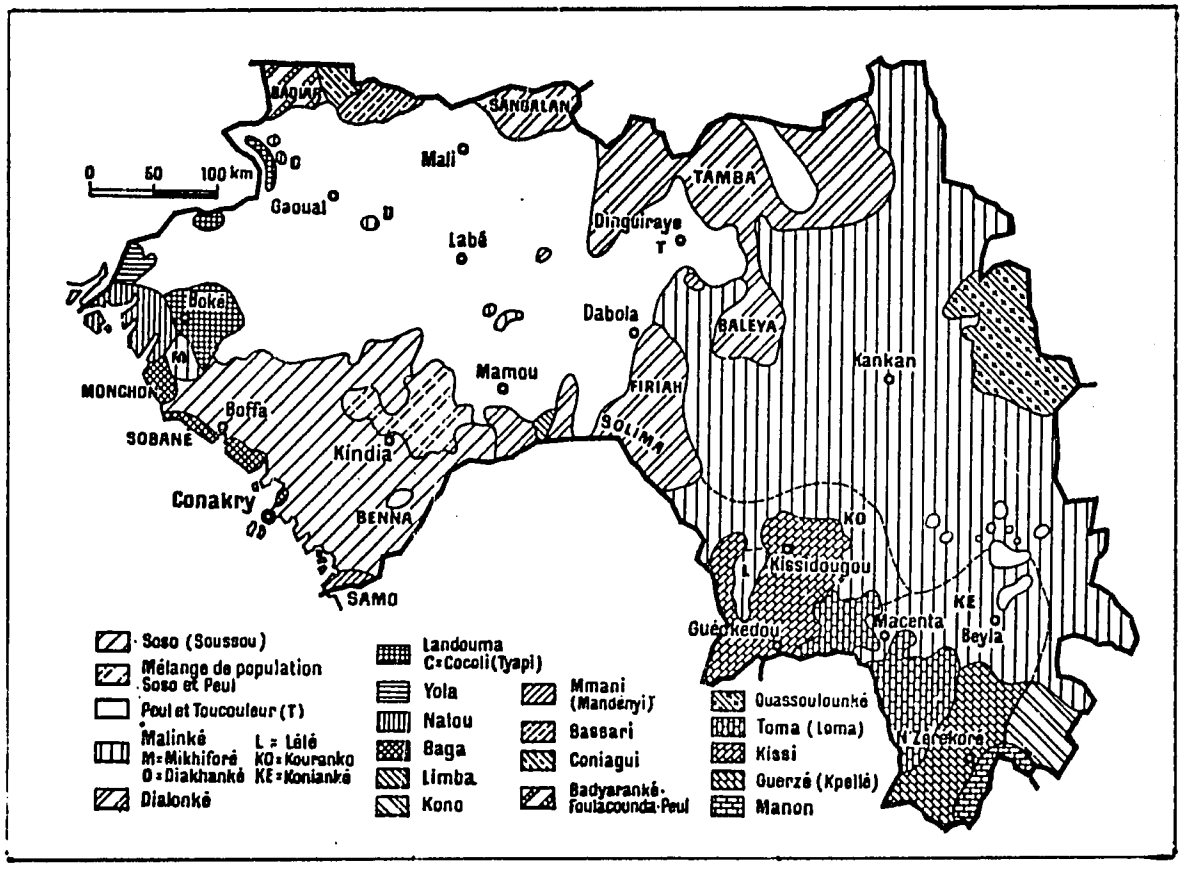


Figure 19. Ethnic Groups of West Africa (above) and Guinea (below)

Sources: Top: Adapted from Hopkins (1973).
Bottom: Suret-Canale. 1970.

The different terrains as well as the diverse origins of these communities dictate varying habitats. These range from street villages on offshore sandbars (the Baga); to cluster villages in forested areas (the Susu and most forest peoples); to grouped villages ringed by scattered hamlets in the Fouta Djallon region (the Peul, Dialonké, Bassari, Badiaranké, Diakanké, and others); and in the extreme, to the urban environment of metropolitan Conakry which has grown rapidly since independence (GNCU 1979).

Language. The distribution of spoken languages closely mirrors the distribution of ethnic communities. Among the two dozen vernacular languages and numerous dialectical variants, eight have been selected as national languages. Listed alphabetically, these are: Bassari, Coniagui, Guerze, Kissi, Malinké, Poular (the language of the Peuls), Susu, and Toma. According to one accepted system of classification, all the languages of Guinea are either in the West Atlantic family (including Poular) or in the Mande family (including Malinké and Susu). Among these, Poular, Malinké, and Susu--the languages of the largest ethnic groups--are employed as lingua franca within extensive regions. Since 1968 school instruction has been in the national languages.

Although Guinea refused to join the French Community and anticolonial sentiment has been fanned by the administration, the nation nevertheless adopted French as the only official language. All government business is conducted in French. While French is understood by approximately one in five literate Guineans, adult literacy is barely 20 percent (World Bank 1982). French thus remains a predominantly elite mode of communication, understood by just four percent of the population. Guinea's language policy is discussed at length in a recent text prepared by the Ministry of Education and Culture (GNCU 1979).

Most of the indigenous languages have remained purely oral tongues. During the present century, however, a number of these languages have adopted modified Latin or Arabic alphabets. In the case of Poular and the other major tongues, this move has generated a rich and broad body of literature.

According to one measure of linguistic and ethnic homogeneity, Guinea is ranked as the world's 19th least homogeneous nation (Kurian 1982).

2.2.3 Population Size, Growth, and Distribution 7/

According to most available sources, Ginea's 1980 population was between 5.3 and 5.4 million persons (Kurian 1982; World Bank 1982; U.S. Dept. State 1980). If past statistics are any indication, these figures are subject to substantial variation attributable to questionable census practices (for example, enumerating Guinean expatriates). Table 7 shows the growth of Guinea's population since 1950, while indicating the extent of variations in measurement and estimation techniques.

Currently, if the 1980 figure is accurate, Guinea ranks as Africa's 25th most populous nation, ahead of 13 other countries. Its present estimated population growth rate of 2.8 percent (World Bank 1982) is about average for the continent, though high by world standards. If the growth rate continues through the end of the century, Guinea can expect to have seven million inhabitants by the end of this decade, and nine million by the year 2000. The World Bank estimates that Guinea's population may not stabilize until 2130, at which time there would be as many as 28 million inhabitants, five times the current population.

In 1980, 19 percent of the population was urban, as compared to just ten percent two decades earlier. Indeed, as in most developing countries, the average annual growth of the urban population far exceeds the overall average population growth rate (6.1 percent vs. 2.8 percent). Conakry, the nation's capital and major urban center, is the principal magnet drawing rural residents. In 1980, 80 percent of all urban dwellers lived in Conakry, the only city of over 500,000 persons. Since 1959, just after independence, Conakry's population has grown from 78,000 to 412,000 in 1974, to a current estimated size of more than 800,000 for the metropolitan area.

Guinea's average population density of 21.7 persons per sq km is not particularly high by African standards (Rwanda's roughly equal population, for example, subsists on approximately one tenth the area of Guinea; among West African States, Guinea's population density is sixth lowest of fifteen). As Table 1 indicates, Guinea's nearly five and a half million residents are far from uniformly distributed across the land. Apart from the Conakry metropolitan zone, average population density varies from a low of seven persons per sq km in Kouroussa administrative

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7/ Sources: Brasseur. 1976.
Kurian. 1982.
Rivière. 1977.
World Bank. 1982.

Table 7. Population, 1950 to 1980, according to Various Sources

Year	Boateng. 1978.	Brasseur. 1976.	Europa. 1981b.	GNCU. 1979.*	Harrison Chruch. 1980a.	Kurian. 1982.	Riviere. 1977.	U.S. Dept. Commerce. 1979.	USAID 1976.	U.S. Dept. State. 1980.	World Bank. 1982.
1950								2.466			
1955							2.570	2.734	3.080		
1960							3.072	3..067	3.300		
1965		3.300					3.510	3.510	3.570		
1970						3.921	4.069	4.069	3.930		
1972				5.143					4.090		
1974			4.309						4.280		
1975	4.416		4.416					4.714	4.380		
1976			4.527								
1977			4.643		4.643						
1978			4.763								
1979			4.887					5.275			
1980						5.351				5.300	5.400

*Based upon official 1972 census.

Sources: As indicated.

Table 7. Population, 1950 to 1980, according to Various Sources

Year	Boateng. 1978.	Brasseur. 1976.	Europa. 1981b.	GNCU. 1979.*	Harrison Chruch. 1980a.	Kurian. 1982.	Riviere 1977.	U.S. Dept. Commerce. 1979.	USAID. 1976.	U.S. Dept. State. 1980.	World Bank. 1982.
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1974			4.309						4.280		
1975	4.416		4.416					4.714	4.380		
1976			4.527								
1977			4.643		4.643						
1978			4.763								
1979			4.887					5.275			
1980						5.351				5.300	5.400

*Based upon official 1972 census.

Sources: As indicated.

region of Upper Guinea, to a high of 54 persons per sq km in Labé in the central Fouta Djallon in Middle Guinea (Table 1). Figure 20 shows the distribution of population density in Guinea according to the 1972 census. Since that time overall population has increased by about 25 percent and regional densities can be expected to have risen accordingly.

The mean age in Guinea is approximately 17 (the median age is 18.2 years; Kurian 1982), and as the population grows, this age is dropping. According to USAID (1982c), 44 percent of Guineans are less than fourteen years of age; 24 percent are between 15 and 30; 29 percent are between 31 and 65; and only three percent are older than 65. The World Bank (1982) lists average life expectancy at birth at just 45 years. At present a majority of Guineans are female (50.5 percent), but this was not always the case. In 1950 about 50.4 percent of the population was male (USAID 1982c). The change is no doubt due to male laborer migration abroad.

2.2.4 Migration 8/

Historically all of West Africa, and Guinea, in particular has sustained a high degree of human mobility. For many centuries the populations that now inhabit the area have been continuously migrating and intermarrying. As historian A.G. Hopkins (1973) has observed, the mobility of the labor force has been an established characteristic of the region's economy, by far predating European colonialism. Pastoralism, transhumance, migratory drift, shifting cultivation, hunting, and endemic marriage practices have all encouraged exceptional levels of communal mobility. In the traditional social and occupational patterns of West African societies, migration made economic sense.

During the present century, new industries and agricultural systems have created seasonal demands for labor that transcend national and internal administrative boundaries. The demands of plantations in the Ivory Coast, for example, have been manifested in all the neighboring states. Similarly, groundnut farms in Gambia and Senegal (now Senegambia) have drawn large numbers of wage laborers from Guinea. Other Guinean laborers have migrated seasonally to work in Liberia and Sierra Leone, while cattle herders

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8/ Sources: Amin. 1974.
Byerlee. 1980.
Hopkins. 1973.
Kurian. 1982.
Nelson, et al. 1975.
White and Gleave. 1971.

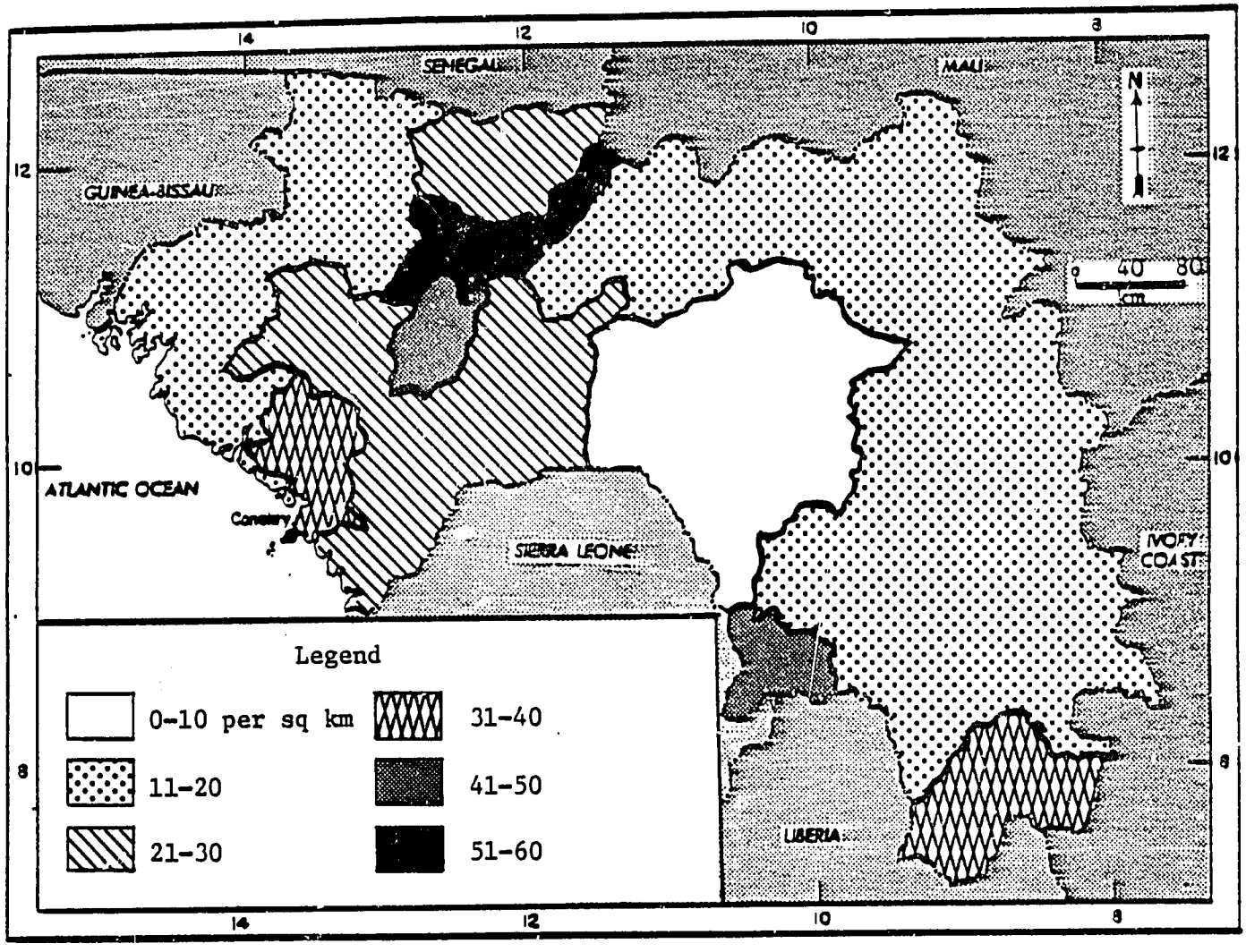

Figure 20. Population Density prior to 1972*

* Boundaries of zones shown are based upon densities in Guinea's administrative regions.

Source: Drawn by author from data in Table 1.

seeking pastures generally cross borders undisturbed. Finally, since independence, reportedly large numbers of Guineans have become exiled in other West African countries, allegedly for political reasons. The total number of emigrants--seasonal and permanent--has not been estimated accurately. In the context of the vast social migrations of previous centuries, however, current levels of movement remain relatively small (Hopkins 1973).

Internally, migration has been essentially of two types. First, there remain established causes such as seasonal movements of herds to and from valleys and plateaus. During the present century, and particularly since independence, migration to urban centers has provided a second type of social movement. In 1920 only 15,000 Guineans, or about one percent, of a total estimated population of 1.3 million lived in towns. By 1960 the proportion had risen to ten percent, and it presently stands at nearly 20 percent (Amin 1974; World Bank 1982). The government, recognizing the problems accompanying such rapid urbanization since 1960 has repeatedly attempted to limit the number of rural migrants to the cities. Harsh measures were instituted to arrest and deport unemployed migrants. By 1970, according to most reports, these practices were abandoned as the rate of urbanization has steadied at about 6.1 percent per annum (World Bank 1982; Nelson, et al. 1975).

2.3 Land Use

2.3.1 General Features 9/

Table 8 summarizes the functional allocation of land in Guinea between 1960 and 1979. The data appearing in the table are derived from FAO surveys, and it should be noted that the total area shown differs slightly (by 32,800 ha, or 0.13 percent, for 1960 to 1978) from the figure in Table 1.

While the tabulation indicates relative stability of national land use patterns from independence to 1978, a quick glance at the 1979 figures suggests drastic changes in official classification criteria in 1979. Between 1961 and 1979 the amount of cultivatable land, that is arable land and land under permanent crop (row 1 of Table 8), remained virtually constant at approximately 4.1 million ha. Of that total, more than 98 percent was considered arable (see Table 8, note a). Similarly, throughout this

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9/ Sources: Europa. 1981b.
FAO. 1964.
-----. 1976.
-----. 1981a.

Table 8. Land Use, 1960 to 1979

Row	Land Type	Area											
		1960[f]		1961-65[g]		1969[g]		1974[g]		1978[h]		1979[i]	
		1,000 ha	%	1,000 ha	%	1,000 ha	%	1,000 ha	%	1,000 ha	%	1,000 ha	%
1.	Arable & under permanent crop	—	(0.0)	3,950	(16.1)	4,100	(16.7)	4,150	(16.9)	4,170	(17.0)	1,570	(6.4)
2.	Arable land[a]	—	(0.0)	3,880	(15.8)	4,030	(16.4)	4,080	(16.6)	4,100	(16.7)	1,500	(6.1)
3.	Land under permanent crop[b]	—	(0.0)	70	(0.3)	70	(0.3)	70	(0.3)	70	(0.3)	70	(0.3)
4.	Permanent meadows & pastures[c]	—	(0.0)	3,000	(12.2)	3,000	(12.2)	3,000	(12.2)	3,000	(12.2)	3,000	(12.2)
5.	Forests & woodlands[d]	1,046	(4.3)	1,046	(4.3)	1,046	(4.3)	1,100	(4.5)	1,100	(4.5)	10,740	(43.7)
6.	Other lands[e]	23,540	(95.7)	16,594	(67.5)	16,440	(66.9)	16,336	(66.4)	16,316	(66.4)	9,286	(37.8)
7.	Total area	24,586	(100.0)	24,586	(100.0)	24,586	(100.0)	24,586	(100.0)	24,586	(100.0)	24,586	(100.0)

[a] Land under temporary crops, temporary meadows, vegetable gardens, and fallow land.

[b] Lands that do not need to be replanted after harvest; excludes timber lands.

[c] Lands used for forage or left as wild prairie for more than five years.

[d] Includes deforested land which is scheduled to be reforested.

[e] Unused but potentially productive land, and barren land, parks, roads, built-on land, and all other terrain not previously included.

[f] FAO. 1964.

[g] FAO. 1976.

[h] Europa. 1981b.

[i] FAO. 1981a.

Table 8. Land Use, 1960 to 1979

Row	Land Type	Area											
		1960[f]		1961-65[g]		1969[g]		1974[g]		1978[h]		1979[i]	
		1,000 ha	%	1,000 ha	%	1,000 ha	%	1,000 ha	%	1,000 ha	%	1,000 ha	%
1.	Arable & under permanent crop	—	(0.0)	3,950	(16.1)	4,100	(16.7)	4,150	(16.9)	4,170	(17.0)	1,570	(6.4)
2.	Arable land[a]	—	(0.0)	3,880	(15.8)	4,030	(16.4)	4,080	(16.6)	4,100	(16.7)	1,500	(6.1)
3.	Land under permanent crop[b]	—	(0.0)	70	(0.3)	70	(0.3)	70	(0.3)	70	(0.3)	70	(0.3)
4.	Permanent meadows & pastures[c]	—	(0.0)	3,000	(12.2)	3,000	(12.2)	3,000	(12.2)	3,000	(12.2)	3,000	(12.2)
5.	Forests & woodlands[d]	1,046	(4.3)	1,046	(4.3)	1,046	(4.3)	1,100	(4.5)	1,100	(4.5)	10,740	(43.7)
6.	Other lands[e]	23,540	(95.7)	16,594	(67.5)	16,440	(66.9)	16,336	(66.4)	16,316	(66.4)	9,286	(37.8)
7.	Total area	24,586	(100.0)	24,586	(100.0)	24,586	(100.0)	24,586	(100.0)	24,586	(100.0)	24,586	(100.0)

[a] Land under temporary crops, temporary meadows, vegetable gardens, and fallow land.

[b] Lands that do not need to be replanted after harvest; excludes timber lands.

[c] Lands used for forage or left as wild prairie for more than five years.

[d] Includes deforested land which is scheduled to be reforested.

[e] Unused but potentially productive land, and barren land, parks, roads, built-on land, and all other terrain not previously included.

[f] FAO. 1964.

[g] FAO. 1976.

[h] Europa. 1981b.

[i] FAO. 1981a.

period FAO reported an unchanging total of 3 million ha of permanent meadows and pastures (row 4), and a nearly constant 1.1 million ha of forested land (row 5). Finally, "other" lands (see note e) varied but slightly, dropping from 16.6 million ha to 16.3 million ha during this 18-year span.

In 1961 the government revised its classification system by changing the status of seven million ha of "other" land (29.3 percent), redistributing it among arable land and pastureland. The result of this reorganization was the matrix described above. Sometime before the 1979 figures were reported, the government undertook a similar revision, removing another seven million ha from the "other" category. This time, however, as Table 8 shows, these lands were not redistributed among arable and pastureland. Instead, the entire seven million ha of "other" lands were transfered to forestlands. In addition, another 2.6 million ha of terrain, previously considered arable, were now designated as forests and woodlands. The net result of these change were: (1) arable land dropped to 36.5 percent of its previous amount; (2) forests and woodlands grew by nearly ninefold (876 percent); and (3) "other" lands shrank by 43 percent to just 38 percent of the total (instead of 66 percent, as before).

Effectively, of course, it is unlikely that any change occurred in the actual usage of land. The significant changes noted in Table 8 were purely administrative in nature. They were implemented either: (1) to depict more realistically the modes in which land was being used (as in the case of arable land); (2) to achieve an artificially high level of forested land, and thus make it appear that land hitherto classified as unproductive "other" land was, in effect, potentially valuable; or (3) to afford a measure of official protection to land previously considered not worth protecting.

It should be noted that the new classification criteria correspond with those employed by USAID (1982c). There is reason to believe, furthermore, that 1.5 million ha more nearly represents the amount of arable land in Guinea. Some sources state the total cultivated area at an even lower figure, just 1.1 million ha (ARB 1981). Nevertheless, it may be that the amount of land presently under cultivation represents but a small fraction of Guinea's potentially cultivatable land. Some estimates place that amount at 7.4 million ha (ARB 1981).

Figure 21 provides a different perspective on land use. It shows the regions allocated for agriculture, pastoralism, and fishing. Although much of Guinea is forested, Figure 21 shows that agriculture and pastoralism are practiced almost everywhere.

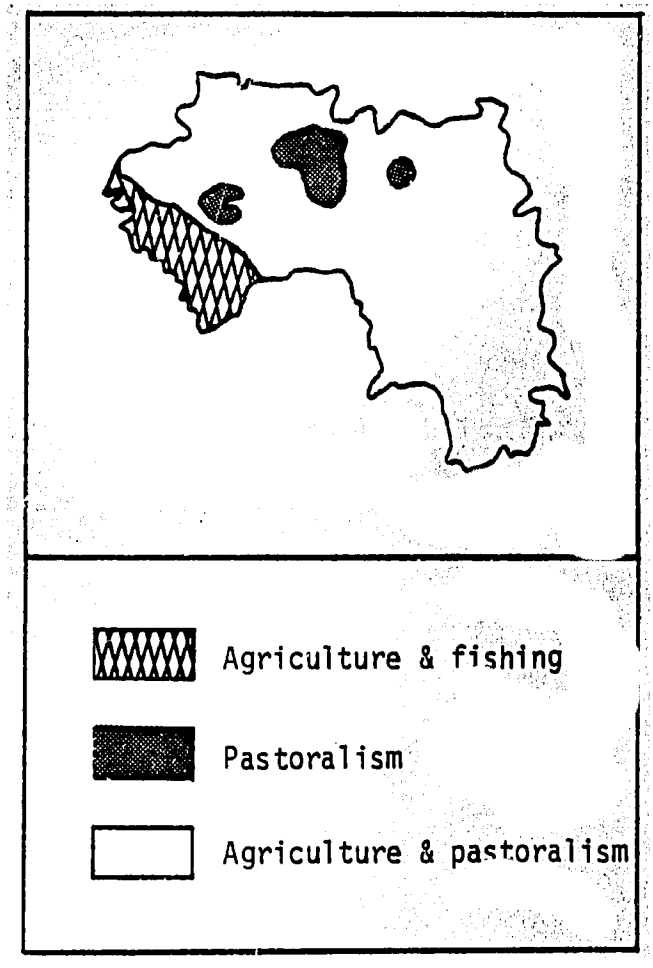

Figure 21. Functional Land Use, 1973

Source: Adapted from Davies (1973).

2.3.2 Land Tenure 10/

As in most neighboring countries, land in Guinea cannot be owned by individuals. Only the state holds title to lands. The Guinean government inherited this legacy from its predecessor, the French colonial administration. But even prior to French occupancy, lands were held communally by lineage groups. Then, as now, what mattered was not ownership, but disposal rights and use rights. Almost everywhere in Guinea, traditional modes of land tenure were usufructory.

Under colonial rule, local patterns of land tenure were modified to increase central control. Diverse tribal laws were homogenized and land control was vested in indigenous chiefs and headmen willing to cooperate with the authorities. Unused land, typically fallow land, was often reassigned and its title was assumed by the government. Since independence land tenure administration has generally devolved to village level political councils, each known as Pouvoir Révolutionnaire Local (Local Revolutionary Authority, or PRL). These councils, appointed by PDG officials in Conakry, increasingly have replaced chiefs as the agencies for reassigning land use rights.

Since the colonial period numerous community leaders and heads of lineage groups have acquired sizable landholdings through the new patronage systems. Nevertheless, most Guinean farm plots continue to conform to traditional small-scale patterns. Table 9 shows that nearly half of the nation's agricultural landholdings in 1975 were smaller than two ha, and only 15 percent exceeded five ha (see Guinea total figures). As the tabulation demonstrates, however, there is considerable regional variation in land tenure patterns. Lower and Middle Guinea exhibit the most egalitarian distribution, with under ten percent of the land as parcels of more than five ha. Middle Guinea has the largest proportion of small plots--28 percent. In Upper Guinea and the Forest Region, by contrast, 22 percent and 17 percent of landholdings are larger than five ha. At the administrative region level, two extreme features are noteworthy: (1) in Labé (Middle Guinea), 41 percent of the holdings are under one ha, and 84 percent below two ha; and (2) in Kankan (Upper Guinea), the opposite situation prevails, 52 percent of holdings exceed five ha, and 87 percent are larger than two ha.

10/ Sources: FAO. 1979.
Legum. 1981a.
McGrath, et al. 1980.
Nelson, et al. 1975.
Riviere. 1973.

Table 9. Distribution of Size of Agricultural Landholdings, 1975

	Percentage of landholdings (in relation to total cultivated area)					
	1 ha	1-2 ha	2-5 ha	5-20 ha	20+ ha	Total*
Lower Guinea (total)	15	34	43	8	1	101
Boffa	11	28	48	11	2	100
Boké	29	39	27	5	1	101
Conakry	5	46	46	3	--	100
Dubréka	12	29	52	7	1	101
Forécariah	10	25	46	19	1	101
Fria	5	30	55	10	--	100
Kindia	22	35	38	5	--	100
Télimélé	22	42	35	3	--	102
Middle Guinea (total)	28	34	25	8	2	101
Dalaba	39	27	27	7	--	100
Gaoual	34	26	35	5	--	100
Koundara	7	16	37	24	16	100
Labé	41	43	15	1	--	100
Mali	30	35	30	5	--	100
Mamou	25	43	30	2	--	100
Pita	23	30	34	13	--	100
Tougué	24	48	22	6	--	100
Upper Guinea (total)	7	24	47	22	--	100
Dabola	5	32	47	16	--	100
Dinguiraye	7	21	68	4	--	100
Faranah	5	21	51	21	--	98
Kankan	4	9	35	52	--	100
Kérouané	11	43	34	12	--	100
Kouroussa	10	23	44	23	--	100
Siguiri	5	18	51	25	--	99
Forest Region (total)	10	33	42	17	--	102
Beyla	12	39	37	12	--	100
Gueckedou	15	31	33	21	--	100
Kissidougou	1	16	57	25	--	99
Macenta	9	38	34	19	--	100
Nzérékoré	8	32	51	9	--	100
Yomou	12	39	37	13	--	101
Guinea (total)	15	31	40	14	1	101

*Totals may differ from 100 on account of rounding.

Source: McGrath, et al. 1980.

2.3.3 Agricultural Practices 11/

In spite of its relatively favorable geoclimatic features and adequate soil resources, Guinea does not produce enough food for its population of nearly 5.5 million (Kurian 1982). Although in 1980 agriculture accounted for the largest share of the GDP (37 percent) and employed 82 percent of the work force, the average Guinean obtained only 78 percent of the daily recommended minimum caloric intake (World Bank 1982). Overall, the U.S. Department of Agriculture estimates that Guinea is only 85 percent self-sufficient in food production (USDA 1981).

With more than 1.5 million hectares of land being cultivated each year (Table 8), yields are low even when compared to those of neighboring countries. Yields of cereals, for example, remain below 800 kg per ha in Guinea, compared to about 1,000 kg per ha for Africa as a whole (FAO 1981a).

What, then, are some of the reasons for low agirucltural yields? Agronomists, development specialists, and planners have offered several hypotheses for Guinea's sluggish agricultural growth (just 2.1 percent per annum during the 1960s; Hodgkinson 1981). Among the proposed reasons have been: the nation's unique form of political economy and its consequent isolation from France, and from world markets and foreign technology; shortage of foreign exhange necessary to emplace productivity-enhancing farming techniques; governmental mishandling of collectivization; and perhaps most often cited, Guinea's continuing reliance on various modes of subsistence agriculture. At independence 75 percent of Guinea's agricultural output (then Africa's highest rate) stemmed from subsistence production, and although current figures are unavailable, they likely remain among Africa's highest (Anthony, et al. 1979).

Although all of the above views reflect the bias of modern western development, they converge in citing Guinea's exceptionally persistent reliance upon traditional agricultural practices. In nearly all such cases, agricultural activities are performed at the level of the nuclear family. Only clearing is done communally. Other farming tasks are accomplished either by females (garden

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11/ Sources: Anthony, et al. 1979.
Cohen. 1980.
GNCU. 1979.
Johnston. 1980.
Kurian. 1982.
Legum. 1981a.
McGrath, et al. 1980.
Nelson, et al. 1975.
USDA. 1981.

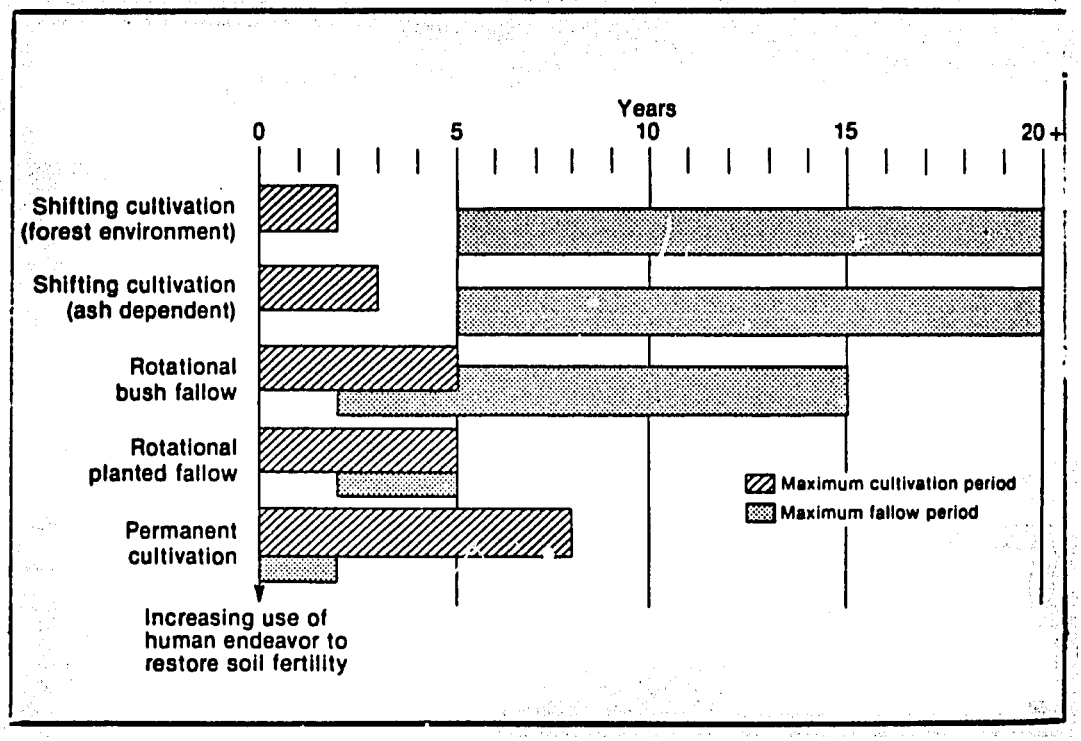
and crop planting, fertilizing, and weeding; field crop harvesting), or by males (clearing, plowing, and maintenance of land; McGrath, et al. 1980).

As in most of sub-Saharan Africa, the oldest surviving mode of intensive farming has been shifting cultivation. Employing this technique, farmers clear a forested area, plant it for two to four years, and then move on, allowing the land to regenerate by leaving it fallow for six to 12 years (Fig. 22; Ruthenberg 1980). While shifting cultivation may have seriously detrimental effects upon vegetative cover, topsoil, and timber supply, not all observers are ready to condemn the practice. Over the past decade a growing body of literature has stressed the beneficial aspects of such seemingly destructive and unproductive farming methods (Gill 1968; Hafner 1977; Eckholm 1979). It is not known what percentage of Guinea's agricultural production is the result of shifting cultivation.

A second common cultivation technique has been bush fallowing. These farming systems have evolved from shifting systems, but differ in that the cultivating societies are settled rather than migrant. Fields are typically close to the villages and some plots of land are permitted to remain fallow (Fig. 22). But under this mode of farming soil becomes depleted within a few years, and inadequate fertilization accelerates the deterioration. Bush fallow, and to a lesser degree rotational planted fallow, probably remain Guinea's principal farming modes.

Permanent cultivation systems (Fig. 22) are generally associated with adoption of innovative techniques, and therefore with higher yields. In Guinea, as in much of tropical Africa, their introduction has been difficult and consequently limited. The most successful attempts at permanent cultivation have been in Guinea's highlands (600m to 1,200 m elevation), especially east of the Fouta Djallon in Upper Guinea. In these regions Malinke villagers have grown millet, rice, and maize (Ruthenberg 1980).

Nevertheless, Upper Guinea is not the nation's most efficient producer of foods. As Figure 23 shows, cereal yields there average only between 0.4 to 0.7 metric tons per ha. It is the southern Forest Region (and two regions in Lower Guinea) that have achieved the highest cereal yields--more than 1.0 metric tons per ha. In some of these areas local cultivators employ advanced techniques such as inundated rice farming. In Kérouané and Yomou administrative regions, for example, rice yields exceed 1.5 metric tons per ha, nearly double the national average (McGrath, et al. 1980; FAO 1981a).



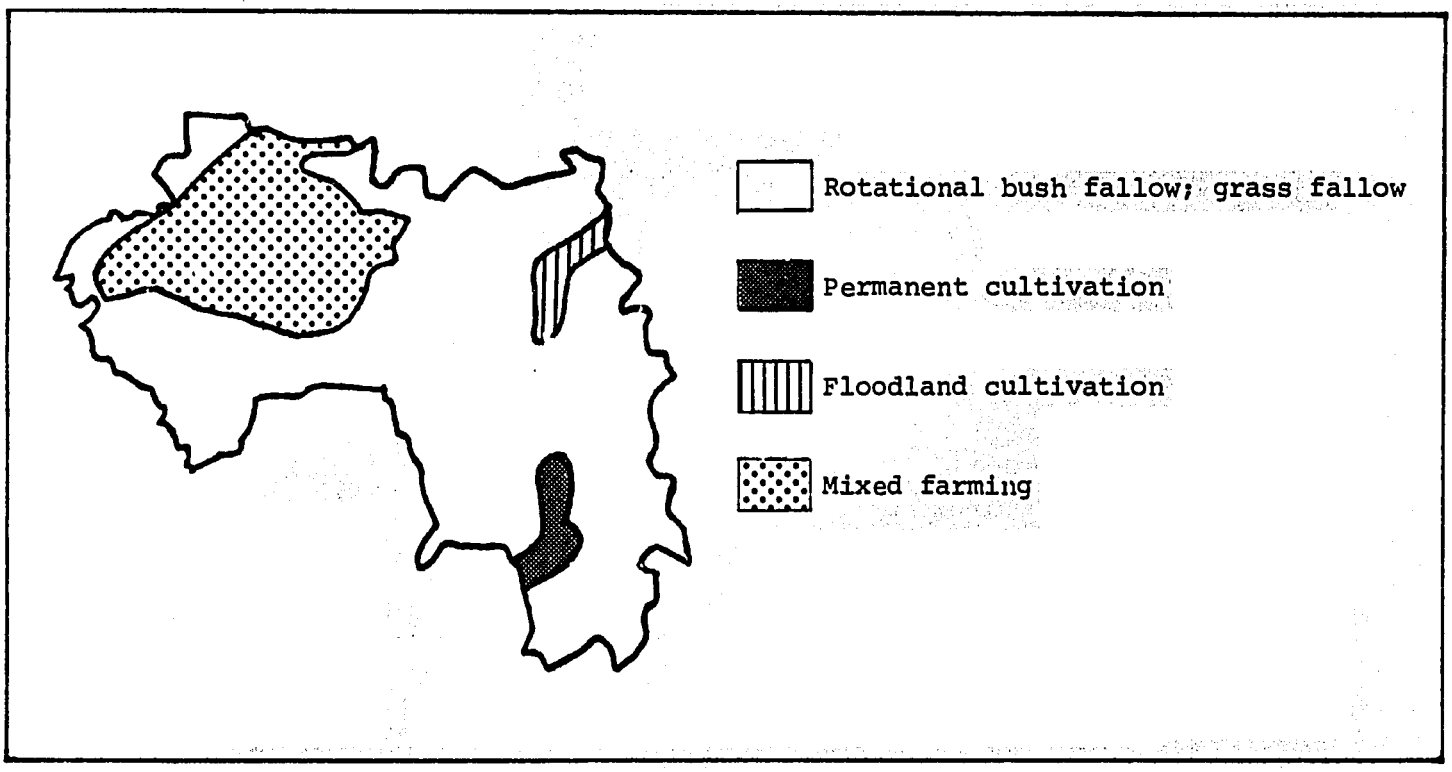


Figure 22. Traditional Farming Practices

Sources: Top: Grove and Klein. 1979.
Bottom: Adapted from White and Gleave (1971).

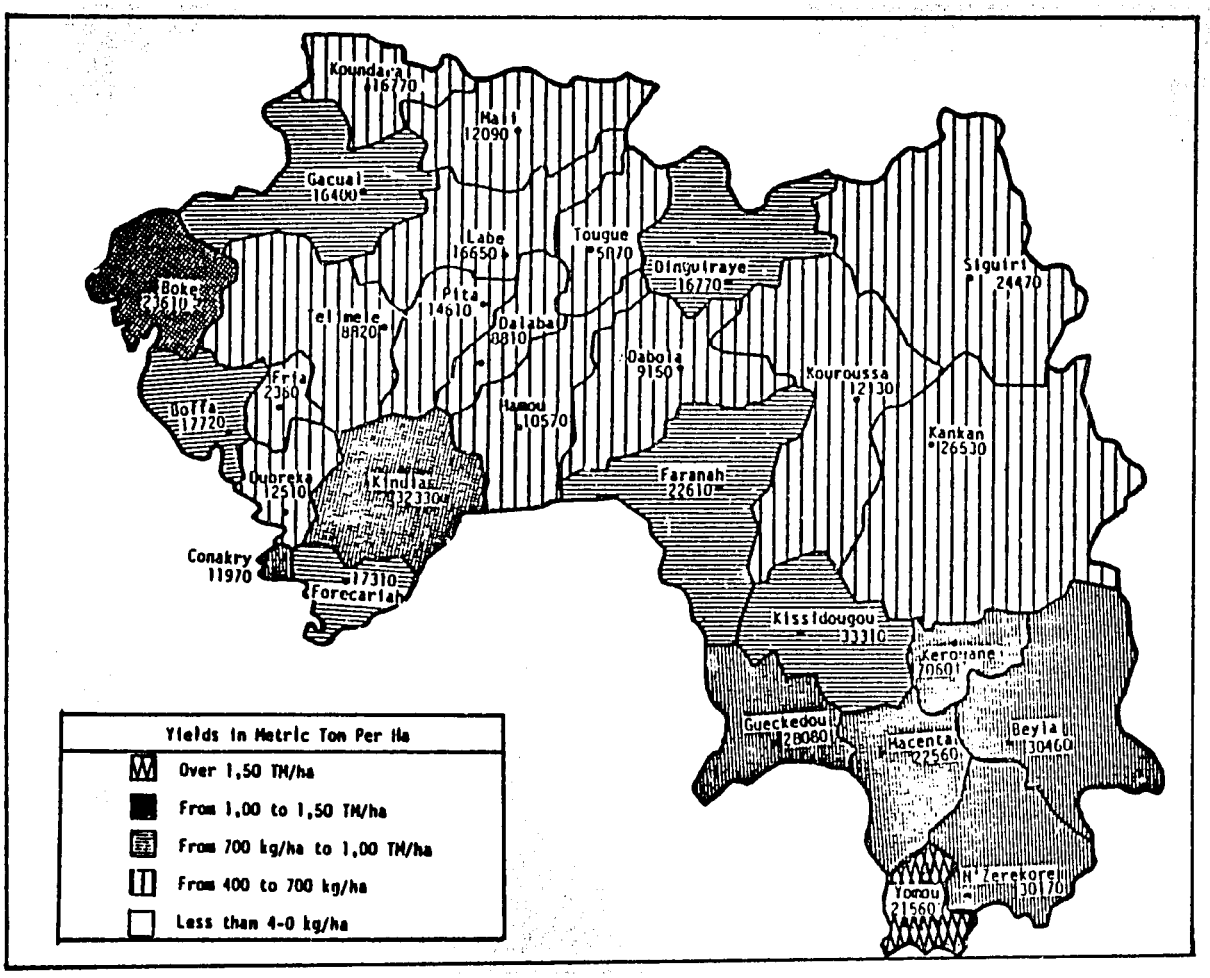


Figure 23. Cereal Yields, 1975

Source: McGrath, et al. 1980.

In 1975, the Guinean government introduced a numberof features intended to modernize the nation's modes of agricultural production. The crux of the changes was insitutitonal--replacement of a central Ministry of Agriculture with seven regional ministries of rural development, and the establishment of politically designated rural brigades. In particular, two such groupings were introduced: (1) Mechanized Production Brigades (BMP); and (2) Non-Mechanized Production Brigades (BAP). Each Local Revolutionary Authority (PRL) was assigned one BMP and one BAP. At the outset 434 pairs of such brigades were mobilized and charged with encouraging farmers to adopt such modern techniques as mechanization, fertilization, application of pesticides and herbicides, transplanting seedlings, and multiple cropping. Although the government, already in 1979, was claiming major successes for this program, other observers have been less sanguine (GNCU 1979; Kurian 1982).

More recently, the government has begun establishing district-level collectivized farms known as FAPAs (District-level Agropastoral Farms). The immediate goal was to create 250 such units (by 1980, there were 250) which are to experiment in high-yield crop production and livestock breeding, and offer agricultural extension services. At the village level, parallel establishments have been emplaced--FACs (Communal Agricultural Farms). These FACs are directed by the two previously formed brigades, BMPs and BAPs. In 1980 there were 2,400 FACs. Early results of FAC operations have been difficult to evaluate. Kurian (1982) indicates that they have yielded some successes. But USAID's Agricultural Sector Report calls the initial performance of FACs "at a minimum disappointing (McGrath, et al. 1980)."

One of the objectives of the FAPAs and FACs has been to increase production by introducing modern farming techniques. One such innovation, the use of commercial fertilizer, has not been widely implemented. Among African nations, Guinea ranks very low in fertilizer consumption. Table 10 compares Guinea's use of chemical inputs with the rest of the continent's. The figures in Table 10 also suggest that the country's consumption of fertilizer has been erratic over the past two decades, with use generally dropping.

Table 10. Fertilizer Consumption, 1961 to 1979

Type of fertilizer		1961-66		1968-69		1973-74		1978-79	
		Total (MT)	Per ha of agric. area (100 gms)	Total (MT)	Per ha of agric. area (100 gms)	Total (MT)	Per ha of agric. area (100 gms)	Total (MT)	Per ha of agric. area (100 gms)
Nitrogenous fertilizers	Guinea	600	1	600	1	200	1	200	6
	Africa	1,251,128	5	1,310,197	7	1,327,291	11	1,388,561	14
Phosphate fertilizers	Guinea	400	1	300	1	500	b	600	1
	Africa	823,768	3	863,227	5	909,651	7	914,814	9
Potash fertilizers	Guinea	500	2	400	1	100	b	200	b
	Africa	326,907	1	338,633	2	368,907	3	357,117	4
Total fertilizers[a]	Guinea	2,000	3	3,000	4	1,000	1	1,000	1
	Africa	891,000	9	1,357,000	14	2,089,000	21	2,660,000	27

[a]Inexplicably, total fertilizer consumption figures for Africa do not represent the sum of individual fertilizer consumption figures.

[b]Less than 0.5.

Source: FAO. 1980.

S2 A

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	Africa	1,251,128	5	1,310,197	7	1,327,291	11	1,388,561	14
Phosphate fertilizers	Guinea	400	1	300	1	500	[b]	600	1
	Africa	823,768	3	863,227	5	909.651	7	914,814	9
Potash fertilizers	Guinea	500	2	400	1	100	[b]	200	[b]
	Africa	326,907	1	338,633	2	368,907	3	357,117	4
Total fertilizers[a]	Guinea	2,000	3	3,000	4	1,000	1	1,000	1
	Africa	891,000	9	1,357,000	14	2,089,000	21	2,660,000	27

[a]Inexplicably, total fertilizer consumption figures for Africa do not represent the sum of individual fertilizer consumption figures.

[b]Less than 0.5.

Source: FAO. 1980.

2.3.4 Crops 12/

As section 2.3.3 has indicated, Guinea's agricultural economy relies primarily upon subsistence crop production. A number of cereals are grown--rice, maize, sorghum, millet, and fonio, an indigenous edible crabgrass seed (Digitaria exilis). Of these, only the first three have substantial lands allocated to their production and thus yield significant quantities (Tables 11 and 12). Other important subsistence crops are tubers (sweet potatoes, yams, cassava, and taro), groundnuts, seeds, fruits, and vegetables (Tables 11 and 12). In addition, several important cash crops, mostly grown on large plantations, have been produced at least since the 1940s: pineapples, bananas, sugarcane, tobacco, and most importantly, coffee.

Analysis of Table 11 shows that several crops now command far larger portions of land than they did three decades ago. Of these: maize is grown on nine times as much land as before; groundnuts on four times as much area; and cofffee on two and a half times the area. Conversely, sorghum now grows on only 2.6 percent of the area it had in 1950. A major de-emphasis of sorghum production seems to have occurred sometime between 1950 and 1961. Similarly, sweet potatoes now grow on just a quarter of their previous area. Most of Guinea's remaining crops of note have approximately the same land allocated as earlier.

Table 12, a summary of agricultural production, reflects many of the characteristics of Table 10. For most crops, changes in area allocations engendered corresponding changes in production. Additionally, in virtually all instances, there have been measurable increases in yield during the intervening decades. The one notable exception to this phenomenon, ironically, is maize. While both land devoted to maize and production have increased substantially (by 833 percent and 353 percent, respectively), production has not kept pace with increased area. Most likely, with demand for maize increasing, there is pressure to allocate more land to its cultivation. This new terrain, it would appear, is less suitable than the original areas. As a result, effective yields have been declining steadily over the past 30 years.

12/ Sources: Davies. 1973.
FAO. 1964.
-----. 1975.
-----. 1981a.
GNCU. 1979.
Harrison Church. 1980a.
Hodgkinson. 1981.
Irvine. 1969.
Kassam. 1976.
Kurian. 1982.
McGrath, et al. 1980.
Nelson, et al. 1975.
USDA. 1981.

Table 11. Area Devoted to Crops, 1948 to 1980

Crop	Average 1948-53[a]	Average 1961-65[b]	Average 1969-71[c]	1978[c]	1980[c]
Cereals	612	778	1,024	970	976
Rice paddy	339	277	411	406	400
Maize	45	328	387	420	420
Sorghum	228	10	11	7	6
Roots and tubers	*	83	81	88	94
Sweet potatoes[d]	43	23	10	10	10
Cassava	56	60	60	65	70
Pulses	*	44	50	53	54
Groundnuts, in shell	31	32	115	125	127
Sesame seed	*	2	2	2	2
Palm kernels	*	*	*	*	*
Palm oil	*	*	*	*	*
Vegetables and melons	*	*	*	-	-
Fruit, other than melon	*	*	*	*	*
Oranges	*	*	*	*	*
Pineapples	*	*	*	*	*
Bananas	4	6	*	*	*
Plantains	*	*	*	*	*
Sugarcane	*	*	*	2	2
Coffee, green	*	42	100	100	100
Tobacco leaves	1	2	2	2	2

*Nil

Notes:

[a] FAO. 1964.
[b] FAO. 1975.
[c] FAO. 1981a.
[d] Figures for 1948-53 and 1961-65 include yams.

Table 12. Production of Crops, 1948 to 1980

Crop	Amount produced (1,000 metric tons)				
	Average 1948-53[a]	Average 1961-65[b]	Average 1969-71[c]	1978[c]	1980[c]
Cereals	365	614	808	758	714
Rice paddy	208	208	364	366	350
Maize	64	281	363	320	290
Sorghum	93	7	8	4	4
Roots and tubers	*	570	632	677	682
Sweet potatoes[d]	112	136	80	72	74
Cassava	218	434	467	500	500
Pulses	*	21	26	30	30
Groundnuts, in shell	18	20	74	82	83
Sesame seed	*	1	*	*	*
Palm kernels	25	22	35	35	35
Palm oil	*	26	43	41	42
Vegetables and melons	*	*	94	113	116
Fruit, other than melon	*	*	376	414	415
Oranges	62	5	7	1	1
Pineapples	3	12	22	16	17
Bananas	57	87	82	75	70
Plantains	*	*	177	220	225
Sugarcane	*	*	*	125	165
Coffee, green	3	12	17	35	35
Tobacco leaves	1	1	1	1	2

*Nil

Notes:

[a] FAO. 1964.
[b] FAO. 1975.
[c] FAO. 1981a.
[d] Figures for 1948-53 and 1961-65 include yams.

The geographical distribution of Guinea's chief subsistence crops is shown on Figures 24 and 25. Inferior grains (chiefly sorghum) dominate in Middle and Upper Guinea, while rice is grown mainly in Lower Guinea. Yams and cassava are produced extensively in the Forest Region, where cultivation of roots and tubers generally dominates (Fig. 25). In addition, the maps do not show that: maize is now grown throughout the country; groundnuts are popular in the northern belt including Koundara, Gaoual, Dabola, and Dinguiraye regions (Fig. 1); vegetables are grown in the vicinity of most towns, especially Dalaba, Kankan, Kindia, Labé, Mamon, and Pita (Fig. 1); and fruits are cultivated near settlements in Middle and Upper Guinea (GNCU 1979). Among Guinea's cash crops: coffee grows almost exclusively in the mountains of the southern Forest Region; sugarcane plantations are mostly in Dubreka region in Lower Guinea; pineapples and bananas grow mainly in Forecariah and Kindia regions; and, tobacco and some tea occur in the Forest Region (Davies 1973; Nelson, et al. 1975). A detailed tabulation of acreage, production, and yields of Guinea's major crops appears in Appendix II.

2.3.5 Rangeland and Livestock 13/

Because many of the groups who settled in Guinea were principally cattle-raising communities, animal husbandry remains an important means of livelihood. As Figure 21 illustrates, pastoralism--sometimes alone, sometimes in conjunction with agriculture--is present everywhere but along the coastal strip.

Both transhumant and sedentary livestock raising are common. Migratory breeding is principally an activity of Fulani (Peul) and Malinké herdsmen, who guide their cattle seasonally between the western spurs of the Fouta Djallon and parts of the coastal lowlands (Fig. 26). Permanent cattle farming occurs mostly in the central Fouta highlands and their eastern extensions, and in the savannas of Upper Guinea.

North of the trypanosomiasis (tsetse) infested zone (about 12°N latitude), humped zebra cattle prevail. These are large and productive, but cannot survive in the tsetse belt. Their numbers in Guinea are consequently limited. A

13/ Sources: GNCU. 1979.
Harrison Church. 1980a.
Kowal and Kassam. 1978.
Kurian. 1982.
Nelson, et al. 1975.
Suret-Canale. 1970.
White and Gleave. 1971.

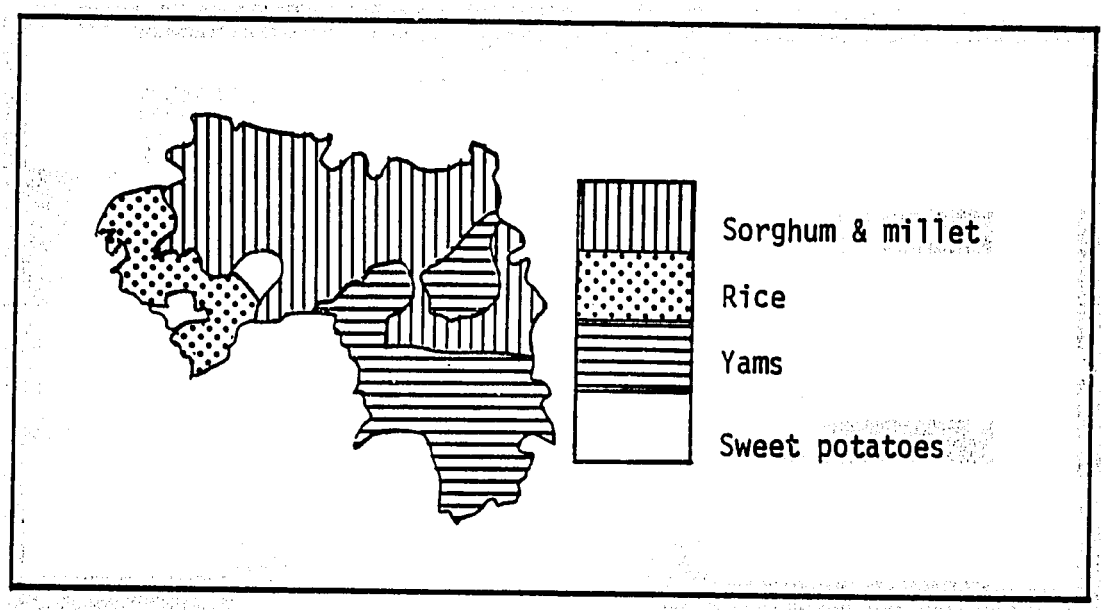

Figure 24. Dominant Subsistence Crops, 1973

Source: Adapted from Davies (1973).

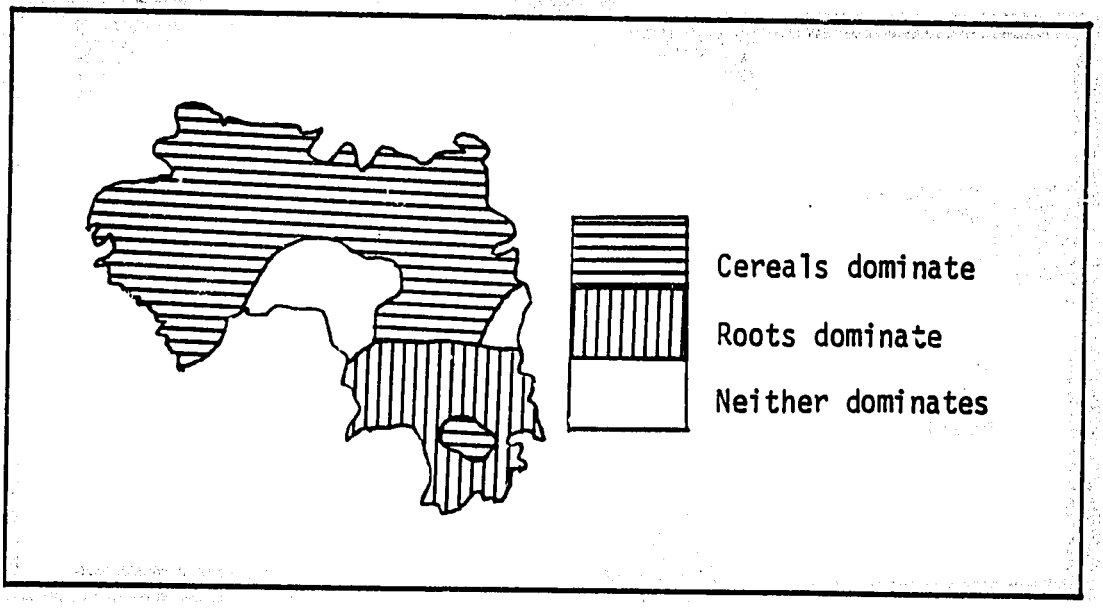

Figure 25. Dominance of Cereals and Roots, 1973

Source: Adapted from Davies (1973).

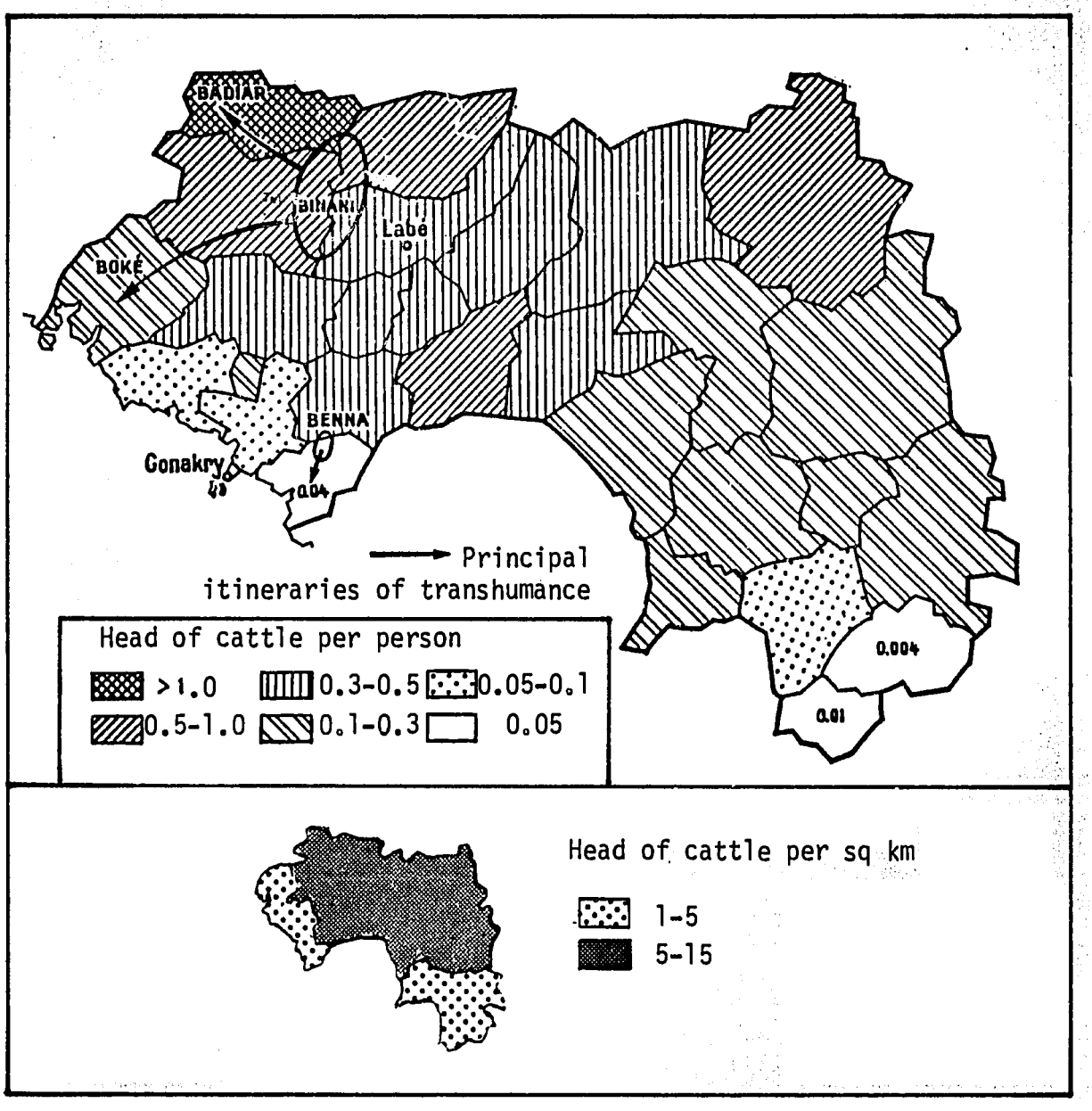

Figure 26. Cattle Density and Transhumance, 1967

Sources: Top: Suret-Canale. 1970.
Bottom: Davies. 1973.

smaller, more resilient breed known as ndama predominates throughout the rest of the country. Figure 26 shows the distribution of density of cattle in 1967. Since that time, human and cattle populations have grown at approximately the same rate (four percent per year). Except for changes in density brought about by permanent human migration, therefore, the current cattle density distribution would not appear significantly different. Table 13 shows the growth of Guinea's herds between 1948 and 1980. The substantial reduction in cattle population between 1961-65 and 1969-71 is attributable to a bovine epidemic during this period.

Among non-bovine livestock, the number of horses has remained constant at approximately 1,000 head, while the number of asses has risen by 50 percent. The growth of porcine, ovine, caprine, and fowl populations has been much more noteworthy. This phenomenon is partly the result of conscious government efforts to encourage livestock breeding. Experimental and operational farms have been established to raise all of these domesticated species.

Table 13. Livestock Population, 1948 to 1980

Livestock	Number (1,000 head)				
	1948-53[a]	1961-65[b]	1969-71[c]	1978[c]	1980[c]
Horses	1	1	1	1	1
Asses	2	2	3	3	3
Cattle	550	1,461	1,300	1,650	1,760
Pigs	3	18	26	36	39
Sheep	115	364	323	425	437
Goats	141	374	342	388	405
Chickens	*	3,300	3,733	6,000	7,000

*Not available

Notes:

[a] FAO. 1964.
[b] FAO. 1976.
[c] FAO. 1981a.

3.0 Environmental Resources and Policy

3.1 Geology, Soils, and Mineral and Energy Resources

3.1.1 Geologic Formations [14/]

The three maps shown on Figure 27 indicate the principal geologic formations and lithological features of Guinea. Seen in a regional context (top left of Fig. 27), most of Guinea's surface consists of the most ancient rock formations--Pre-Cambrian. The remainder of the country's basement complex was formed somewhat later, during the Primary period.

The Pre-Cambrian zone lies in the eastern half of Guinea, reaching as far west as Kindia, just 100 km from the coast. This region represents the westernmost extent of the Pre-Cambrian massif of the African plateau. The composition of this massif varies, but in Guinea the rocks are almost exclusively metamorphosed sediments and igneous intrusions. As Figure 27 (top right and bottom) shows, igneous granites prevail through most of the Pre-Cambrian areas. In the south, these formations are interrupted by basement complexes of metamorphic gneiss, schists, and quartzites. In the northeastern corner, the prevalent bedrocks are Birrimian schists and micaschists.

The western areas, where the basement complex is of Primary origin, exhibit a more varied lithology (Fig. 27). There are: Infra-Cambrian, Cambrian, Ordovician, and Devonian sandstones; Gothlandian and Archean schists; coastal Quartenary alluvia; and several minor localized formations.

[14/] Sources: Ahn. 1970.
Choubert and Faure-Muret.1971a.
-----. 1971b.
FAO-UNESCO. 1977.
Harrison Church. 1980a.
Pritchard. 1979.
Suret-Canale. 1970.

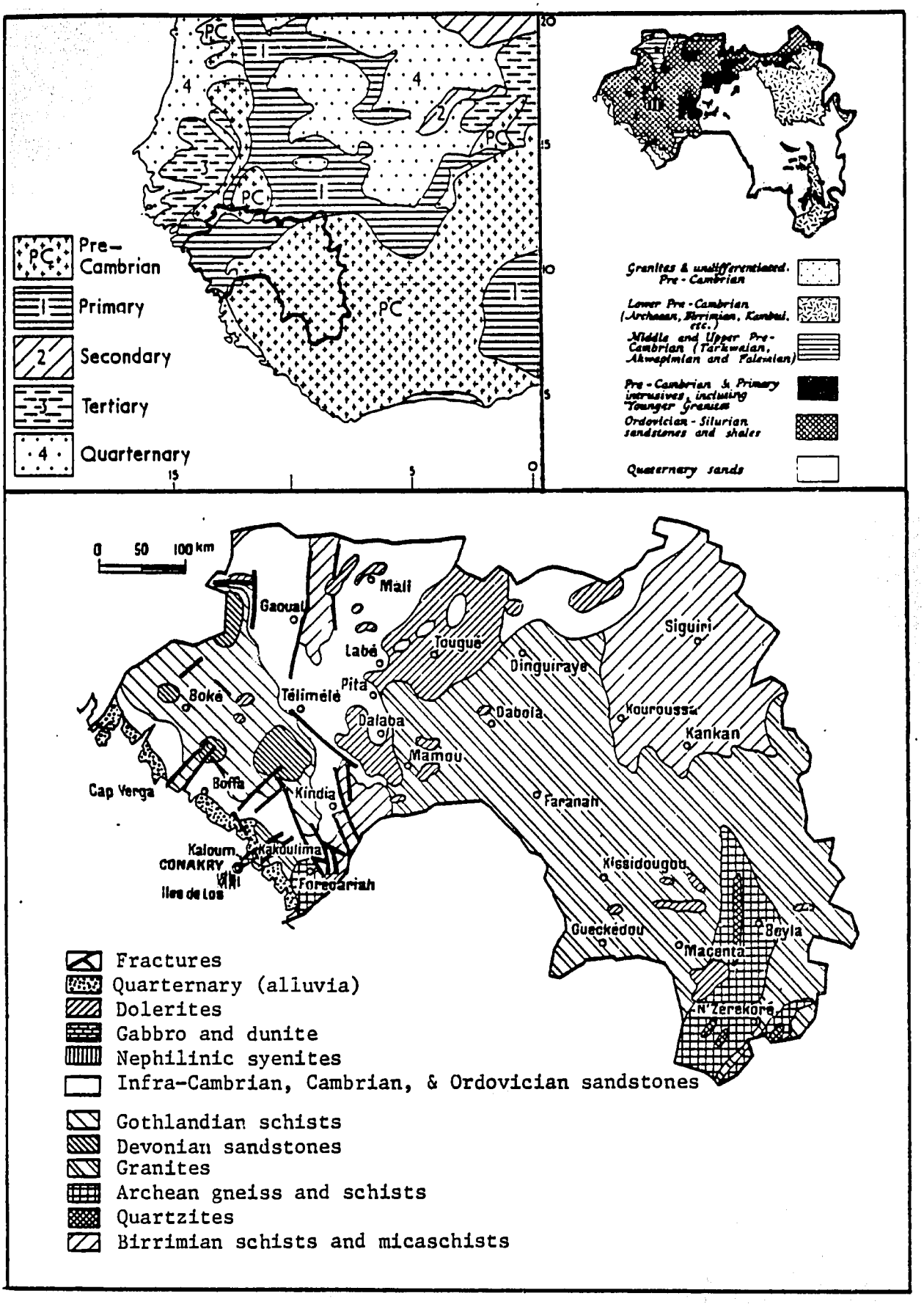

Figure 27. Geology: Regional and Guinean

Sources: Top left: Adapted from Ahn (1970).
Top right: Adapted from Harrison Church (1980a).
Bottom: Adapted from Suret-Canale (1970).

3.1.2 Soils [15/]

Because nearly half of Guinea is underlain by Pre-Cambrian granitic bedrock (Fig. 27), the soils above those surfaces exhibit a certain amount of uniformity (Ahn 1970). Representations of the distribution of Guinea's soil resources vary considerably, reflecting different classification systems. Three such mappings appear below as Figures 28, 29, and 30. Although each of the three categorizations identify soil types, there is little apparent overlap in the distribution of these soils.

Both d'Hoore (1964; Fig. 28) and Ahn (1970; Fig. 29) consider Guinea to consist of four principal soil types. According to d'Hoore, there are: (1) tropical ferruginous soils; (2) ferruginous soils and crusts; (3) ferralitic soils; and (4) rock debris and weakly developed soils. The predominantly Pre-Cambrian eastern portion of Guinea includes all four types, with type (1) occurring in conjunction with granite, type (2) alongside Birrimian schists and micaschists, and type (4) in association with Archean gneis and schists (cf. Fig. 27). Western Guinea, in d'Hoore's scheme, is covered by soil types (3) and (4). Ahn's four soil types correspond to d'Hoore's, but their distribution is considerably different, as Figure 29 shows.

The FAO-UNESCO soil type classification system (1977) is more elaborate than either of the other two. As Figure 30 illustrates, Guinea exhibits eight different soils: (1) Ferric Acrisols; (2) Ferralitic Cambisols; (3) Vertic Cambisols; (4) Orthic Ferrasols; (5) Lithosols; (6) Fluvisols; (7) Ferric Luvisols; and (8) Regosols. Of these, the most widespread soils are Lithosols (5) and Ferric Acrosols (1), with moderate areas covered with Orthic Ferrasols (4), and localized pockets of the other five soils.

Functionally, most of Guinea's soils are considered to possess low levels of fertility (Fig. 31). Only a narrow belt of terrain straddling Upper Guinea and the Forest Region approaches medium levels of inherent fertility. Table 14 summarizes the characteristics and agricultural potentials of the eight soil types shown on the FAO-UNESCO map (Fig. 30). Finally, Figure 32 represents Guinea's soil moisture regimes.

15/ Sources: Acquaye. 1971.
Ahn.
Donahue. 1970.
FAO-UNESCO. 1977.
Fournier. 1967.
d'Hoore. 1964.
Kowal and Kassam. 1978
SIDA-FAO. 1974.
Van Wambeke. 1982.

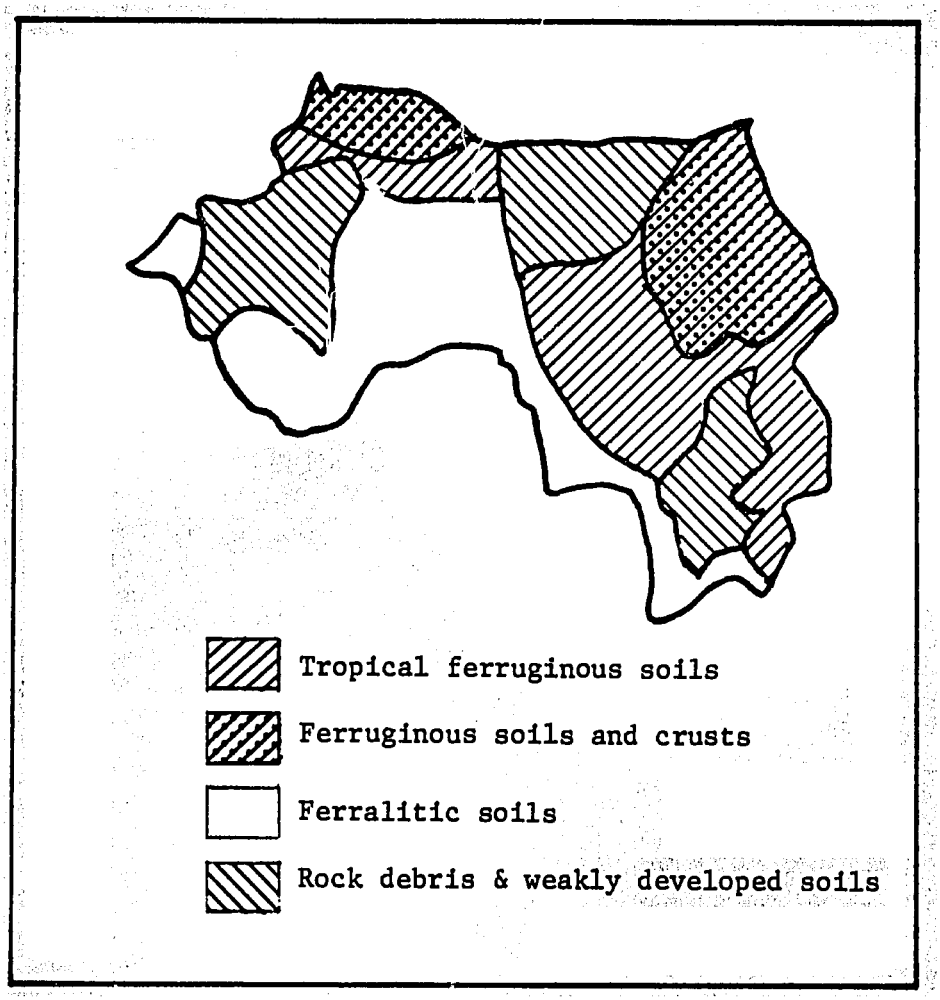

Figure 28. Soil Types, according to d'Hoore (1964)

Source: Adapted from Kowal and Kassam (1978).

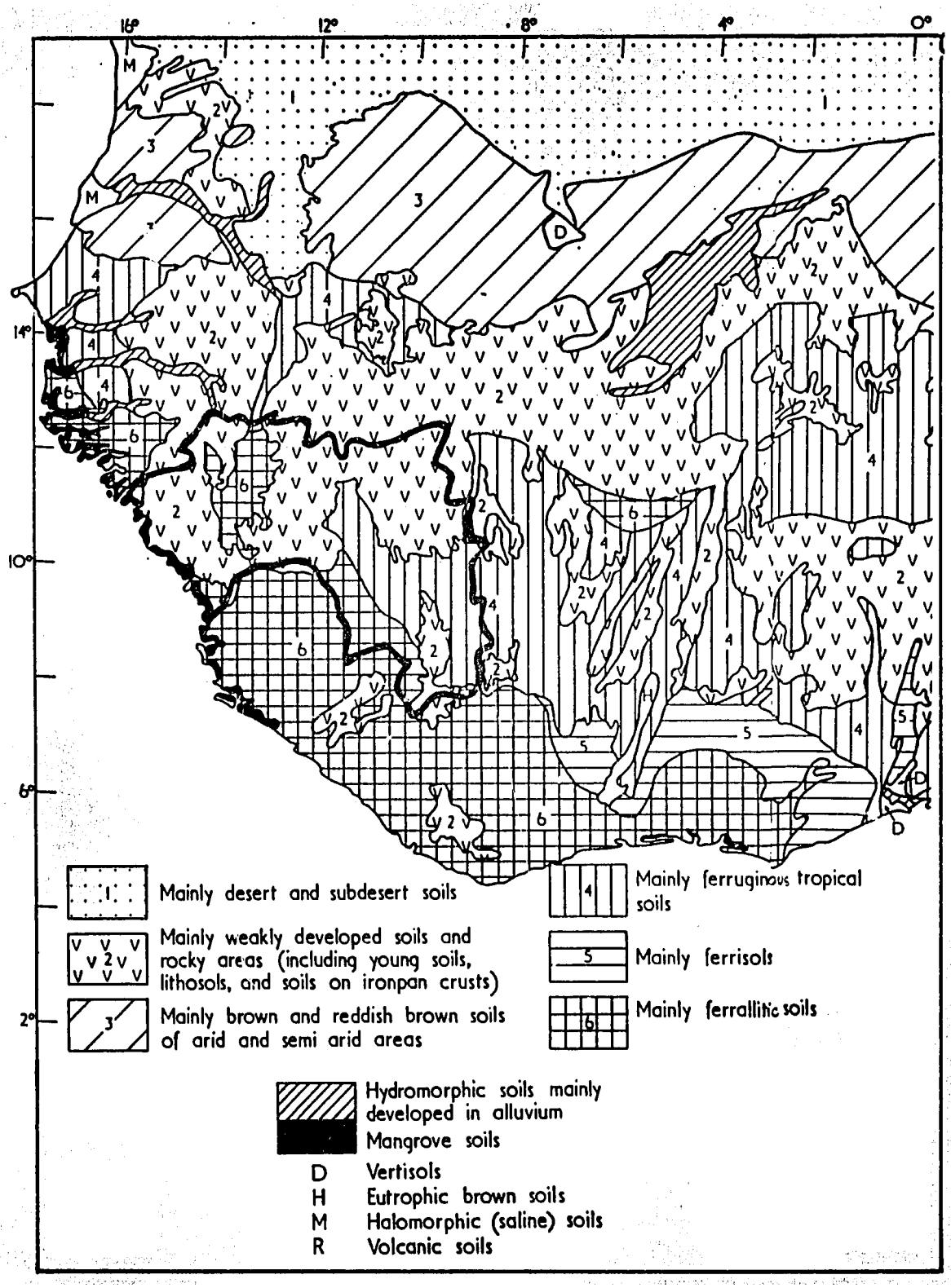

Figure 29. Soil Types, according to Ahn (1970)

Source: Ahn. 1970.

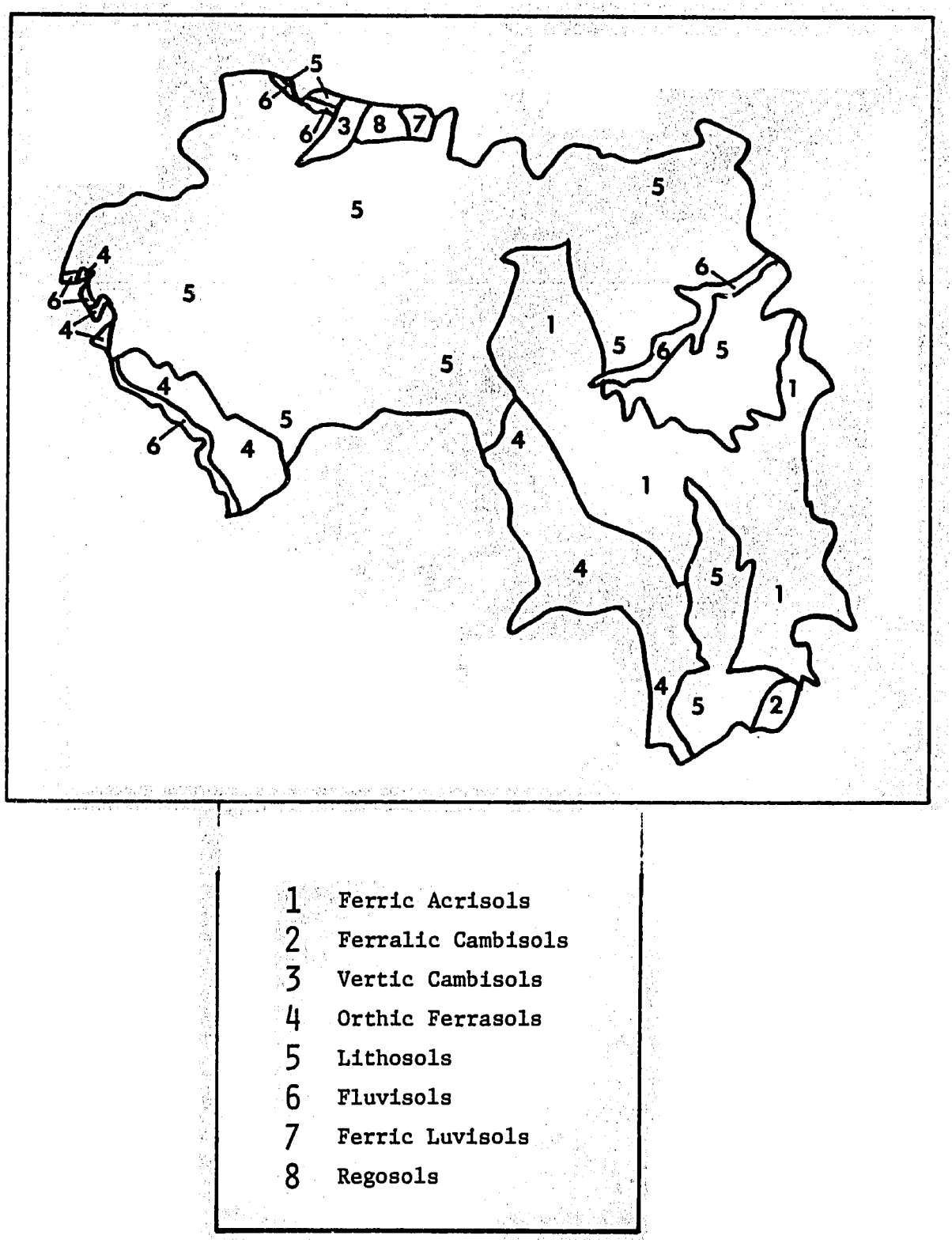

Figure 30. Soil Types, according to FAO-UNESCO (1977)

Source: Adapted from FAO-UNESCO (1977).

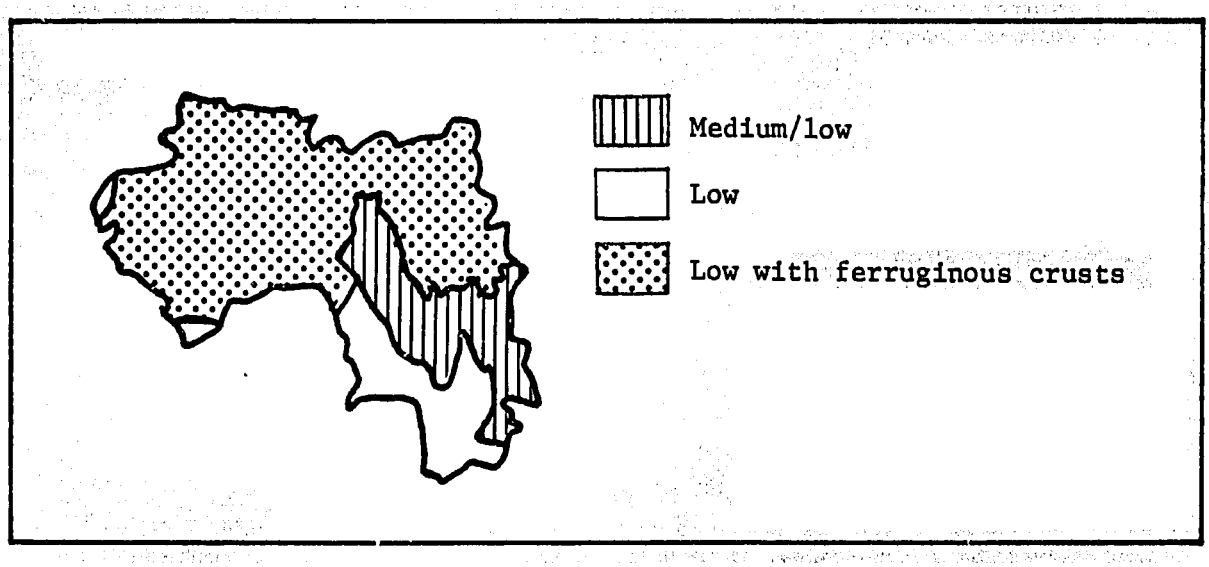

Figure 31. Level of Inherent Soil Fertility

Source: Adapted from Davies (1973).

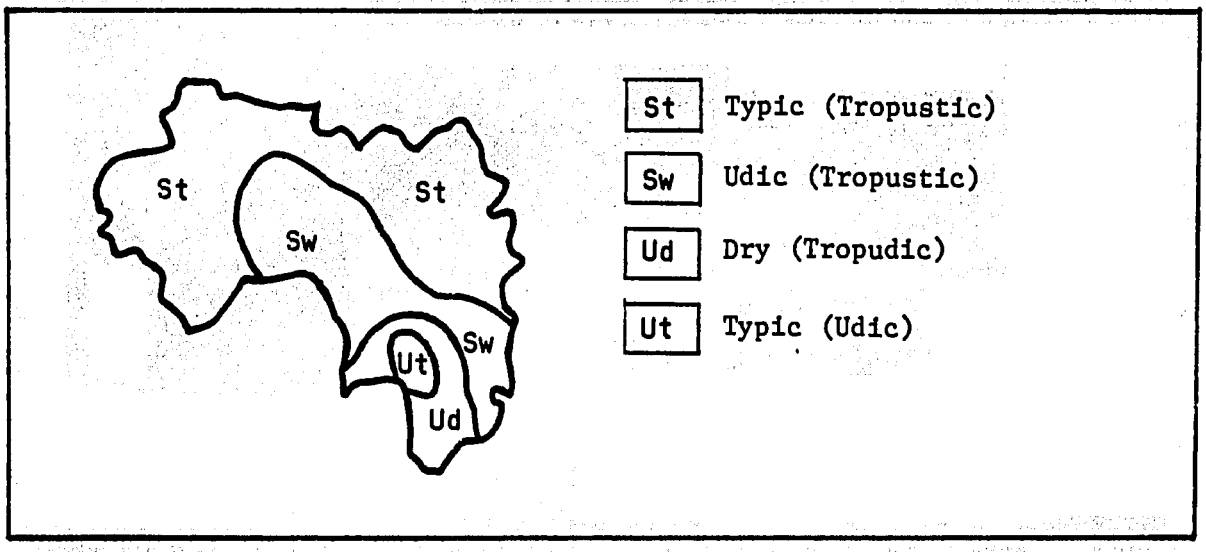

Figure 32. Soil Moisture Regimes

Source: Adapted from Van Wambeke (1982).

Table 14. Soil Characteristics

No. on Fig. 30	Soil type	Texture	Vegetative cover	Type of agricultural practice	Suitability for cultivation	Suitable crops
1	Ferric Acrisols	Coarse to medium	Savanna	Poor subsistence	Poor	Cassava, yam, groundnut, maize, beans, sorghum, eleusine
2	Ferralic Cambisols	Medium to fine	Forest savanna	Fallow	Good	Cacao, coffee, palm rubber, bananas
3	Vertic Cambisols	Hard; difficult to till	Grassy & forest savanna	Mixed farming	Poor in organic matter; rich minerals	Sugarcane, rice, cotton, maize (all with irrigation)
4	Orthic Ferrasols	Medium to fine (variable)	Rainforest & savanna	Subsistence; fallow	Low fertility	Cotton, food crops, coffee
5	Lithosols	Variable	Forest savanna	Fallow; mixed farming	Unsuitable for most agric.	Coffee, cacao
6	Fluvisols	Fine	River valley vegetation	Floodland cultivation	Good	Rice (with irrigation), food crops
7	Ferric Luvisols	Variable	Woodland savanna	Fallow	Variable	Groundnut, tobacco, fodder
8	Regosols	Variable	Woodland savanna	Fallow	Limited	Cassava, maize groundnuts

Sources: FAO-UNESCO. 1977.
Figure 22.

3.1.3 Mineral Resources[16/]

Guinea's mineral deposits constitute the country's most exploitable and most valuable resources. Gold and diamonds are the most precious of these substances and have been mined for centuries. Gold--in river beds and in quartz veins--occurs in the northeastern portion of Guinea, near the Mali border (Fig. 33). But while gold provided an important economic basis for precolonial indigenous states, it contributes but a tiny fraction of Guinea's current GDP. Similarly diamonds--gem and industrial qualities--though produced almost exclusively for export, do not add substantially to Guinea's foreign currency earnings.

Bauxite. Instead, it is Guinea's extraordinary abundance of bauxite which has until now sustained the economy. As recently as 1974 the mineral sector, dominated by bauxite production, accounted for 30 percent of the GDP (Bureau of Mines 1976). More recently, because of diversification, this percentage has fallen to approximately 20.7 percent of the GDP (Huvos 1982). This decline is more apparent than real, however, for during this same period bauxite production has grown dramatically. As Table 15 shows, bauxite exploitation has grown from about 3,000 metric tons in 1972 to nearly five times as much (13,780 MT) in 1980.

This production increase reflects the government's determination to benefit more fully from availability of an important and rare commodity. Already in 1980 Guinea had risen to become the world's second largest producer of bauxite. Its estimated reserves of 6.5 billion tons (a calculation based on a comprehensive recent study by Geosurvey International) are the world's largest (Huvos 1982), and represent perhaps two-thirds of the world total.

Bauxite deposits, as Figure 33 shows, are scattered throughout Lower Guinea and Middle Guinea. The nation's leading producer of bauxite is an international consortium (49 percent government owned), the Compagnie des Bauxites de Guinee. In 1980 the Compagnie's mines at Boke-Sangaredi in the northwest, the largest bauxite mine in the world, produced two-thirds of Guinea's bauxite. Another mining

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16/ Sources: ARB. 1980-82.
Bureau of Mines. 1976.
Europa. 1981a.
Huvos. 1982.
Kurian. 1982.
Legum. 1981a.
Legum. 1981b.
Nelson, et al. 1975.
New African. 1978.
Swindell. 1967.
UNESCO. 1969.
World Mining Yearbook. 1982.

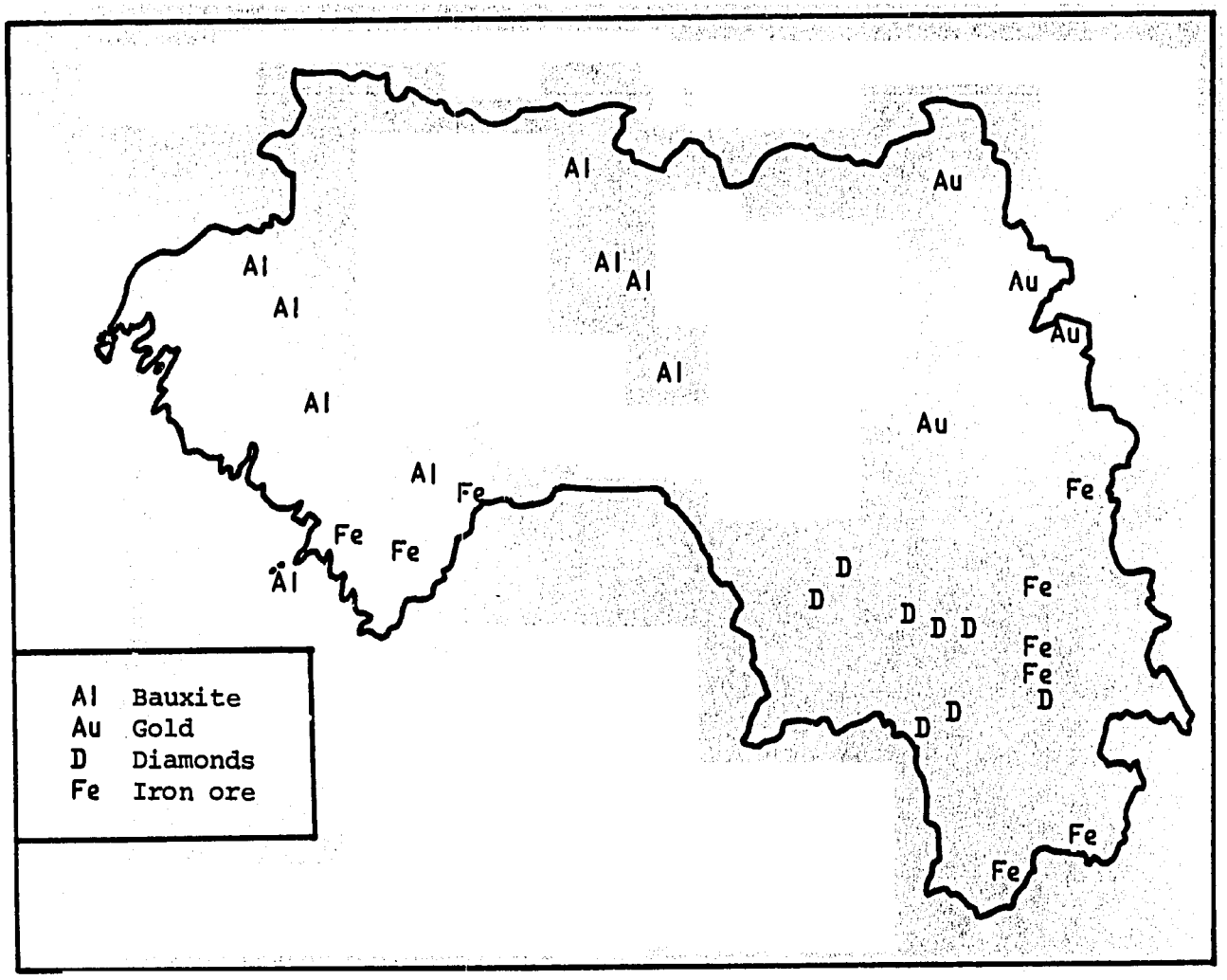

Figure 33. Mineral Deposits

Sources: Boateng. 1978.
Nelson, et al. 1975.
UNESCO. 1968.
USGPO. 1973.
White and Gleave. 1971.

Table 15. Mineral Production, 1960 to 1980

Year	Aluminum		Iron Ore	Diamonds
	Bauxite (1,000 MT)	Alumina (1,000 MT)	(1,000 MT)	(1,000 carats)
1960	1,678[a]	484[a]	1,362[a] 776[d]	1,117[a]
1965	1,870[a]	520[a]	1,133[a] 800[d]	72[a]
1970	2,600[a]	599[a]	--	74[a]
1972	3,000[a]	800[a]	--	80[a]
1974	7,600[b]	80[b]	*	80[b]
1976	10,848[c] 10,298[b]	560[c] 80[b]	*	80[b,c]
1977	10,841[b,c]	562[c] 80[b]	*	80[b,c]
1978	10,456[c] 12,065[b]	610[c]	*	80[c]
1979	13,700[c]	660[c]	*	85[c]
1980	13,780[c]	708[c]	*	38[c]

*Not available

Sources: [a] Nelson, et al. 1975.
[b] Europa. 1981b.
[c] Huvos. 1982.
[d] Swindell. 1967.

complex at Kindia, to the southeast, is entirely government-owned. The Office des Bauxites de Kindia was built by the U.S.S.R., which continues to manage the operation. In 1980, 2.5 million tons were mined at Kindia. A third consortium (also 49 percent Guinean), The Société d'Économie Mixte Friguia also mines and processes bauxite at Fria. In 1980 it accounted for the remaining two million tons of bauxite. In an expansive mood, the government has determined to encourage further exploitation of the nation's bauxite reserves. Disavowing previous isolationism, Guinea has publicly recognized the need to secure and guarantee additional foreign investment for the mining sector (New African 1978). During the past three years foreign investors have taken advantage of the generally sanguine appraisals of Guinea's bauxite reserves and of the government's eager solicitations (ARB 1980-82). Several consortia have concluded agreements to assist in mining both existing and new bauxite deposits. As a result, the mineral sector dominates Guinea's export trade, accounting for 95 percent of earnings. So long as aluminum remains in demand, and until Guinea depletes its rich reserves, the country will continue to benefit from its supply of bauxite.

Iron Ore. Deposits of iron ore have been exploited since the early part of the century. As Figure 33 illustrates, these deposits are distributed particularly in the eastern and western corners of Guinea. Although iron ore production came to a virtual halt in 1970, Guinea's reserves are potentially high. Some estimates place the amount at 15 billion tons (World Mining Yearbook 1982).

Of these reserves, the Mount Nimba mines along the Liberian border are known to contain one of Africa's major iron ore deposits. Reserves there alone are believed to exceed two billion tons (the ore is 68 percent Fe). This is the first location scheduled to be developed by the Guinean government. An ambitious scheme calls for producing two million tons annually by the early 1980s, with exploitation there scheduled to rise ultimately to 15 million tons (Hodgkinson 1981). No figures are available to measure the progress of these plans.

Not far from Mt. Nimba, other rich deposits have been found in the Simandou Mountains. Here too, there may be between 450 million and one billion tons of high-grade iron ore. The government has been working jointly with Liberia and with international mining firms to begin exploiting these deposits. By the end of the decade, Guinea hopes to produce a total of 30 to 40 million tons of iron ore.

Table 16. Mining Contribution to the GDP, 1973 to 1980

Year	GDP	Mining sector expenditures	Mining sector as percentage of GDP
	(millions of Syli)	(millions of Syli)	(%)
1973	19,400	800	4.1
1974	20,400	1,400	6.9
1975	21,000	1,700	8.1
1976	22,700	2,100	9.2
1977	22,300	2,200	9.9
1978	23,500	2,200	9.4
1979	23,500	2,400	10.2
1980	23,700	2,500	10.5

Source: USAID. 1982c.

Table 16 shows the growth of Guinea's mining sector during the past decade. While the GDP increased just 22 percent between 1973 and 1980, expenditures in the mining sector have more than tripled. By 1980 mining accounted for 10.5 percent of the GDP.

3.1.4 Energy Resources[17/]

In contrast to Guinea's long-standing production of bauxite and iron ore, to date the nation has produced no petroleum, natural gas, or coal. Until recently no reserves of fossil fuel were believed to exist in the nation. While coal and natural gas deposits probably can be ruled out, there has been speculation, over the past decade, that Guinea's Atlantic continental shelf may contain petroleum. Until now Guinea has imported all of its petroleum, expending increasing capital for this critical product--from $13.1 million in 1976 to $36 million in 1979 (USAID 1982d).

17/ Sources: ARB. 1980-82.
Bureau of Mines. 1976.
Huvos. 1982.
McGrew. 1981.
Nelson, et al. 1977.
New African. 1978
Suret-Canale. 1970.
USAID. 1982d.
World Bank. 1981b.
World Oil. 1977.

Consequently, since 1974 Guinea has encouraged offshore exploration. SOQUIP, a joint venture between the government and U.S., French, Yugoslav, and Japanese firms, was created to develop any possible sources of oil. In 1980 Guinea concluded an agreement with Union Texas Petroleum to conduct a seismic survey along the northern third of the coast. Drilling has awaited confirmation of offshore deposits (Huvos 1982; ARB 1980). In spite of early optimism, Guinea has yet to produce any oil.

But while substantial discoveries of fossil fuels remain unlikely, Guinea possesses a known and appreciable potential for hydroelectric power. The nation is fortuitously situated in the path of rain-bearing winds, while its countryside is marked by extensive changes in altitude. A 1961 survey of hydroelectric potential estimated that as much as 63.2 billion kilowatt-hours of power could be available. A more recent study suggests that estimated hydroelectric potential may be 6,000 NW (USAID 1982d).

Since the earlier survey the government has been eager to exploit some of this potential, particularly for use in aluminum production. The first generating stations, however, were thermal power plants, not hydroelectric stations. One was constructed at Fria, near the bauxite deposits; others were later installed at various locations (Figure 34).

The first hydroelectric dam was constructed by the French at Grandes Chutes on the Samou River. It was enlarged, but even after completion, its capacity was only 20,000 KW. In the early 1970s new dams were built on the Tinkisso and Donké Rivers. It was not until the adoption of the 1973-78 Five Year Development Plan that hydroelectric generation obtained clear priority. Stations were constructed on the Kokuolo and the Badi Rivers, and five additional dams are under construction or near completion, including a 120 MW dam on the Bafing River, northwest of Dabola. The government has also identified four sites where exploitable falls could be harnessed. The most ambitious proposal has been for construction of a 480 MW station at Souapiti and a 720 MW station at Amaria, both on the Konkoure in Lower Guinea (Fig. 34). The total estimated cost of this project is about $450 million. Funding has been sought from the World Bank, various Arab funds, and international aluminum companies; to date financing for this undertaking has not be secured.

Table 17 lists installed capacity in megawatts (MW) and energy production in gigawatt (million kilowatt) hours (GWh) for the period 1952 to 1977. The table illustrates

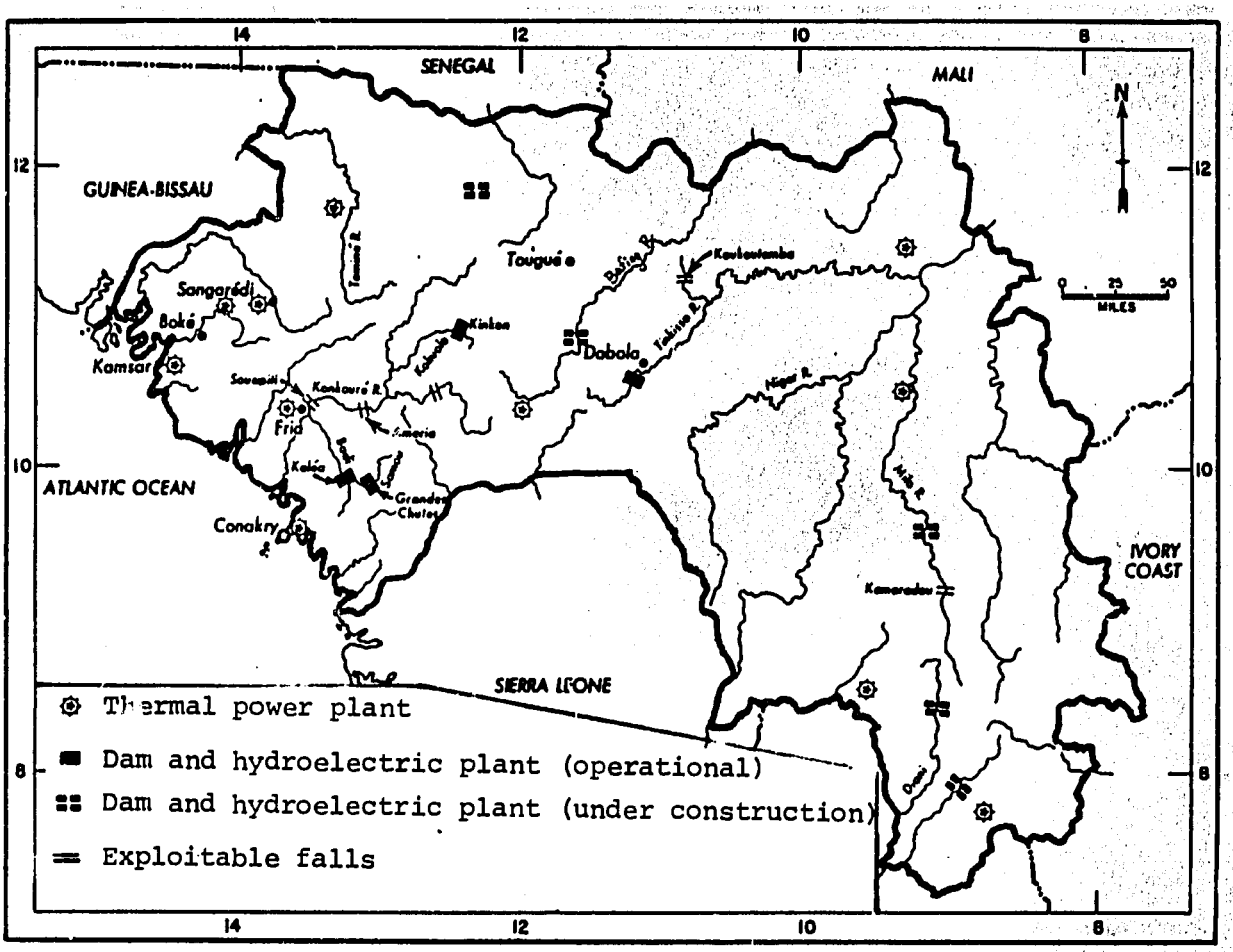

Figure 34. Energy Production Facilities

Sources: Nelson, et al. 1975.
Suret-Canale. 1970.

Table 17. Energy Production, 1952 to 1977

Year	Installed capacity (MW)			Energy production (GWh)		
	Hydro	Thermal	Total	Hydro	Thermal	Total
1952						3[a]
1955						10[a]
1960						102[a]
1965						177[a]
1968	20[b]	72[b]	92[b]	22[b]	190[b]	212[b]
1973						450[c]
1975	41[d]	73[d]	114[d]			500[c]
1976						500[c]
1977						500[c]
1981	40[e]			245[e]		

Sources:
[a] Voss. 1968.
[b] Van der Leeden. 1975.
[c] Europa. 1981b.
[d] Nelson, et al. 1975.
[e] USAID. 1982d.

that notable strides were made in the period just preceding independence, in the five years after independence, and during the early 1970s. If and when financing should become available for the Konkoure project, Guinea's hydroelectric output will rise dramatically.

Apart from energy derived from hydroelectric and thermal power stations, much of rural Guinea's energy is drawn from wood, a traditional source of fuel. Because much of eastern Guinea is forested, fuelwood supplies have not been completely exhausted. The Guinea Highlands, according to a recent FAO survey, retain a "satisfactory" supply of timber. Continued exploitation, however, could begin to threaten this inventory and create serious shortages of firewood (Fig. 35). Other energy sources--windpower, biogas, solar generation, ethanol, geothermal, ocean thermal, and agricultural waste conversion remains highly experimental. There have been scientific trials of these sources in the past few years, and it appears that the most promising may be giogas and ethanol production (USAID 1982d).

3.2 Water Resources

3.2.1 Surface Water[18/]

Guinea's mountain ranges give rise to the Niger River (in the southern Guinea Highlands) and the Bafing, a principal tributary of the Senegal River (in the Fouta Djallon). Perhaps more importantly, the country itself is well drained by these and other mountain-born rivers and streams. Figure 36, which illustrates the main features of Guinea's drainage system, shows that virtually the entire terrain is drained by these rivers.

The Niger River and its tributaries--the Bala, Milo, Tinkisso, Gouala, and other smaller rivers--drain approximately a third of the country and the entire eastern sector. After leaving Guinea, the Niger continues eastward before turning south on its 4,100 km journey to the Gulf of

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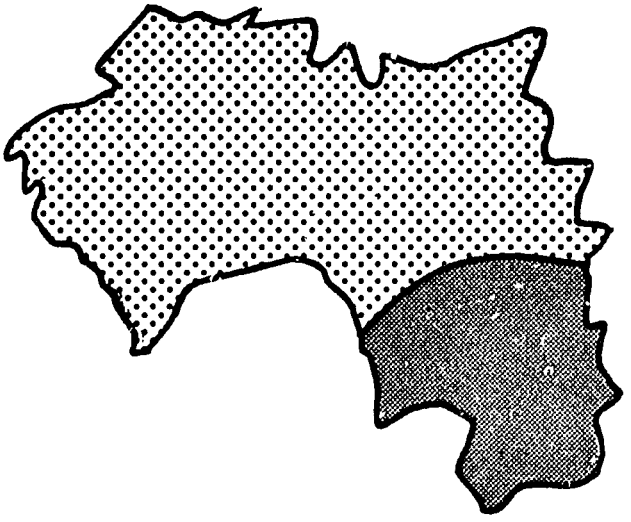
18/ Sources: Balek. 1977.
Beadle. 1981.
FAO. 1975.
Nelson, et al. 1975.
Rochette. 1974.
Symoens, et al. 1981.
UN. 1978.
Van der Leeden. 1975.
WMO. 1971.



Satisfactory situation; but decreasing resources could become inadequate, at least locally, in relation to requirements in the foreseeable future.

Deficit situation; present fuelwood resources are below requirements, obliging the population to overexploit.

Figure 35. Fuelwood Supply

Source: Adapted from FAO (1981b).

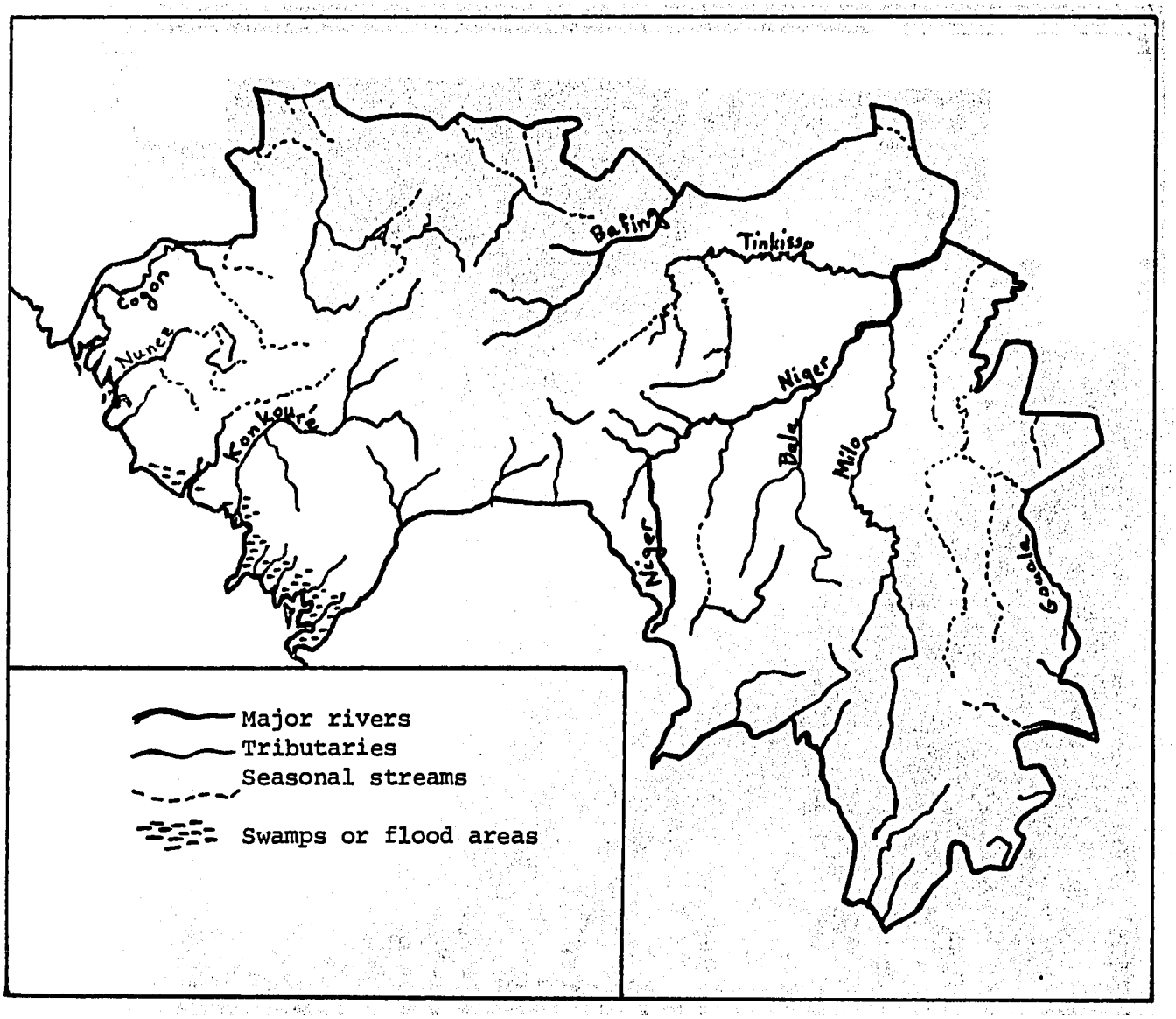


Figure 36. Drainage System

Source: Adapted from Bartholomew (1956).

Benin. Two hundred kilometers beyond the border with Mali, just past Bamako, the monthly discharges of the Niger are listed in Table 18a, and Table 18b provides additional information relating to the water balance of the Niger. Figure 37 is a graph of the flood regime of the Niger at Koulikouro, across the border in Mali.

The Bafing River, one of the sources of the Senegal, rises near Dalaba in the central Fouta highlands. It flows to the northeast until it joins the 1,100 km long Senegal just north of the border with Mali. Figure 38 shows the portion of the Senegal River basin that is within Guinea.

Although Guinea is dissected by an extensive river system, few of the rivers are navigable. Inland, the Niger and some of its tributaries support barge and passenger traffic during the summer months only. Nearer the coast, the Konkoure, Rio Nunez, and Cogon bear some navigation, but the rivers' chief utility lies in their hydroelectric potential.

3.2.2 Groundwater[19/]

The only sizable true aquifers in Guinea are situated along the coast, within the sedimentary basin. The remainder of the country, as Figure 39 illustrates, is underlain by bedrock having very little, if any, porosity. Nevertheless, there have been surveys of the terrain, concentrating on areas adjoining population centers. A permanent Hungarian hydrological mission spent more than a decade, from 1960, evaluating prospects for groundwater exploitation.

In the coastal areas, particularly the Kaloum peninsula which contains Conakry and along the Rio Nunez estuary further north, groundwater supplies exist and are being used. Yields per well in these areas are relatively high at 20 to 50 cubic meters per hour (cu m/hr). Elsewhere, prospects are not as sanguine. Groundwater potential is probably greatest in the vicinity of springs lying on volcanic terrain in the Fouta Djallon. In areas lying above shaly sandstones and quartzites, water may be present, but typical yields are very low (based upon drilling in neighboring countries), rarely exceeding 3 cu m/hr. In the zones underlain by crystalline and metamorphic rocks--nearly three-quarters of the country--

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19/ Sources: Balek. 1977.
ECA. 1978.
Shwartsev. 1972.
UNDESA. 1973.

Table 18. Characteristics of the Niger River

a. Monthly Discharges of the Niger River at Koulikouro, Mali

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Discharge (in cu m/sec)	405	195	105	60	105	390	1,230	3,255	5,235	4,320	1,890	295	1,457

Source: Balek. 1977.

b. Water Balance of the Niger, Siguiri to Koulikouro

Characteristic	Source to Siguiri	Within Siguiri-Koulikouro interbasin
Drained area (sq km)	70,000	50,000
Precipitation (mm)	1,640	1,424
Runoff (mm)	420	393
Evapotranspiration (mm)	1,220	1,031
Runoff coefficient (%)	0.25	0.28
Water yield (liter/sec/sq km)	13.30	12.50
Mean annual discharge (cu m/sec)	931	624

Source: Balek. 1977.

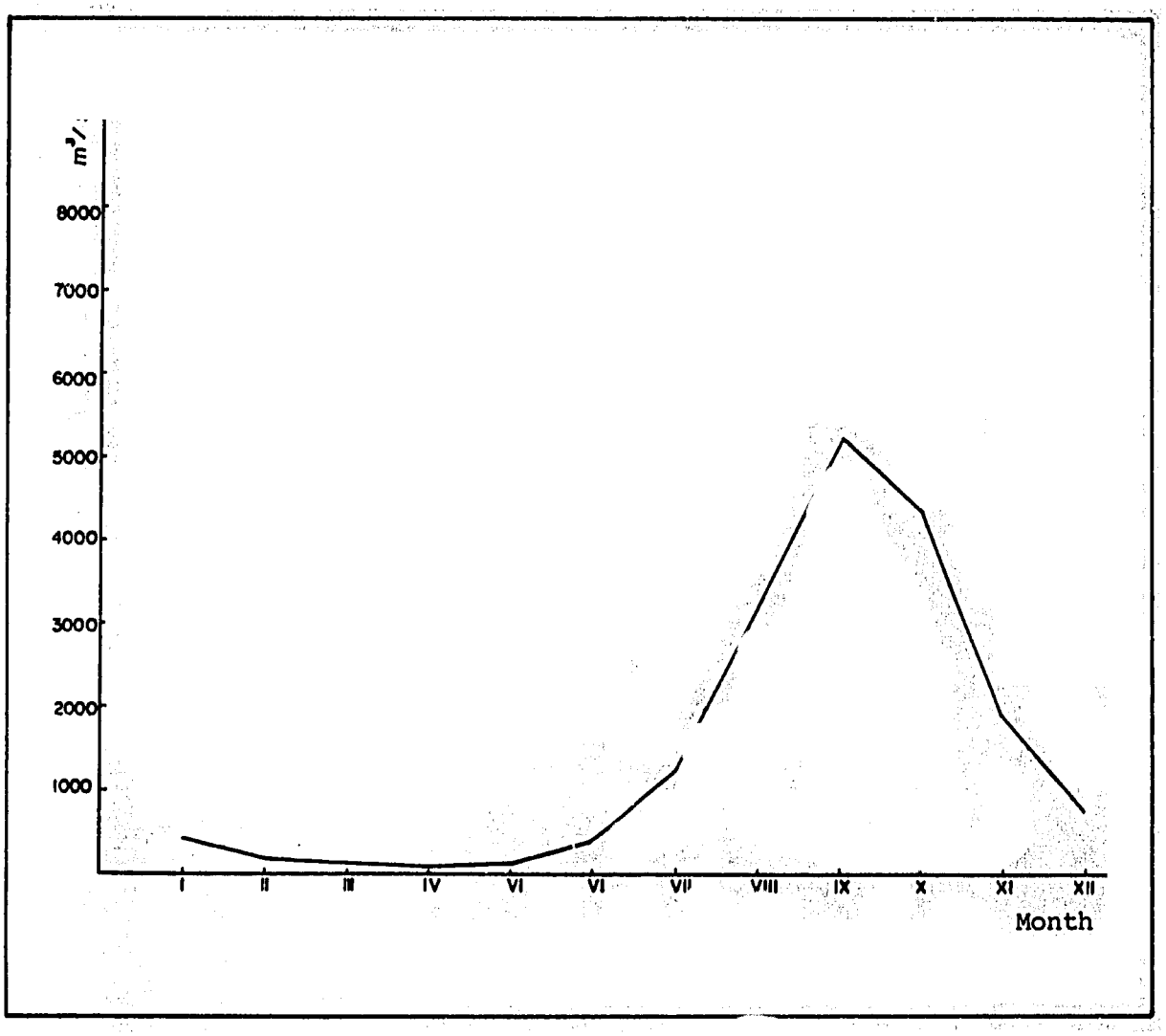

Figure 37. Flood Regime of the Niger River at Koulikouro, Mali

Source: Balek. 1977.

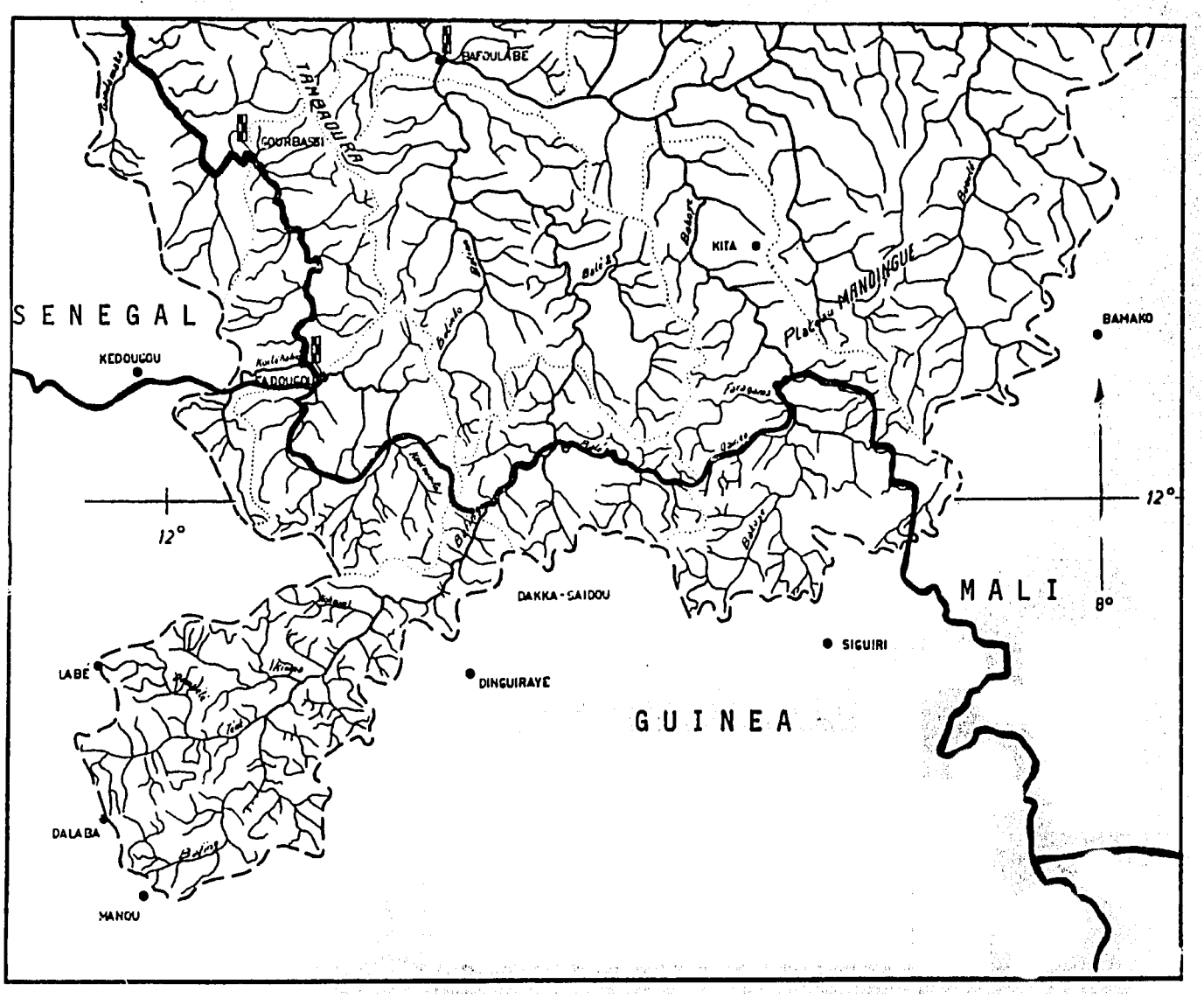

Figure 38. Senegal River Basin Drainage System in Guinea

Source: Adapted from Rochette (1974).

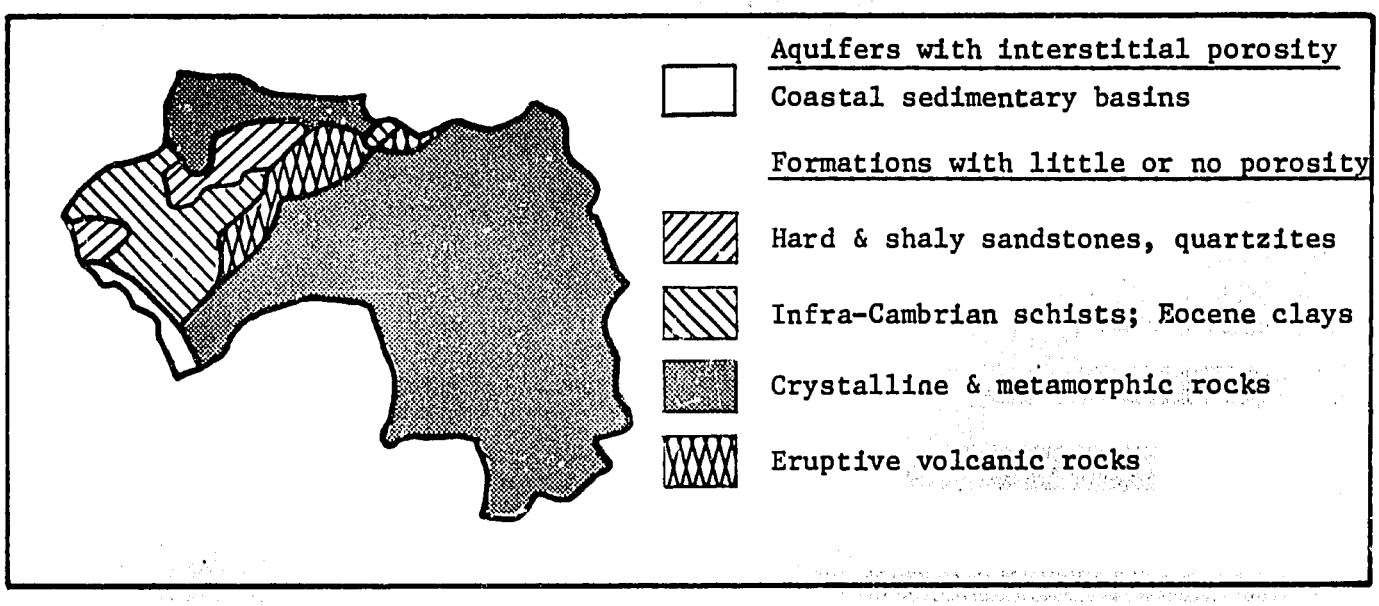

Figure 39. Aquifers

Source: Adapted from UNDESA (1973).

expected yields are also low, perhaps in the range of 1 to 10 cu m/hr. For the near future, it remains unlikely that aquifers can supply the nation's water needs, except perhaps along the alluvial coastal strip.

3.2.3 Coastal Waters and Swamps[20/]

Guinea's Atlantic coastline extends some 500 km in a northwest-southeast direction. With few exceptions, the land is low-lying and frequently cut by inlets of the sea. Because tides are appreciable, often above 5 m, much of the costal strip is permanently flooded, creating swampy estuaries extending as far as 25 km to the interior. Since the waters in these areas stagnate, they become brackish and insect-ridden. The swampy coastal regions, therefore, have been lightly populated and generally avoided by foreign settlers. Recent studies have shown that these swamps and their outlying areas have a high potential for producion of plankton and other microbiomass (Zeitschel 1969; Corcoran and Mahnken 1969).

Historically, the coastline has constituted the principal entryway into Guinea by Europeans. Traditionally, Baga and Susu inhabitants have fished the estuaries, lagoons, and coastal waters. The seas off Guinea contain about 200 species of edible fish, which are caught mainly during the wet season. The catch has comprised an important part of the diet as well as a regional medium of exchange. Until recently, fishing was limited to small-scale activity, engaged in principally by hereditary fisherfolk. As Guinea takes stock of its valuable offshore ocean-borne resources, offshore fishing is likely to increase considerably.

3.2.4 Irrigation and Domestic Use of Water[21/]

Irrigation. As a continent, Africa has undergone very little irrigation. While 15 percent of the world's arable

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20/ Sources: Balek. 1977.
Beadle. 1981.
Berrit. 1969.
Nelson, et al. 1975.
Symoens, et al. 1981.
Williams. 1969.

21/ Sources: ARB. 1981.
Anthony, et al. 1979.
FAO. 1975.
-----. 1977.
-----.
Van der Leeden. 1975.
White and Gleave. 1971.

and permanently cropped land is irrigated (and 34 percent of Asia's), only 3.6 percent of Africa's agricultural terrain is irrigated. In West Africa the figures are even lower; only a quarter as much land is irrigated there as in East Africa (although there is 50 percent more arable land). It is not surprising, therefore, that in Guinea only about one percent of the agricultural land is artificially irrigated. Table 19 provides figures for the years 1961 to 1975. Since 1975, compilation of statistics on arable land and irrigated land has been modified (see Table 8, for example), making comparisons with earlier periods difficult.

Table 19. Irrigated Land, 1961 to 1975

	1961-65	1968	1970	1972	1975
Area of arable and permanently cropped land (1,000 ha)	3,950	4,080	4,130	4,130	4,170
Area under irrigation (1,000 ha)	22	30	45	45	45
Irrigated area as percentage of arable and perm. crop area (%)	0.6	0.7	1.1	1.1	1.1

Source: FAO. 1976.
-----. 1977.

Nevertheless, Guinea's government has shown some interest in extending the nation's irrigated agricultural area. In June 1981 the country obtained a grant of three million dollars (U.S.) to expand farms on irrigated lands. The current Five Year Plan (1981-85) places strong emphasis on modernizing agriculture. Specially targeted for improvement are irrigable crops such as rice and plantation fruits (ARB 1981). Because of Guinea's ideological commitment to local citizen-activated brigades, much of the envisioned improvement in agriculture and irrigation is to be small-scale.

Domestic Use of Water

Table 20 provides figures for the percentage of Guinea's population having access to safe water. The steady drop in the proportion of the urban population served reflects two features of the country's development: (1) the 6.1 percent annual growth rate of Guinea's urban population between

1970 and 1980; and (2) the apparent lack of provision of commensurate urban water facilities. Some progress has been noted in the installation of rural water hookups and standposts.

Table 20. Percentage of Population Having Access to Safe Water, 1970 to 1978

Year	Urban population	Rural population	Total population
1970[a]	97	0	11
1975[b]	*	*	10
1976[c]	69	3.0	14
1978[c]	44	2.5	10

*Not available

Sources: [a] Van der Leeden. 1975
[b] World Bank. 1982.
[c] USAID. 1982c.

Per capita water consumption in Guinea is about a third higher among Guinea's urban residents than among city dwellers elsewhere in West Africa. In Guinea consumption in 1970 was approximately 125 liters per capita per day in homes with direct connections, and about 50 liters per day among persons with access to public standposts (Van der Leeden 1975). Figures for rural water consumption were unavailable.

3.3 Vegetation

3.3.1 General Features[22/]

As earlier sections have demonstrated, Guinea's terrain exhibits considerable variation in elevation, soil characteristics, and geologic formation. Two important climatological features, however--precipitation and temperature--do not fluctuate greatly from one extreme to

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22/ Sources: Lawson. 1966.
Nelson, et al. 1975.
Schnell. 1968.
Suret-Canale. 1970.

another. According to Holdridge's generally accepted system for classifying natural life zones, rainfall and temperature are the two determining factors defining a region's division into ecological zones. As a result of the relative constancy of these factors in Guinea, the country may be divided into just two such zones: dry forest, and moist forest (Fig. 40).

In spite of Holdridge's scheme, it would be misleading to suggest that Guinea's vegetation exhibits little variation. Observers generally have divided Guinea into five or six vegetative regions. In broad outline, the classifications concur (four such interpretations appear as Figure 41, below). The differences principally are manifested as variations in terminology and as degrees of localized elaborations. Thus, each representation shows a coastal belt of lightly forested plains (called forest and savanna mosaic, lowland broadleaf evergreen forest, or lightly wooded savanna; Fig. 41). Again, all agree that: (1) much of northeastern Guinea is comprised of Sudanian savanna; (2) southeastern Guinea contains the nation's only true dense humid tropical rainforest; and (3) that most of the remainder of the country is a mixture of savanna and woodlands. Additionally, three of the four maps in Figure 41 (except for (c) from Suret-Canale 1970) show pockets of coastal mangroves. Table 21, based on data collected by Persson (1977), provides estimates of the areas of the different vegetative covers.

Table 21. Areas of Vegetation Types

Type	Area (1,000 ha)	Percent of total (%)
Guinea (semi-deciduous, dry evergreen)	20,100	81.7
Forest savanna mosaic	2,600	10.6
Moist forest	800	3.3
Montane communities	800	3.3
Mangrove	300	1.2
Total	24,600	100.0*

*Slight error due to rounding

Source: Persson. 1977.

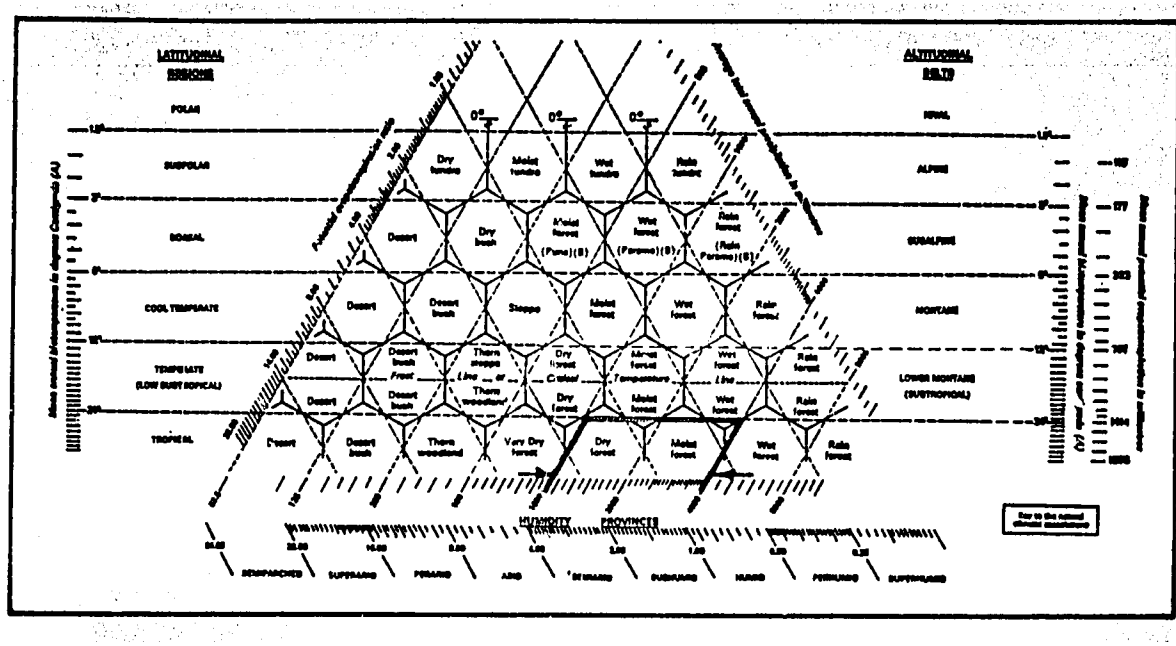
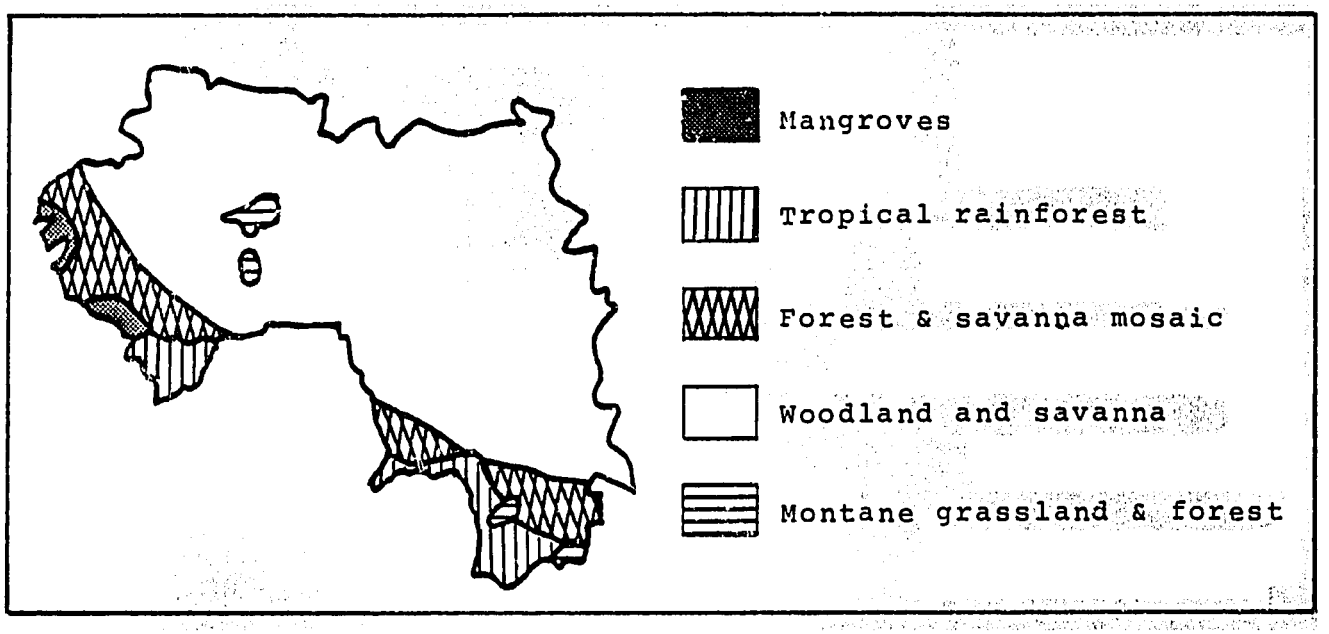
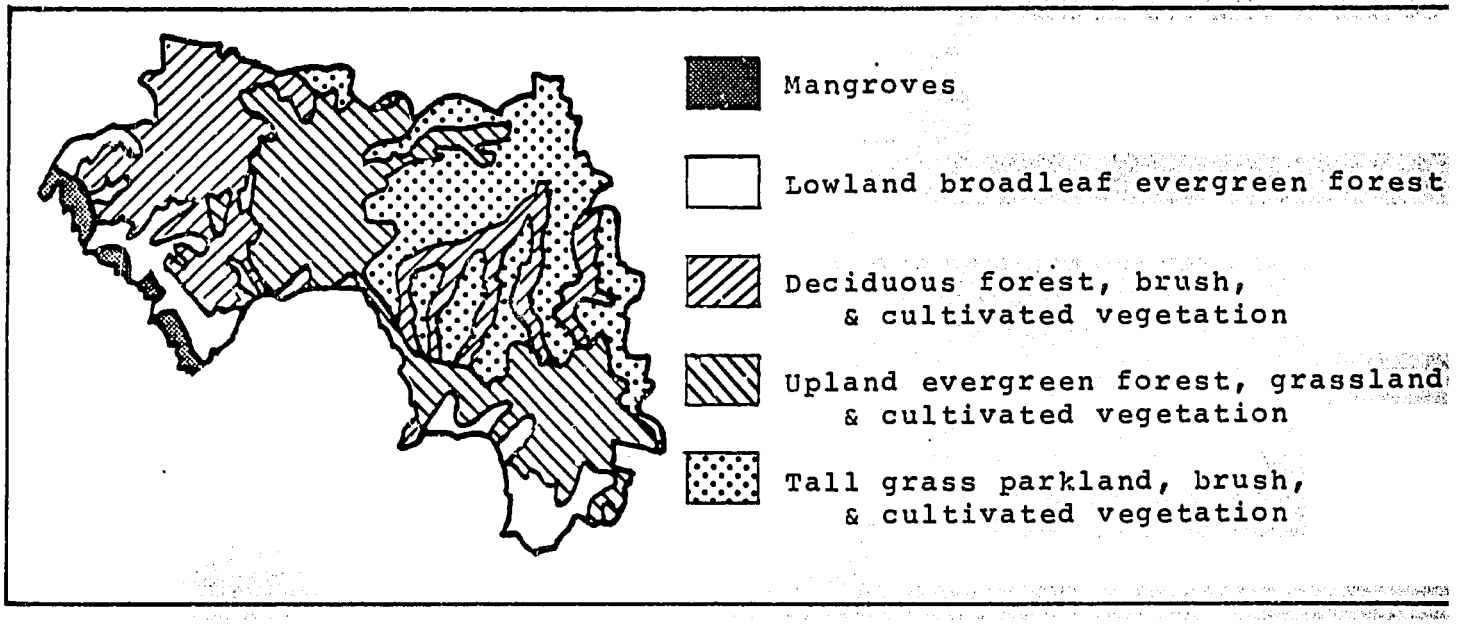


Figure 40. Holdridge's Scheme for Natural Life Zones

Source: Rosayro. 1974.



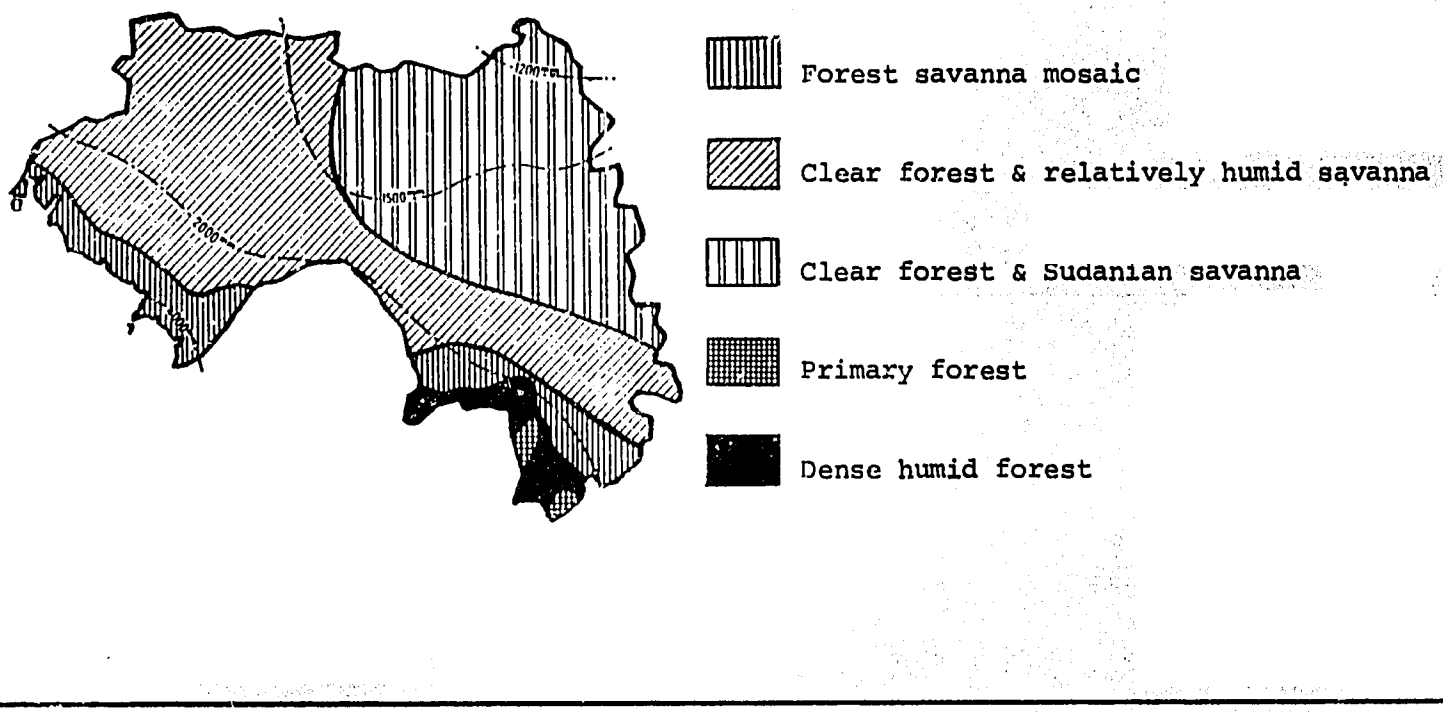
a. Vegetation, according to Davies (1973)



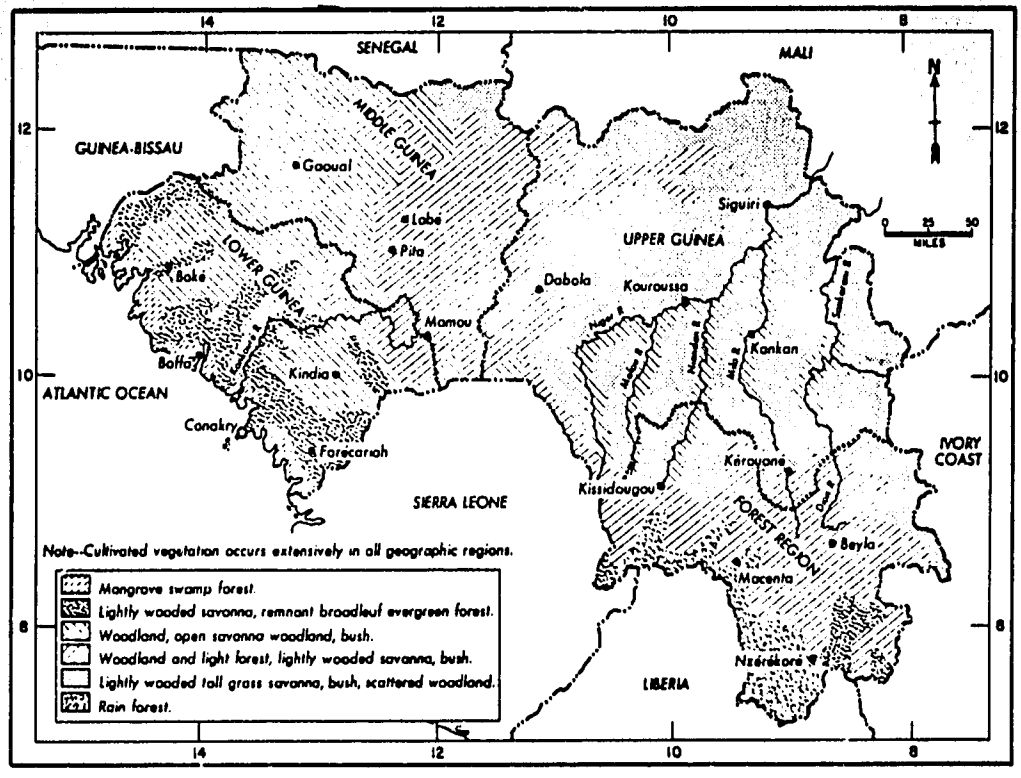
b. Vegetation, according to USGPO (1973)

Figure 41. Vegetation

Sources: a: Adapted from Davies (1973).
b: Adapted from USGPO (1973).



c. Vegetation, according to Suret-Canale (1973)



d. Vegetation, according to Nelson, et al. (1975)

Figure 41. Vegetation

Sources: c: Adapted from Suret-Canale (1970).
d: Adapted from Nelson, et al. (1975).

3.3.2 Natural Forests[23/]

According to FAO, as listed in Table 8, during the period between 1960 and 1978 approximately 4.5 percent of Guinea's total land area was classified as "forests and woodlands". Without explanation, in 1979 this percentage was increased tenfold, to nearly 44 percent. The additional land now considered forested was drawn from terrain previously included in: "other lands", a category including "barren land," "potentially productive land", and parks; and in "arable lands." It is likely that the earlier, uninflated figure represents actual forested terrain. That less than a twentieth of the area of a previously heavily forested region remains indicates the serious degradation of the original vegetative cover. The revised figure reflects the inclusion of lands that are primarily covered with savanna, brush, and light forst. Table 22 indicates the amounts of forested land in Guinea.

The genuinely forested lands may be classified according to four essentially different types of cover: (1) mangroves; (2) evergreen (lowland and upland); (3) deciduous; and (4) tropical rainforest.

Mangroves. The four maps of Figure 41 provide divergent representations of the extent of tidal forests in Guinea. The entire coastline is low-lying, cut by estuaries, and swampy, providing an ideal environment for mangrove forests. That fact supports the contentions of maps (b) and (d) in Figure 41, showing virtually the entire coastline as mangrove forest. Because Guinea's littoral zone remains relatively sparsely populated (Fig. 20) and undeveloped, except in the vicinity of Conakry, this vegetation has not been greatly threatened. The Guinean coastal mangrove ecosystems, therefore, continue to provide a habitat for marine wildlife and a host of social and economic benefits to the resident population.

No thorough surveys of species distribution have been undertaken in Guinea. However, a recent study on the global status of mangroves (Saenger, et al. 1981) suggests that the species shown in Table 23 may be found along Guinea's

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23/ Sources: Ahn. 1970.
IUCN. 1979.
Lawson. 1966.
Nelson, et al. 1975.
Saenger, et al. 1981.
Schnell. 1968.
Suret-Canale. 1970.

Table 22. Amounts of Forested Area, by Type

Type	Area (1,000 ha)
Forests and woodlands	1,200*
Closed Forest	700
Broadleaved	700
Mangrove	400
Non-mangrove	300
Non-broadleaved	0
Other forest	500
Open woodlands	14,000*
Moist	4,000
Dry	10,000
Man-made forest, total planted area	2.1*
Broadleaved	1.5
Pine	0.6
Total (* included in total)	15,202.1

Source: Persson. 1977.

Table 23. Possible Mangrove Species

Species	Lifeform
Exclusive species:	
Avicenna germinans	Tree (3m)
A. nitida	Tree
Conocarpus erectus	Tree
Laguncularia racemosa	Tree
Nypa fruticans	Palm
Rhizophora harrisonii	Tree
R. mangle	Tree
R. racemosa	Tree
Nonexclusive species:	
Acrostichum aureum	Fern
Cynometra manii	Tree
Hibiscus tiliaceus	Tree
Thespesia populnea	Tree

Sources: Saenger, et al. 1981.
Suret-Canale. 1970.

coastline. These species, if properly utilized, can yield substantial economic benefits. Table 24 lists some of the potential products of mangroves and their environments. Some of the obvious uses of mangrove species (for example, as firewood, timber, and wood) clearly have been recognized and incorporated into local customs among coastal villagers. Other, less apparent mangrove products (chemicals, foods, oils, medicines) may not have been adopted by Guineans.

Wooded Forests. In the areas where savanna growth has not supplemented the original forest cover, the canopy is characterized by very high trees, some reaching more than 60 m. Typically, Guinean forests--whether evergreen, deciduous, or dense rainforest--are storied. Thus, the crowns of the resident species tend to reach different heights, creating a layering effect. The uppermost storey consists of trees reaching perhaps 50 m in height. Second storey trees extend to 20-30 m, while the lower and densest layer includes trees of 5 to 20 m. Beneath these layers is a mixture of shrubs, ground level plants, and sometimes grasses (Lawson 1966).

Just inland from the littoral mangrove swamps, there are occasional broadleaf evergreen forests, characterized by stands of Parinari excelsa Sab., a tree of the Rosaceae family. Other trees occurring in this zone include: scandent palms such as Calamus sp. and Ancistrophyllum sp.; trees with prop roots, as Uapaca sp.; Cynometra ananta; various Leguminosae, such as Piptadeniastrum sp., Albizia sp., and Tetrapleura sp.; Moracae, including Antiaris sp., Chlorophora sp., Ficus sp., and Myrianthus sp.; Rubiaceae, such as Nanclea sp. and Mytragyna sp. (Lawson 1966).

The plateaux of the Fouta Djallon in Middle Guinea are dominated by Parinari excelsa, and at moderate altitudes, by Erythrophleum guineense. Other species are Steganotaenia araliacea, Pycnocyda ledermanii, Pimpinella praeventa, Dicoma sessiliflora, Echinops longifolius, and Aloe barteri.

The montane forests surrounding Beyla, in southeastern Guinea are populated by Protea angolensis, Eupatorium africanum, and Eulophia propinqua. Further south, along the border with Ivory Coast, the forest is composed of Triplochiton scleroxylon, Terminalia sp., Chrysophyllum perpulchrum, and other caducous trees. To the west, near Mt. Nimba, the humid valleys along the western part of the Nimba chain are characterized by Tarrieta utilis and Mapania spp. Above 900 to 1,000 m the dominant species is Parinari excelsa. Along the eastern slopes the vegetation is dense semideciduous, but degraded, characterized by Trilochiton scleroxylon and Chyrsophyllum perpulchrum (Schnell 1968).

Table 24. Products of Mangrove Ecosystems

A. Mangrove Forest Products

Fuel	Firewood (cooking, heating) Charcoal Alcohol
Construction	Timber, scaffolds Heavy construction (e.g. bridges) Railroad ties Mining pit props Boat building Dock pilings Beams and poles for buildings Flooring, panelling Thatch or matting Fence posts, water pipes, chip-boards, glues
Fishing	Poles for fish traps Fishing floats Wood for smoking fish Fish poison Tannins for net and line preservation Fish attracting shelters
Textiles, leather	Synthetic fibres (e.g. rayon) Dye for cloth Tannins for leather preservation
Food, drugs & beverages	Sugar Alcohol Cooking oil Vinegar Tea substitute Fermented drinks Dessert topping Condiments from bark Sweetmeats from propagules Vegetables from propagules, fruit or leaves Cigar substitute
Household items	Furniture Glue Hairdressing oil Tool handles Rice mortar Toys Matchsticks Incense
Agriculture	Fodder, green manure
Paper products	Paper of various kinds
Other products	Packing boxes Wood for smoking sheet rubber Wood for burning bricks Medicines from bark, leaves and fruits

Source: Saenger, et al. 1981.

Savanna. As Tables 21 and 22 indicate, savanna--either in isolation or in association with light forest cover--accounts for the large bulk of Guinea's vegetative cover. Guinean savanna (as compared to Sudanian savanna) is by far the predominant form in the country, as the name suggests. Trees in these regions are mostly broadleaved and reach heights of about 15 m, occasionally forming a closed canopy. Most of these trees are deciduous, but lose their leaves for only brief periods each year.

In the southern stretches of savanna, characteristic species are Lophira lanceolata and Daniellia oliveri. The northern savannas are dominated by Isoberlinia doka. Other savanna species are: Afzelia spp., Brachystegia spp., Burmannia bicolor, Butyrospermum parkii, Cyanotis spp., Daniella spp., Eriocaulon spp., Pterocarpus spp., Scleria spp., Terminalia spp., Uapaca spp., Utricularia subulata, and Xyris spp. A number of thick-barked, fire-resistant trees such as Lophira lanceolata, Afzelia africana, Anogeissus leiocarpus, Borassus aethiopium, and Parkia clappertoniana are also present (Kowal and Kassam 1978; Lawson 1966; Schnell 1968).

3.3.3 Grasslands and Range[24/]

According to FAO surveys since 1961, Guinea's permanent meadows and pastures have covered a constant three million ha (30,000 sq km, or 12.2 percent of the total area; Table 8). Even the post-1978 reclassification of land types did not affect the area of meadowlands and pasturelands. In addition to these three million ha, as the previous section (3.3.2) has shown, grasslands and range sometimes occur in conjunction with forests or savannas. Additionally, an unspecified portion of the terrain designated as "other lands" may be suitable for grazing some of the time (seasonally or every few years).

According to Rattray's intensive study of African grass cover, Guinea's terrain may be divided into three major areas. As Figure 42 illustrates, the entire northeastern portion of the country is principally overlain by grasses of the Andropogon family; below this zone, Hyparrhenias predominate; and, at the southernmost extremities,

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24/ Sources: Kowal and Kassam. 1978.
Lawson. 1968.
Rattray. 1960.
Strange. 1980.
Whyte. 1968.

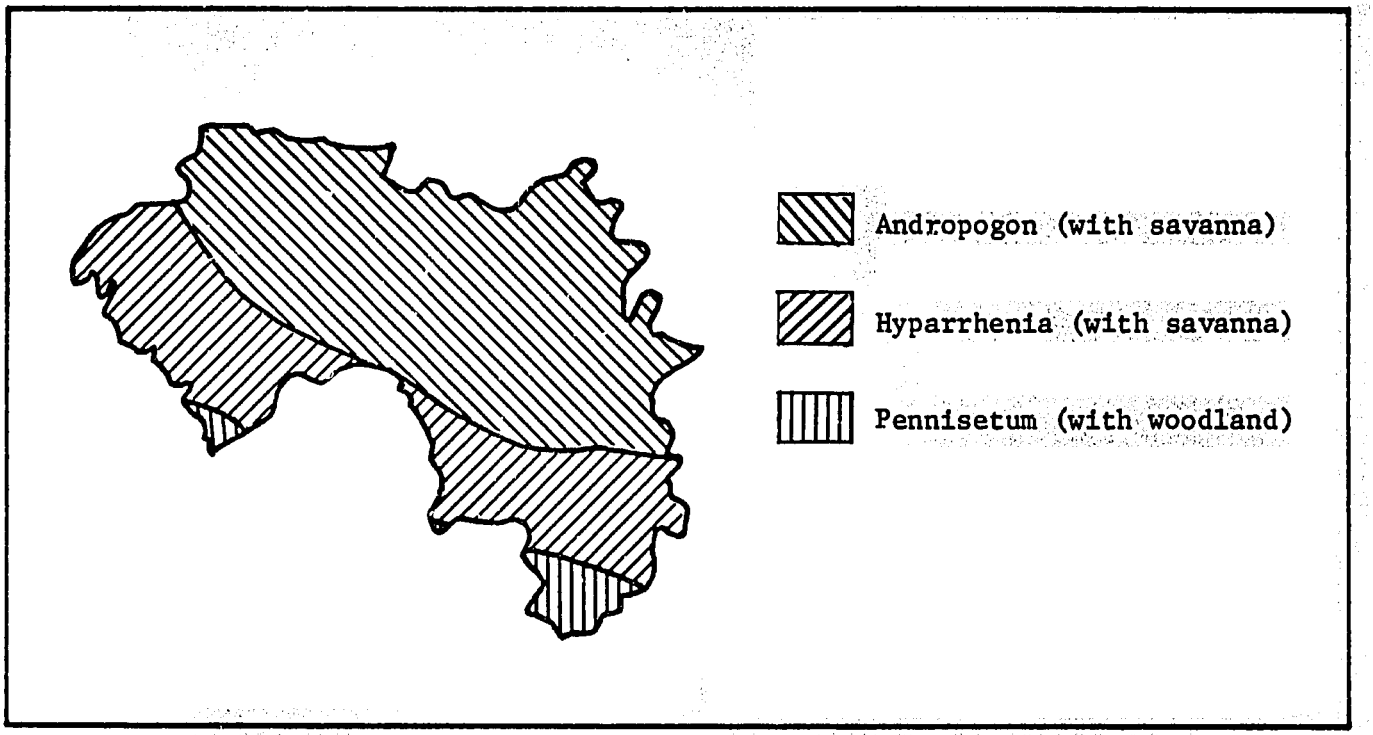

Figure 42. Grasses

Source: Adapted from Rattray (1960).

Pennisetum is the characteristic cover. In nearly all cases, these grasses occur in conjunction with trees, shrubs, or other vegetation. In addition, as Table 25 lists, other grasses are found in association with the three principal types. Of these, the main genera are Cymbopogon, Digitaria, Panicum, Rottboellia Schizachyrium, Setaria, and Sporobolus.

3.3.4 Forest Exploitation[25/]

Not counting thinly wooded open woodlands and savannas, Guinea possesss approximately 1.2 million ha of forested area (Table 22). Of this amount, it has been estimated that 600,000 to 700,000 ha (50 to 58 percent) should be exploitable. About a third of this area is dense forest; the remainder is open or mixed forest. In all, the gross volume of standing timber in Guinea is estimated at 370 million cubic meters. Table 26 shows that in this respect, Guinea ranks sixth among 11 West African nations. Total roundwood production in 1973 was 2.93 million cubic meters, fourth highest in the region. If roundwood production is compared to standing timber, 0.79 percent of Guinea's available timber was converted to roundwood in 1973, about average for West Africa (Table 26).

Table 27, based upon data collected by Persson (1977) and by FAO (Europa 1981b), shows the amount of roundwood produced form Guinea's timber resources. Production has increased steadily since 1960, growing at an average rate of about 3.6 percent per annum. Perhaps the most significant indication provided by Table 27 is the dominance of fuelwood as an eventual product of cut timber. For each year shown in the tabulation, fuelwood accounts for about 85 percent of all roundwood production.

Of the commercial grades of timber, among the most valuable types are teak (Tectona grandis), ebony (Diospyros spp.), acacia (Acacia spp.), shea (Butyrospermum parkii), and baobab (Adansonia digitata). Much of the wood used for fuel is of inferior quality, drawn from short trees, shrubs, and branches. Medicines, chemicals, lacquers, oils, and other products are also derived from mangroves (see Table 24), rubber trees, cinchona trees (Cinchona ledgeriana and C. succirubra), oil palms, and other forms of vegetation.

25/ Sources: Europa. 1981b.
Kurian. 1982.
Persson. 1977.
Riviere. 1977.
Suret-Canale. 1970.
Voss. 1968.

Table 25. Grasses

Grass type	Species found in Guinea	Associated soil types (L or SC*)	Remarks
Andropogon	A. gayanus	SC	Tussock grassland, up to 2.4 m tall, with mainly perennial spp.
	A. chevalieri	SC	
	A. pinguipes	SC	
	A. pseudapricus	SC	
	A. tectorum	SC	
Chechrus	C. biflorous	--	
Cymbopogon	C. giganteus	SC	Tall perennial, above 2 m.
Ctenium	C. newtonii	L	
Diectomis	D. fastigiata	L	Perennial grass.
Digitaria	D. perottettii	SC	
Elyonurus	E. elegans	L	
Hyparrhenia	H. chrysargyrea	SC	Open to dense grass cover, 1.2 to 1.8 m tall, annuals and perennials. Good grazing when short and young; protein content too low to maintain cattle when grass is mature.
	H. cyanescens	SC	
	H. diplandra	SC	
	H. rufa	SC	
	H. subplumosa	SC	
Loudetia	L. togoensis	L	Open to dense grass cover, annuals and perennials.
Panicum	P. afzelii	SC	
	P. phragmitoides	SC	
	P. praealtum	SC	
	P. sublaetum	SC	
	P. tambacoundense	SC	
Penisetum	P. hordeoides	SC	Open, mainly annual grass cover with many weeds. Palatable pasture that can be maintained by close grazing.
	P. subsangustum	SC	
Rottboellia	R. exalta	SC	

Table 25. Grasses (cont.)

Grass type	Species found in Guinea	Associated soil types (L or SC*)	Remarks
Schizachyrium	S. brevifolium	SC	Open to fairly dense grass cover, mainly annuals.
	S. exile	SC	
	S. nodulosum	L	
	S. platyphyllum	SC	
	S. semiberbe	SC	
Setaria	S. pallide-fusca	SC	Perennial grass. Palatable; sometimes cultivated as fodder.
Sporobolus	S. patulus	SC	Perennial grass.

*L=Lateritic soils
SC=Sandy clay soils

Sources: Kowal and Kassam. 1978.
Rattray. 1968.

Table 26. Standing Timber and Roundwood Production in West Africa, 1973

Country	Standing timber gross volume (million m^3)	Total roundwood production (million m^3)	Roundwood production, as proportion of standing timber (%)
Ghana	670	10.13	1.51
Guinea	370	2.93	0.79
Guinea-Bissau	55	0.53	0.96
Ivory Coast	2,100	10.90	0.52
Liberia	500	1.77	0.35
Mali	450	2.86	0.64
Mauritania	215	0.54	0.25
Niger	280	2.49	0.89
Nigeria	1,400	59.76	4.27
Senegal-Gambia	230	2.78	1.21
Sierra Leone	130	2.69	2.07

Source: Persson. 1977.

Table 27. Roundwood Production, 1960 to 1978

Eventual use	Volume of roundwood production (1,000 m^3)[a] 1960[b]	1973[c]	1976[d]	1978[d]
Sawlogs, veneer logs, and logs for sleepers	34	e	180	180
Other industrial wood	200	465[e]	317	333
Fuelwood	1,800	2,460	2,716	2,857
Total	2,034	2,925	3,213	3,370

Notes:
[a] All roundwoods are derived from broadleaved species.
[b] OAU. 1977.
[c] Persson. 1977.
[d] Europa. 1981b.
[e] Volume is for all industrial use.

The country's largest sawmill is located in Nzérékoré, deep in the Forest Region of Guinea. Built with Soviet assistance in 1964, the mill is supplied by the Diecke reserve of primary forest. Thus far the mill has been unable to produce the annual 50,000 cubic meters of sawn wood for which it was designed. In 1972, the latest year for which figures are available, only 90,000 cubic meters of sawn wood were produced in the entire country. Much of this lumber was being exported; the remainder was used to supply furniture manufacturing factories, the construction industry, and other domestic facilities. There is also a particle board factory at Seredon, near Macenta, but it too has failed to operate near capacity (O'Toole 1978).

3.3.5 Administration, Policy, and Planning[26/]

Until early 1981 the forestry sector of Guinea's economy was managed by the Ministry of Agriculture, Water and Forests. A reorganization among federal ministries changed the name of that agency to the Ministry of Agriculture and Agricultural Cooperatives. It is unclear whether forestry remains within the new ministry, or whether responsibility for maintaining forested lands and overseeing roundwood removal has been shifted elsewhere, perhaps to the Ministries of Industry or Internal Trade. In May 1981 a new ministry was created to safeguard the nation's environment; this Ministry of the Environment and Town Planning likely has been assigned some measure of guardianship over Guinea's forestry resources (Europa 1981c; Legum 1981b).

Because forestry traditionally has been administered from within the Ministry of Agriculture, it is difficult to obtain data regarding its sectoral contribution to the GDP, or allocations for its provision within the national budget. It can be deduced, nonetheless, that forestry has not been considered an important component of Guinea's economy. Agriculture, as a whole, while it comprises more than a third of Guinea's GDP (World Bank 1982), receives but a tiny portion of the country's budget expenditures (the figure is on the order of one-half of one percent; Nelson, et al. 1975).

There have been indications over the past several years that the government may upgrade the priority of forestry. Reforestation has become an expressed goal of the

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26/ Sources: Europa. 1981c.
Legum. 1981b.
OAU. 1977.
Riviere. 1977.

administration, and it has been advocated in its last two development plans. In 1981 Guinea obtained assistance from USAID for a five-year community forestry project, scheduled to cost $460,000 (USAID 1982b).

3.4 Faunal Resources, Exploitation, and Conservation Measures

3.4.1 Mammalian Fauna[27/]

African wildlife, because of its abundance, diversity, and uniqueness, has been the subject of sustained and detailed study. The faunal resources of the Republic of Guinea, however, have not undergone the same degree of scrutiny as those of other countries. To date there have been few scientific surveys, analyses, or texts on the animals of Guinea. As a result, virtually all information regarding the country's wildlife, particularly its terrestrial species, has had to be obtained from sources discussing Africa, or West Africa, as an entity.

A summary of Guinea's mammalian species can thus be drawn from the most recent Field Guide to the Mammals of Africa (Haltenorth and Diller 1980). The listing, which appears below as Table 28, demonstrates the richness and variety of Guinea's mammalian population. According to Table 28, at least 90 species of mammals inhabit the forests, savannas, grasslands, river valleys, estuaries, and swamps of this West African nation.

Although no enumerations or censuses have been available for this study (it is not known whether any exist), there is reason to believe that a number of Guinea's mammals are in danger of elimination. The IUCN Red Data Books (1976; 1978a) and the U.S. Fish and Wildlife Survey (FWS 1980) together list 11 species as endangered or threatened (Table 29). Among these, perhaps the best known are: chimpanzee, African elephant, pygmy hippopotamus, leopard, and manatee.

27/ Sources: Dorst. 1970.
FAO-UNEP. 1979.
FWS. 1980.
Haltenorth and Diller. 1980.
IUCN. 1976.
-----. 1978a.
Myers. 1976.
Nelson, et al. 1975.

Table 28. Endemic Mammalian Species

Common Name	Scientific name
Even-toed ungulates	Artiodactyla
Pigs	Suidae
Bush pig	*Potamochoerus porcus*
Giant forest hog	*Hylochoerus meinertzhageni*
Warthog	*Phacochoerus aethiopicus*
Hippopotamusses	Hippopotamidae
Hippopotamus	*Hippopotamus amphibius*
Pigmy hippopotamus	*Choeropsis liberiensis*
Chevrotains	Tragulidae
Water chevrotain	*Hyemoschus aquaticus*
Hollow-horned ruminants	Bovidae
Duikers or crowned antelopes	Cephalophinae
Red-flanked duiker	*Cephalophus rufilatus*
Blue duiker	*C. monticola*
Yellow-backed duiker	*C. sylvicultor*
Common duiker	*C. grimmia*
Small antelopes	Raphicerinae
Oribi	*Ourebia ourebi*
Bushbucks	Tragelaphinae
Bushbuck	*Tragelaphus s[illegible]cus*
Sitatunga	*T. spekii*
Bongo	*T. eurycerus*
Eland	*T. oryx*
Roan, sable, and oryx antelopes	Hippotraginae
Roan antelope	*Hippotragus equinus*
Reed and waterbucks	Reduncinae
Waterbuck	*Kobus ellipsiprimnus*
Kob, Puku	*K. kob*
Bohor reedbuck	*Redunca redunca*
Hartebeestes	Alcelaphinae
Sassaby	*Damaliscus lunatus*
Hartebeeste	*Alcelaphus buselaphus*
Gazelles	Gazellinae
Red-fronted gazelle	*Gazella rufifrons*

Table 28. Endemic Mammalian Species (cont.)

Common Name	Scientific name
Cattle	Bovinae
Cape buffalo	Syncerus caffer
Hyraxes	Hyracoidea
Tree dassie	Dendrohyrax arboreus
Cape dassie	Procavia capensis
Elephants	Proboscidea
African elephant	Loxodonta africana
African pigmy elephant	L. pumilio
Sea cows	Sirenia
African manatee	Trichechus senegalensis
Aardvarks	Tubulidentata
Aardvark	Orycteropus afer
Scaly anteaters	Pholidota
White-bellied pangolin	Manis tricuspis
Giant ground pangolin	M. gigantea
Rodents	Rodentia
Squirrels and scaly-tailed flying squirrels	Sciuridae and Anomaluridae
Western ground squirrel	Xerini spp.
Giant forest squirrel	Protoxerus stangeri
Temminck's giant squirrel	Epixerus ebii
Gambian sun squirrel	Heliosciurus gambianus
Red-legged sun squirrel	H. rufobrachium
Lord Derby's flying squirrel	Anomalurus derbianus
Beecroft's flying squirrel	Anomalurops beecrofti
Long-eared flying squirrel	Idiurus macrotis
Porcupines	Hystricidae
African bush-tailed porcupine	Atherurus africanus
North African crested porcupine	Hystrix cristata
Cricetines	Cricetidae
Giant Gambian rat	Cricetomys gambianus
Emin's giant rat	C. emini
Cane rats	Thryonomyidae
Cane rat	Thryonomis swinderianus

Table 28. Endemic Mammalian Species (cont.)

Common Name	Scientific name
Rabbits and hares	Lagomorpha
Whyte's hare	*Lepus whytei*
Carnivores	Carnivora
Dogs and foxes	Canidae
Pale fox	*Vulpes pallida*
Side-striped jackal	*Canis adustus*
Hunting dog	*Lycaon pictus*
Martens and weasels	Mustelidae
Striped polecat	*Letonyx striata*
Ratel	*Mellivora capensis*
Spot-necked otter	*Lutra maculicollis*
Cape clawless otter	*Aonyx capensis*
Civet cats	Viverridae
Small-spotted genet	*Genetta genetta*
Hausa genet	*G. thierryi*
Large-spotted genet	*G. tigrina*
Pardine genet	*G. pardina*
African civet	*Viverra civetta*
Two-spotted palm civet	*Nandinia binotata*
Egyptian mongoose	*Herpestes ichneumon*
Slender mongoose	*H. sanguineus*
Marsh mongoose	*H. paludinosus*
Banded mongoose	*Mungos mungo*
Gambian mongoose	*M. gambianus*
Cusimanse	*Crossarchus alexandri*
White-tailed mongoose	*Lehneumia albicauda*
Striped hyaena	*Hyaena hyaene*
Spotted hyaena	*Crocuta crocuta*
Cats	Felidae
Lion	*Panthera leo*
Leopard	*P. pardus*
Cheetah	*Acinonyx jubatus*
Caracal	*Caracal caracal*
Serval	*Leptailurus serval*
African wild cat	*Felis silvestris*
Golden cat	*Profelis aurata*
Primates	Prosimii
Lorises	Lorisidae
Lesser galago	*Galago senegalensis*
Demidoff's galago	*G. demidovii*
Potto	*Perodicticus potto*

Table 28. Endemic Mammalian Species (cont.)

Common Name	Scientific name
Monkeys and baboons	Cercopithecidae
Baboon	Papio cynocephalus
Collared mangabey	Cercocebus torquatus
Patas monkey	Erythrocebus patas
Lesser white-nosed guenon	Cercopithecus petaurista
Diana monkey	C. diana
Mona monkey	C. mona
Green monkey	C. aethiops
White colobus	Colobus polykomos
Red colobus	C. badius
Olive colobus	C. verus
Apes	Pongidae
Chimpanzee	Pan troglodytes
Insectivores	Insectivora
Hedgehogs	Erinaceidae
Four-toes hedgehog	Erinaceus albiventris
Otter shrews	Potamogalinadae
Lesser otter shrew	Micropotamogale lamottei

Note: The order in which mammals are listed follows the hierarchical arrangement in Haltenorth and Diller (1980).

Source: Haltenorth and Diller. 1980.

Table 29. Endangered or Threatened Mammals

Common name	Scientific name	Status[a] IUCN[b]	Status[a] FWS[d]
Chimpanzee	Pan troglodytes	T	T
Colobus, olive	Colobus verus	T	--
Eland, Western giant	Taurotragus derbianus derbianus	--	E
Elephant, African	Loxodonta africana	T	T
Hippopotamus, pygmy	Choeropsis liberiensis	T[c]	T
Leopard	Panthera pardus	T	E
Manatee, West African	Trichechus senegalensis	T	T
Mandrill	Papio sphinx	--	E
Mangabey, white collared	Cercocebus torquatus	--	E
Monkey, Diana	Cercopithecus diana	--	E
Wild dog, African	Lycaon pictus	T	--

Notes:
[a] T = threatened; E = endangered
[b] IUCN. 1978a.
[c] IUCN. 1976.
[d] FWS. 1980.

3.4.2 Avifauna[28]

As in the case of mammalian species, occurrences of avifauna in Guinea are extremely difficult to ascertain. There have been no surveys of bird populations in the country. Even regional texts such as the Field Guide to the Birds of West Africa (Serle and Morel 1977) generally omit any mention of Guinea in the discussions on distribution and habitat. This situation most likely reflects the twenty-year isolation of Guinea from the scientific community as a whole, and from mainstream ornithological research in particular.

Serle and his co-investigators (Serle and Morel 1977) have catalogued a total of nearly 1,400 species of birds, belonging to 73 families, for the entire West African subcontinent. Based upon a random sampling, it appears that as many as half of the listed species may occur in Guinea, either as residents or migrants. The avian population includes: predatory species; large water birds; parrots and hornbills; "game birds"; fowl; and dozens of small colorful finches, warblers, sunbirds, weavers, and sparrows.

Remarkably, neither IUCN (King 1981) nor the Fish and Wildlife Service (FWS 1980) considers any of Guinea's avian species to be threatened. Partly, of course, this is a result of insufficient data based upon a paucity of fieldwork and observation. As population pressure forces increased urbanization in the vicinity of established settlements, larger species or species having specialized habitats will certainly become threatened.

3.4.3 Herpetofauna and Amphibians[29]

Guinea's forests and swamps provide natural habitats to a large and varied population of reptiles and amphibians. Snakes--pythons, mambas, vipers, and water snakes--, crocodiles, tortoises, turtles, frogs, and toads all abound in Guinea's tropical environment. As in all of West Africa, crocodiles are under the greatest pressure to

[28] Sources: FWS. 1980.
King. 1981.
Nelson, et al. 1975.
Serle and Morel. 1977.
Thiollay. 1978.

[29] Sources: FWS. 1980.
IUCN. 1975.
Nelson, et al. 1975.

survive. Three species, the African slender-snouted crocodile, the Nile crocodile, and the West African dwarf crocodile continue to exist precariously. But all three of these species are threatened or endangered, according to IUCN and FWS (Table 30). In addition, the Fish and Wildlife Service considers the African viviparous toad to be endangered.

Table 30. Endangered or Threatened Reptiles and Amphibians

Common name	Scientific name	Status[a]	
		IUCN[b]	FWS[c]
Crocodile, African slender-snouted	Crocodylus cataphractus	T	E
Crocodile, Nile	Crocodylus niloticus	T	E
Crocodile, West African dwarf	Osteolaemus tetraspistetraspis	T	E
Toad, African viviparous	Nectophrynoides occidentalis	--	E

Notes: [a] T=threatened; E=endangered
[b] IUCN. 1975.
[c] FWS. 1980.

3.4.4 Aquatic Fauna[30/]

Guinea's inland freshwater streams and its coastal saltwater inlets, bays, lagoons, and open sea are well stocked with aquatic lifeforms. The rivers and streams are a source of tilapia and numerous other fish, some of these edible. Along the coast, there are not only fish, but crustaceans such a crayfish, shrimp, and crab; and molluscans such as oyster, octopus, squid, and cuttlefish.

Further offshore, in the Gulf of Guinea, the main pelagic species include Sardinella aurita and S. maderensis, Ilisha sp., Scomber sp., Trachurus sp., Brachydeuterus sp., and Paracubiceps sp. Table 31 lists some of the important fish found off Guinea's coast.

30/ Sources: Crutchfield and Lawson. 1974.
Nelson, et al. 1975.
Priest. 1963.
Williams. 1969.

Table 31. Pelagic Species in the Gulf of Guinea

Scientific name	Common name
Brachydenterus sp.	--
Clupea harengus	Herring
Conger caudilimbata	Conger
Engraulis enchrasicholus	Anchovy
Galeoides sp.	Fusiform shark
Hypoclydonia bella	--
Ilisha sp.	--
Katsuwonus pelamis	Skipjack tuna
Macrouridae sp.	--
Mugil cephalus	Striped mullet
M. curema	White mullet
Neothunnus argentivittatus	Yellowfin tuna
N. macropterus	Yellowfin tuna
Pagrus sp.	Sea bream
Paracubiceps sp.	--
Pseudotolithus sp.	--
Sardinella spp.	Sardine
Scomberomorus commersonii	Barracuda
S. maculatus	Spanish mackeral
Scoliodon terrae-novae	West African shark
Tarpon atlanticus	Tarpon
Trachurus trachurus	Horse mackerel
Trichiurus lepturus	Cutlassfish
(various spp.)	Bass
(various spp.)	Billfish
(various spp.)	Bonito
(various spp.)	Jack
(various spp.)	Redfish
(various spp.)	Sauries
(various spp.)	Snoek

Sources: Crutchfield and Lawson. 1974.
Nelson, et al. 1975.
Williams. 1969.

3.4.5 Wildlife Exploitation and Fisheries

3.4.5.1 Commercial Uses of Terrestrial Fauna[31/]

Until the colonial era, hunting was the principal livelihood of many of Guinea's resident communities. Particularly in the inland forested areas, seasonal hunting was undertaken by skilled specialists. Employing traps, spears, clubs, and bows and arrows, hunters were generaly integrated within farming societies.

Prior to the introduction of rainforest cash crops such as cacao and coffee, hunting was far more important than it is now. Despite the partial clearing of forested areas for plantations, hunting continues as an economically important activity, particularly among residents of the Forest Region. There and in other wooded locales, wildlife provides a variety of bush meat, which is usually smoked for preservation. Elephants, antelopes, monkeys and lemurs, palm civets, tree hyraxes, porcupines, squirrels, mire, rats, other small rodents, snakes--in short, "anything that moves,"--all are presumed edible (White and Gleave 1971). The animals are taken during the post harvest dry season, cured, and kept or sold in village markets. In the savannas, hunters venture in groups, sometimes accompanied by dogs. Increased efficiency and widespread use of firearms has facilitated hunting, and consequently increased the threat to certain species.

Throughout most of Africa animals are killed for products other than their meat (skins, furs, horns, tusks, and feathers, for example). Some of this profiteering no doubt occurs in Guinea as well. The endangerment of the African elephant and of the cheetah are partial indicators of the economic value of those species. Because Guinea continues to isolate itself from regional and global markets, however, there is some reason to believe that the non-meat value of faunal species remains limited. Similarly, while sustained yield harvesting of wildlife is being developed and implemented elsewhere--particularly in East Africa--there is no evidence of such practices in Guinea.

31/ Sources: Child. 1971.
Hopkins. 1973.
Huxley. 1963.
Pollock. 1974.
White and Gleave. 1971.

3.4.5.2 Fisheries[32/]

Guinea's fishing taps two sources of supply: the inland rivers, and the Atlantic coastal waters. Both types of fishing predate the colonial period, and continue to reflect the traditional origins of the enterprise. According to a 1968 estimate, approximately 10,000 Guineans were identified as fisherfold (Suret-Canale 1970).

Guinea's streams are fished extensively at least twice each year. By use of diverse methods such as fishing lines and hooks, nets, baskets, traps, and poisons, residents catch an average of 1,000 metric tons each year (Table 32).

Ocean fishing, accomplished mainly aboard dugout canoes--some with outboard motors--accounts for about 90 percent of Guinea's annual catch. In 1972 Guinea's fishing fleet consisted of 1,300 canoes and just nine trawlers (Crutchfield and Lawson 1974; Suret-Canale reported the existence of 13 trawlers in 1968). Between 1971 and 1975, Guinea's catch of ocean fish more than doubled, from 5,000 MT to 12,400 MT. Since then, the volume appears to have settled at around 9,000 to 10,000 MT per year (Table 32).

Table 32. Fish Catch, 1960 to 1978

Source	Volume of fish caught (1,000 metric tons)							
	1960[a]	1971[b]	1973[c]	1974[c]	1975[c]	1976[c]	1977[c]	1978[c]
Inland waters	*	*	1.0	1.0	1.0	1.0	1.0	1.0
Atlantic Ocean	*	5.0	8.5	11.1	12.4	8.9	8.1	9.0
Total catch	5.0	*	9.5	12.1	13.4	9.9	9.1	10.0

*Not available

Sources: [a] OAU. 1977.
[b] Crutchfield and Lawson. 197[illegible]
[c] Europa. 1981b.

[32/] Sources: Crutchfield and Lawson. 1974
Europa. 1981b.
Hopkins. 1973.
May and McClellan. 1968
Nelson, et al. 1975.
OAU. 1977.
Shaw. 1977.
Williams. 1969.

Whether from the ocean or from streams, once landed the fish are usually dried and smoked for use throughout the year. Everywhere in Guinea, fish is considered a valuable food. Estimates of daily per capita fish consumption range from 12 grams to 14 grams, the lowest figure among West Africa's coastal states. This represents an amount that provides about ten percent of the iron and two percent of the protein in the diet (May and McClellan 1968). According to FAO, Guinea's fish production in 1970 met only a third of the demand, a demand that was expected to rise by 50 percent during the following decade (Crutchfield and Lawson 1974).

Although Guinea's total annual catch of pelagic species remains relatively small at about 9,000 MT, the coastal waters increasingly are being exploited by the fishing fleets of noncoastal states. Already in 1971, more than two-thirds of the total nominal catch in the waters under the jurisdiction of the Commission for the East Central Atlantic Fisheries (CECAF; includes the waters off the coasts of Morocco to Zaire) was taken by foreign fleets. In 1971 the USSR and Norway alone accounted for more than third of the regional catch. According to a report in the New Afican (Shaw 1977), the vast majority of these catches is not even processed in West Africa. As Guinean fishing boats go further offshore and increase their capacity, competition from foreign fleets seems likely to become an issue of contention.

3.4.6 Parks and Reserves[33/]

Although Guinea is comprised of several biogeographic zones, each rich in vegetative and faunal lifeforms, to date only one specific area officially has been set aside as a nature reserve. Partly as a spontaneous recognition of the importance and uniqueness of the Mt. Nimba region, and partly in reaction to international pressure (the area transects three countries, Guinea, Liberia, and Ivory Coast; see Fig. 2), Guinea has maintaned the status of this environment as a Strict Natural Reserve (SNR). Originally designated as a protected area in 1974, the Mt. Nimba Park covers 13,000 ha in Guinea (another 5,000 ha are protected in Ivory Coast). In 1980 the Guinean portion of Mt. Nimba SNR was nominated as a World Heritage Site (WHS; IUCN 1981). Table 33 summarizes some of the features of the park.

33/ Sources: Curry-Lindahl. 1974a.
IUCN. 1974.
-----. 1979.
-----. 1980.
-----. 1981.
MAB. 1979.

Table 33. Characteristics of Mt. Nimba Strict Natural Reserve

Name:	Mt. Nimba SNR
Area:	13,000 ha within Guinea; 18,000 ha in total (including portion in Ivory Coast)
Biographical province:	Guinean Rainforest
Date established:	1944
Description:	Formerly a Pleistocene forest refuge, with remarkably rich flora and fauna. The lower slopes are covered in dense, semideciduous forest, giving way, above 1,000 m, to montane forest rich in epiphytes. The summits of this long, iron-rich mountain are covered in montane savanna. There are more than 200 endemic animal species. In addition, a rare amphibian, the viviparous toad, Nectophrynoides occidentalis, occurs in the montane savannas (as Table 30 shows, that species is endangered). In 1955 high-grade iron ore was discovered in the region, and in 1963 mining operations were initiated, threatening the pristene state of the park.
Recommendations of the Special Working Session on the Conservation of Biotic Communities in West and Central Africa, 1980:	- Considering the importance of mountains and West Africa plateaux in the conservation of fauna and flora on the one hand, and in the general surface water reserve cycle on the other; - Considering Mount Nimba's particular importance in these different areas and that Mount Nimba has been found to be rich in various mineral deposits; - Impressed by the information received that existing biotic communities have not been destroyed for the sake of minerals, though disturbed by possible developments and impending threats; The session recommends: - that the governments of Ivory Coast, the Republic of Guinea and Liberia deploy all forces for the protection of the whole Mount Nimba system;

Table 33. Characteristics of Mt. Nimba Strict Natural Reserve (cont.)

	- that if need be, the international community in charge of ecosystems conservation cooperate with the governments concerned to determine the most important zones and establish scientific priorities with the least economic implications possible; - request IUCN in particular to coordinate and promote these efforts to their earliest realization.
Status:	Strict Natural Reserve (Govt. of Guinea); planned World Heritage Site (IUCN); Biosphere Reserve (MAB).

Sources: Curry-Lindahl. 1974a.
IUCN. 1981.

According to IUCN (1981), in addition to the Mt. Nimba SNR, one other area has been declared as a Man and the Biosphere (MAB) Afrotropical Realm Biosphere Reserve. The location of the second site is not identified by IUCN, however, and MAB's own 1979 compilation of Biosphere Reserves (the latest such document), lists no such areas in Guinea. The Government of Guinea's Ministry of Education and Culture, in a recent publiation (GNCU 1979), further alludes to "reserves or areas protected by the Water and Forestry Administration." But in this text too, the locations of such protected areas are not identified.

The Fouta Djallon mountain range may be one area under consideration for official protection. Because of its location as the source of several important regional river systems, the Special Working Session of the Conservation of Biotic Communities in West and Central Africa has recommended that Guinea, Senegal, and Guinea-Bissau cooperate to restore and preserve the Fouta Djallon. To date, however, no part of the Fouta Djallon rnage or plateau has been declared a protected area (IUCN 1981). In conclusion, lacking more specific data, it must be assumed that the Mt. Nimba SNR is presently the only major vegetation and wildlife preserve in Guinea.

3.4.7 Governmental Agencies[34/]

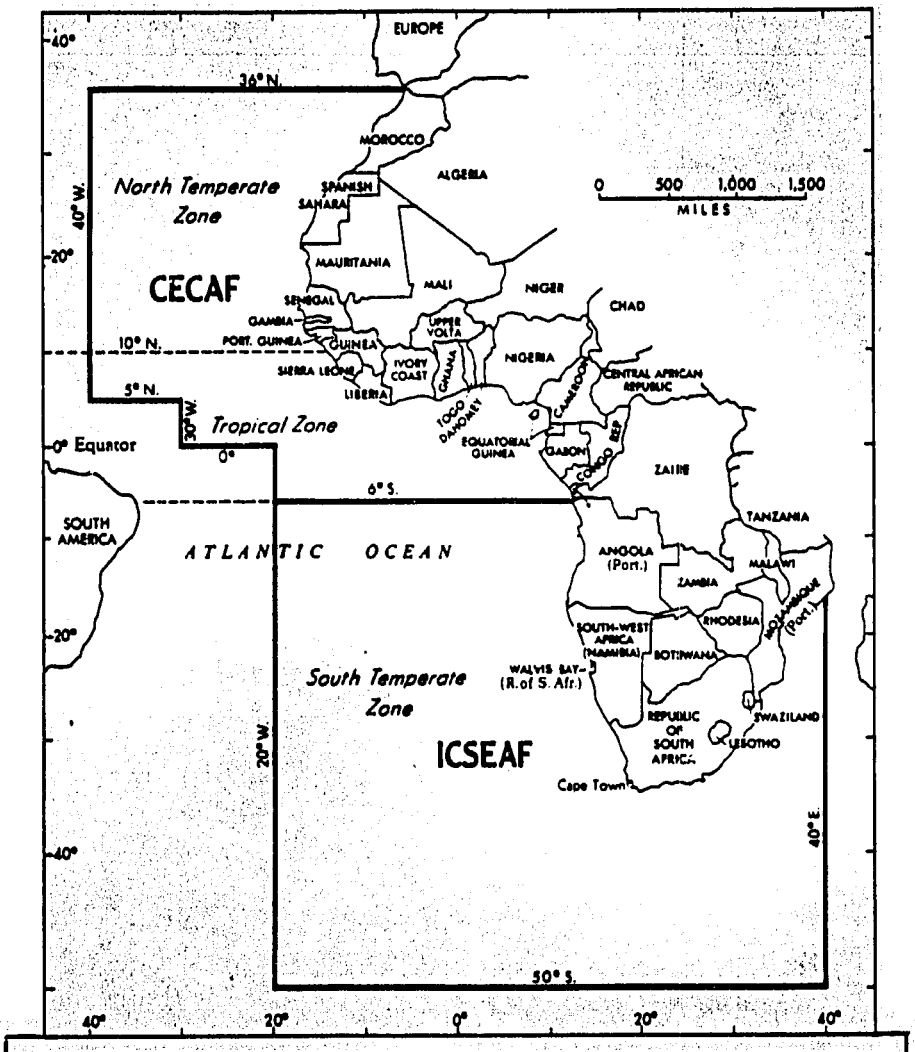
As the preceding section has indicated, there does not currently appear to be grat interest or activity in conservation of wildlife. So long as Guinea is beset by serious economic problems, matters relating to preserving natural areas will probably retain relatively low priority. From a May 1981 listing of the country's ministries, in fact, it remains unclear which of these organizations is responsible for affairs relating to wildlife and parks (Europa 1981c). According to a 1979 Ministry of Education statement, the responsibility for protecting certain areas lies with the Water and Forestry Administration (GNCU 1979). It is unclear, however, which ministry oversees the work of this agency.

Fishing, because it is a productive commercial enterprise, receives more official attention. As such, it is regulated at the ministerial level, within the Ministry of Livestock

34/ Sources: Grutchfield and Lawson. 1974
Duic. 1978.
Europa. 1981c.
GNCU. 1979.
O'Toole. 1978.

and Fishing. Recognizing the need to coordinate internationally fishing in the Atlantic Ocean, the government joined with other littoral West African states in forming the Commission for the East Central Atlantic Fisheries (CECAF). This organization exercises jurisdiction over the waters west of the northern half of the African coast (Fig. 43).

Commercial fishing has not been nationalized, so it operates privately. A number of cooperative ventures with foreign nations dominate Guinea's fishing industry. The main such associations are: The Société Guinéo-Koweitienne de Pêche (SOUGUIKOP; or the Guinean-Kuwaiti Fishing Company); the Société Nippo-Guinéenne de Pêche (SONIGUE; or the Nippo-Guinean Fishing Company); and the Societe Africaine des Pêches Maritimes (AFRIMAR; or the African Maritime Fishing Company; O'Toole 1978).



CECAF = Commission for the East Central Atlantic Fisheries

ICSEAF = International Commission for the Southeast Atlantic Fisheries

Figure 43. Jurisdictory Area of the Commission for the East Central Atlantic Fisheries (CECAF)

Source: Crutchfield and Lawson. 1974.

4.0 Environmental Problems

4.1 Isolationism and Lack of Information[35/]

From its creation in 1958 as a nonaligned democratic and socialist republic, Guinea has asserted its independence from external influences. Perhaps the earliest manifestation of Guinea's deliberately isolationist policy was its refusal to participate in France's post colonial community of former territories, and its coincident withdrawal from the Franc Zone. Some of the economic consequences of this self-imposed withdrawal from international affairs have been described in the literature and are familiar to observers of the African continent.

The issue of whether Guinea's twenty-year isolationism was or was not in its own long-term interest remains a sensitive political matter. What is more apparent is that during this period the country withdrew not only from global politics and foreign markets, but from regional development associations, scientific forums, and international educational exchanges. As a result, very little research was conducted in Guinea, virtually no Guinean scientists benefited from foreign training, and few foreign ideas could be absorbed into the indigenous mode of planning and administration.

Specifically, with regard to environmental issues, Guinea's xenophobia and reclusiveness have been particularly felt. Although, as the preceding chapters and sections illustrate, there are often ample sources describing Guinea's environment, there are extremely few studies assessing the nation's ecological problems. Guinea's population, climate, terrain, and resources resemble those of neighboring countries; it is reasonable to suppose that the national shares its West African neighbors' environmental concerns, as well. But while recent research has provided substantive information on such problems in Mauritania, Senegal, Mali, Sierra Leone, Liberia, Ivory Coast, and Ghana, hard facts have been difficult to obtain in the case of Guinea.

As Guinea readjusts its orientation, this paucity of information can be expected to be filled. There have been steady signs over the past five years that the country's ruling party, the PDG, is ready to emerge from its "cocoon of secretive isolation" (New African 1978). With a more sympathetic government in power in France, moreover, Guinea has begun an important rapprochement with its former colonial master (Africa Diary 1982). If this revived

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35/ Sources: Africa Diary. 1982.
Dunn. 1978.
Kurian. 1982.
New African. 1978.
Synge. 1981.

climate of openness should continue, it is likely that Guinea's previously understudied and richly varied environment will be subjected to increased scrutiny, and perhaps ultimately to more control and protection.

Until the information gap resulting from a quarter century's neglect is filled, however, any evaluation of Guinea's environmental problems must remain somewhat speculative. For now, it is fair to say that the insufficiency of information--caused by inadequacy of: scientific and technical research; training facilities; regional and international cooperation; and public expenditures for environmental maintenance--itself constitutes one of Guinea's most serious environmental problems.

4.2 Physical and Climatic Problems[36/]

Perhaps nothing attests more strongly to Guinea's fortuitous geoclimatic situation than the fact that the nation generally has been spared by most natural disasters. Lying safely to the south of the chronically drought-stricken Sahel zone, Guinea has not experienced the serious water shortages of its northern neighbors. And, although its coastal plains are exposed to occasional tidal and rain-induced flooding, there have been no recent recorded floods of catastrophic proportions. Nor does the available literature mention destruction by cyclones, hurricanes, or tidal waves. There have been instances of tornadoes and other localized atmospheric turbulence, but their effect has been very limited.

Physiographically, while Guinea, like much of the surrounding region lies atop the vast West African craton, the has been no major tectonic activity since the Quaternary period, when lava flows created the Fouta Djallon highlands. There are no volcanoes--active or inactive--within the country, and there have been no measurable earthquakes (Pritchard 1979).

The only physical phenomenon that approaches disastrous proportions is flooding--both coastal and inland. Along the low-lying littoral plains, estuaries are periodically inundated by tidal action during the dry season and by rainwater during the wet months. Frequently the action of the water destroys dikes and

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36/ Sources: Choubert and Faure-Muret. 1971c.
Kowal and Kassam. 1978.
Kurian. 1982.
Nelson, et al. 1975.
Pollock. 1974.
Pritchard. 1971.
-----. 1979.
Suret-Canale. 1970.
de Vos. 1975.

constructed drainage outlets, allowing destructive salts to seep into rice fields adjoining mangrove swamps. Inland, along the flood plains of the Niger, the Bafing, and Guinea's other important rivers, heavy rainfall seasonally swells the streams. Occasionally, the waters reach flood level, displacing inhabitants, damaging villages and homes, and destroying crops. Sometimes, through waterlogging, the effects of heavy flooding persist after the waters have receded. Since independence, the two worst such floods occurred in 1962 and in 1967. During the early 1970s, in the valley of the Upper Niger River, such flooding alternated with mild drought.

The colonial administration, in its late phase, began implementing some flood control programs. These included construction of barrages, embankments, and drainage canals. At independence only some 10,000 ha (100 sq km) of land adjoining the Niger had been affected by such structures. There is little evidence that substantial new flood prevention measures have been adopted during the twenty-five years since. Perhaps because the country has not suffered a flood of catastrophic proportions, there has been no urgency to expend scarce capital resources for flood control.

Brush and forest fires are the only additional naturally caused phenomena of consequence in Guinea. Each year thousands of hectares of savanna and woodland are lost to flames. Because spontaneous conflagrations have been occurring since primeval times, many vegetative species have adapted to the threat by evolving fire-resistant barks (see 3.3.2), thus preserving themselves and inhibiting the spread of fire. The most seriously damaging fires, however, usually are not natural, but man-caused. Their consequences cause heavy deforestation and considerable soil erosion. This aspect of fires will be discussed further in the section on land use problems (4.4 below).

4.3 Environmental Disease

4.3.1 General Features of Public Health[37/]

If public health is defined as the degree of adjustment of a population to its environment, Guinea, like most nations in West Africa faces serious public health problems. Poor availability of safe drinking water (10 percent of the population in 1978; Table 20), low agricultural productivity and consequent food shortages (Guinea ranks 87th in the world in per capita food consumption; Kurian 1982),

37/ Sources: Duic. 1978.
May. 1968.
Nelson, et al. 1975.
Rivière. 1977.
O'Toole. 1978.

prevalence of infectious disease, insufficient medical personnel and facilities (Guinea is 123rd in the world in medical personnel; Kurian 1982), and low budgetary priority for expenditures in the public health sector (just four percent of total expenditures in 1973; Riviere 1977) combine to produce a generally low level of public health.

Table 34 summarizes the main indicators relating to public health in Guinea. The crude birth rate, crude death rate, and fertility rate are about average for "low-income countries." But life expectancy (45 years in 1980) is three years below average, and both infant and child mortality rates are well above average (165 and 37 in Guinea, and 130 and 22 on the average, respectively; World Bank 1982). One of the few indicators which compares favorably with figures elsewhere in the developing world is the ratio of population to nursing personnel--2,490. It should be noted, however, that over the past two decades, all of the statistics shown on Table 34 have improved considerably.

One health-related indicator which has experienced notable improvement has been the number of hospitals, dispensaries, and health care facilities. Although the approximately 250 such establishments remain vastly inadequate to meet the needs of Guinea's rising population, the number has grown significantly since independence. As late as 1953 there were only three dispensaries, four maternity clinics, and four buildings with hospital facilities outside the capital (Rivière 1977). Table 35 lists the locations and types of health care institutions in 1978. The table shows clearly that many districts remain without primary health care facilities. Additionally, even in Conakry there are shortages of equipment and medical supplies, and management is frequently ineffectual.

Finally, Table 36 provides figures for Guinea's budgetary allocations for public health.

4.3.2 Prevalent Diseases[38/]

Nearly all of the diseases affecting Guinea's population can be considered to originate in, or to be transmitted by the environment. Some ailments can be seen as direct consequences of the climate--heat, sun, and wind. Dehydration is the most common of these conditions; it may

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38/ Sources: Ford. 1975.
Kurian. 1982.
Monjour and Tourne. 1980.
Nelson, et al. 1975.
O'Toole. 1978.
Sow. 1978.
Tolba. 1979.
Van den Berghe. 1963.
de Vos. 1975.
USAID. 1975b

Table 34. Health-related Indicators

Statistic	Year(s)	Value	Source(s)
Total population (millions)	1980	5.4	a
Average annual population growth rate (percent)	1970-80	2.9	a
Crude birth rate (per 1,000)	1980	46.0	a
	1981	45.8	b
Total fertility rate (avg. no. of children per woman)	1980, 1981	6.2	,b
Crude death rate (per 1,000)	1980	20.0	a
	1981	19.6	b
Life expectancy at birth (years)	1980, 1981	45.0	,b
Infant (0-1 year) mortality rate (per 1,000 live births)	1980	165.0	a
	1981	162.8	b
Child (1-4 years) death rate (per 1,000)	1980	37.0	a
	1981	36.4	b
Population per physician (number)	1977	16,630.0	a
Population per nursing person (number)	1977	2,490.0	a
Population per trained midwife (number)	1976	7,990.1	b
Population per hospital bed (number)	1976	634.0	b
Food consumption per capita (calories per day)	1977	1,943.0	;b
Daily per capita caloric supply (percent of FAO requirement)	1977	78.0	a
Daily per capita protein supply (grams per day)	1977	42.6	b
Daily per capita protein supply (percent USDA requirement)	1977	71.0	b

[a] World Bank. 1982.
[b] USAID. 1982c.

Table 35. Urban Hospitals and Medical Facilities, 1978

Location	Type of Facility	Number
Conakry Administrative Region		
Conakry	Hospitals (H)	2
Conakry	Dispensaries (D)	4
Dixinn	D	1
Madina	D	1
Ratome	Maternity clinic (M)	1
Lower Guinea		
Kindia	D	1
Forecariah	H	1
Fria	H	1
Fria	M	1
Dubreka	D	1
Telimele	H	1
Boke	H	1
Middle Guinea		
Labe	H	1
Mamou	M	1
Tougue	H	1
Koundara	H	1
Upper Guinea		
Kankan	H	1
Kankan	D	3
Kankan	M	1
Kouroussa	H	1
Siguiri	H	1
Dinguiraye	M	1
Forest Region		
Nzerekore	H	1
Nzerekore	D	1
Macenta	H	1
Beyla	H	1
Kissidouguou	D	1
Gueckedou	D	1
Totals:		
	Hospitals (H)	15[a]
	Dispensaries (D)	14[b]
	Maternity clinics (M)	5
	Total medical facilities	34[c]

Notes: [a] This figure probably represents the number of "first-class" hospitals. According to the government, there are also 13

Notes: (cont.)

"second-class," and 16 "third class" hospitals in Guinea (Nelson, et al. 1975).

[b] According to the government, there were a total of 241 dispensaries throughout the entire country (Nelson, et al. 1975).

[c] In 1976 there were an estimated 7,650 hospital beds (USAID 1982c).

Source: Duic. 1978.

Table 36. Budgetary Allocations for Public Health, 1964 to 1973

Year	Total budgetary expenditures (millions of Guinean francs)	Expenditures for public health (millions of Guinean francs)	Public health expenditures, as percent of budget (%)
1964-65	22,570	1,420	6.3
1965-66	25,080	1,660	6.6
1966-67	29,640	1,280	4.3
1967-68	32,100	1,650	5.1
1968-69	23,476	1,735	7.4
1969-70	25,880	1,680	6.5
1970-71	22,856	1,490	6.5
1971-72	27,830	1,670	6.0
1972-73	45,000	1,820	4.0

Source: Rivière. 1977.

induce heat stroke, cramps, circulatory malfunctions, and in extreme cases, coronary failure. The dry Harmattan winds originating in the Sahara also cause physical discomforts and illness. By stirring up microbe-laden dust, these winds spread infections such as conjunctivitis, meningitis, and respiratory diseases. In addition, the hot winds dry up the rhinopharyngial mucosae, thus weakening their ability to defend against infection.

The environment plays a less direct, but nevertheless active role in spreading other infectious diseases. Some are transmitted vectorially. Common endemic diseases carried by vector organisms are: (a) trypanosomiasis, or "sleeping sickness" (tsetse fly, or Glossina morsitans); (b) malaria (anopheles spp. mosquito); (c) schistosomiasis, or bilhariasis (gasteropodous molluscs, such as Billinus pryogophysa, B. globosus, and B. trucatus); (d) filariasis, or elephantiasis (crustacean copopods known as cyclops or Guinea worms, Dracunculus medinensis); (e) onchocerciasis, or river blindness (biting black flies); and (f) leishmaniasis (sand flies).

Except for trypanosomiasis and leishmaniasis, all the vector organisms carrying the various parasitic agents prosper in the vicinity of standing, stagnant water. Flooding at the conclusion of the rainy seasons generally produces such environments for the insects, crustaceans, and snails that are the transmitting agents for the above diseases. Along the swampy coastline, moreover, conditions favorable to the multiplication of parasite vectors exist throughout the year. The molluscan which transmits schistosomiasis thrives particularly in waters created by irrigation and hydroelectric dams.

The tsetse fly, one of Africa's most enduring agents for transmitting human and bovine disease, does not require a water-based habitat. Rather, the vector is distributed almost universally through a 1,000-km wide belt stretching across the African continent from the Guinean Atlantic coast to Mozambique along the Indian Ocean coast. As Figure 44 illustrates, all of Guinea lies within Africa's "tsetse belt." Figure 45 shows the distribution of three other parasitic diseases, schistosomiasis mansoni, schistosomiasis haematobium, and onchocerciasis. All three prevail in Guinea, particularly in the forested southeastern region. Since the late 1960s Soviet and Eastern European researchers have conducted and published the results of several studies on the prevalence of tropical vectorial infectious diseases in Guinea (see bibliography).

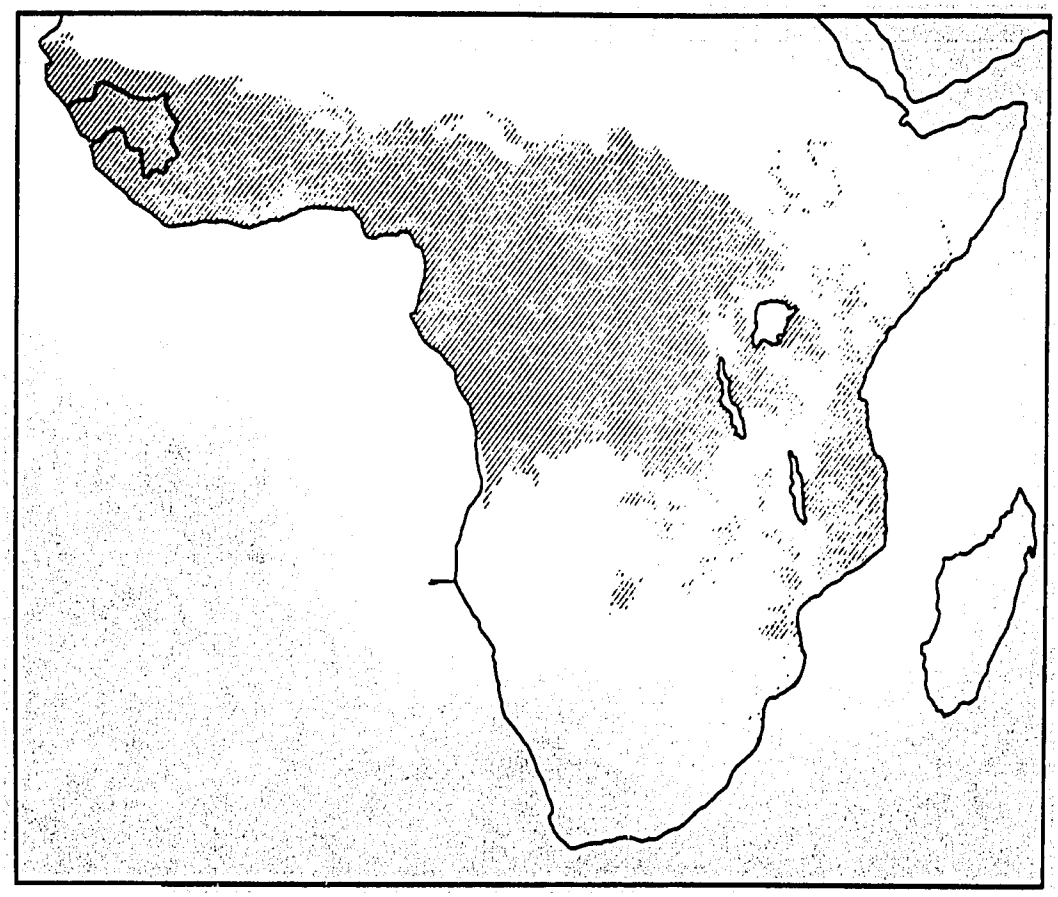
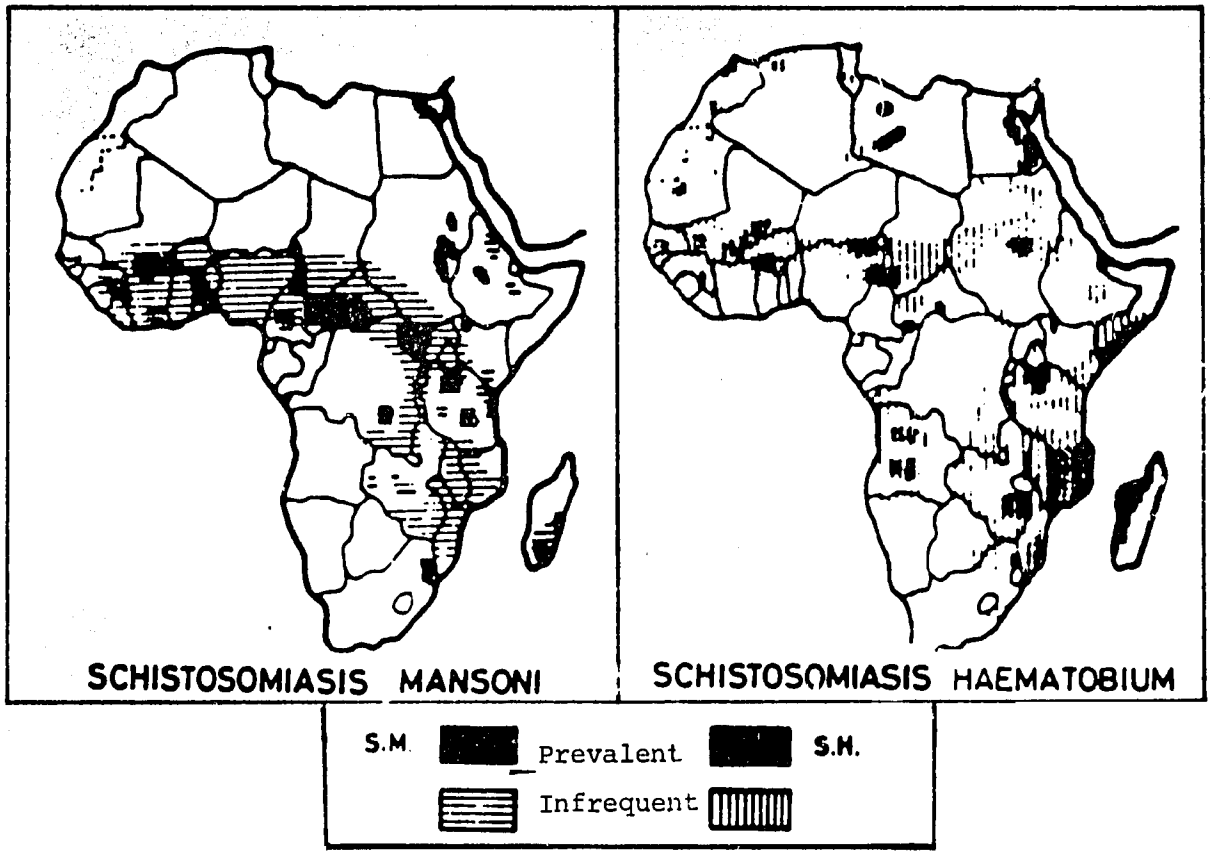


Figure 44. Tsetse Infested Areas of Africa

Source: Ford. 1975.



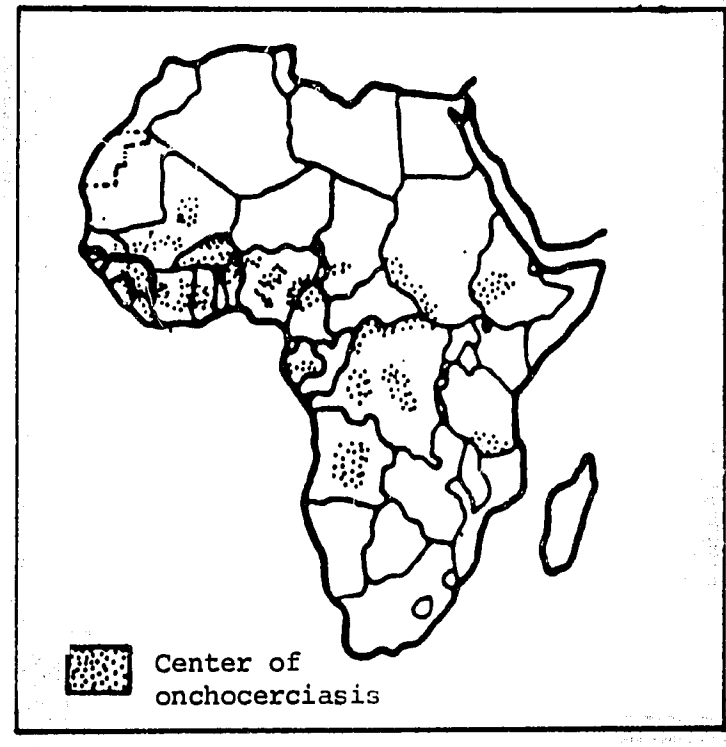


Figure 45. Distribution of Schistosomiasis and Onchocerciasis in Africa

Source: Adapted from Tolba (1979).

Not all serious infectious diseases in Guinea are vectorially transmitted. In addition to the above parasitic infections: amobiasis (protozoan); ascaridiasis, anguillulosiasis, and ankylostomiasis (all three, nematode); hookworm; and yaws (spirochete) are common ailments. These infections are usually transmitted by contaminated drinking water or by unsanitary living conditions.

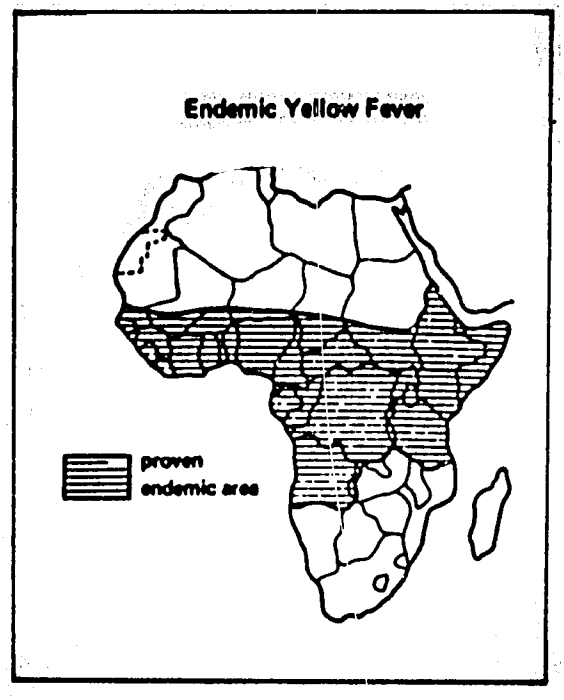
Amobiasis and other forms of dysentary affect the digestive system, causing diarrhea, fever, and eventually, severe dehydration. Other intestinal disorders, principally caused by bacteria, also are rampant. Cholera, salmonella, and shigella are the most common of these. Other bacterial infections present in Guinea are cerebro-spinal meningitis, pneumonia, tetanus, leprosy (see Fig. 40 for geographic distribution), and tuberculosis. Until recently more than half of all Guineans manifested symptoms of tuberculosis. The chief viral diseases are hepatitis, rubeola (measles), and yellow fever, transmitted by the mosquito, Aedes aegypti (see Fig. 46 for geographic distribution). Smallpox was formerly present in Guinea, but has now been eradicated after a concerted vaccination campaign.

Venereal diseases of all types, especially syphillis, occur with very high frequency among the population. The post-adolescent age group is the most affected. Although control through penicillinotherapy is possible, facilities are inadequate and supplies of the drug are unreliable. As with all infectious diseases, transmission of venereal infections is facilitated by overcrowding, poor sanitation, and improper hygiene.

4.3.3 Nutritional Deficiencies[39/]

Guinea's inability to provide adequate nutrition for much of its population is a chronic problem whose origins are precolonial. Although the region is thought to possess the potential for agricultural prosperity and food self-sufficiency, it has rarely been able to achieve either objective. Since attaining independence, Guinea's agricultural sector has performed sluggishly (nevertheless per capita food production in Guinea has remained consistently greater than in all other West African nations

39/ Sources: Kurian, 1982.
May and McClellan. 1968.
Monjour and Tourne. 1980.
Nelson, et al. 1975.
USDA. 1981.



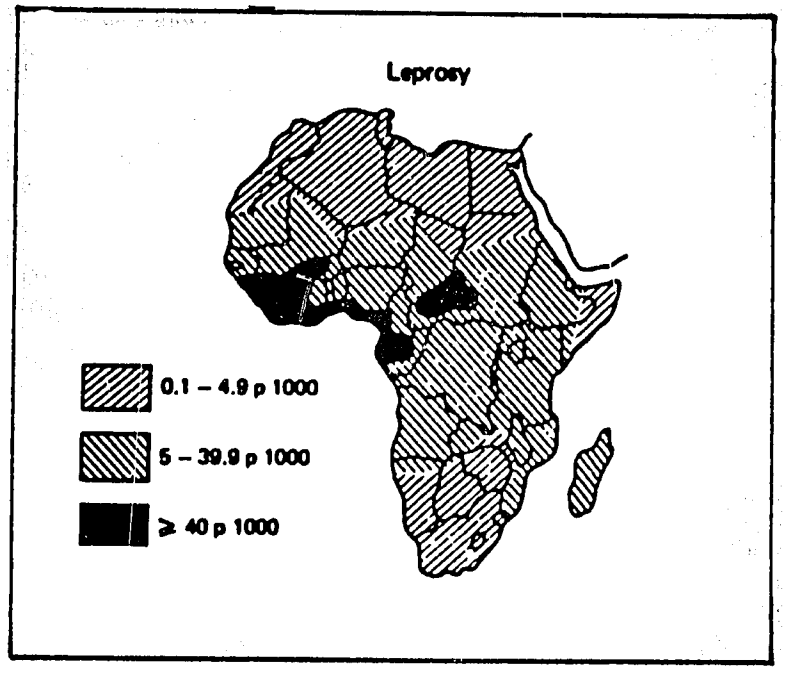


Figure 46. Distribution of Yellow Fever and Leprosy in Africa

Source: ENDA. 1981.

except for Ivory Coast). Table 37 shows that in 1979, the index of per capita food production was virtually identical to that in 1961-1965, the base period.

Table 37. Index of Per Capita Food Production, 1961 to 1979

Year	1961-65	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Index	100	107	110	109	108	98	94	101	93	102	101

Source: USDA. 1981.

Despite the fact that agriculture accounts for 37 percent of the GDP--average for "low-income countries" (World Bank 1982)--the food production sector generally has been unable to meet the requirements of Guinea's growing population. During the 1976-1978 period the nation was only 85 percent self-sufficient in food production, one of the lowest porportions in the region (USDA 1981).

Year after year Guinea's fragile economy has had to expend scarce hard currency to import the shortfall. Throughout the late 1970s, annual grain imports averaged more than 50,000 MT, at a cost of 25 to 40 million sylis ($1.25 million to $2 million). Even more importantly, as Table 38 shows, these imports sometimes account for more than ten percent of Guinea's total import expenditures, nearly negating the earnings from exports of cash crops such as pineapples, palm kernels, coffee, and bananas.

Although Guinea has been importing foods since independence, there is still not enough food for many residents to maintain a healthy diet. As Table 34 indicates, in 1977 daily caloric consumption remained just 78 percent of the minimum FAO requirement; similarly, protein intake was only 71 percent of the recommended USDA minimum. During especially bad harvest years the government has had to ration grain. In 1974, after a particularly poor season, Gineans were limited at first to eight kilograms of rice per month, then to just three. Foreign assistance, particularly from the U.S.'s PL480 program has sometimes alleviated the problem. In 1976 to 1978, for example, Guinea obtained 7,800 MT of grain through PL480, an amount equivalent to about a seventh of its grain inputs (USDA 1981).

Table 38. Food Imports, 1964 to 1976

Year	Value of rice imports (million sylis)	Total value of imports (million sylis)	Value of rice (or food--see note c) imports as percentage of value of total imports (%)
1964	9.8[a]	123.8[a]	8.0
1965	15.0[b]	131.0[b]	11.5
1967	10.0[b]	165.0[b]	6.1
1968	7.4[a]	151.5[a]	4.9
	7.0[b]	151.0[b]	4.6
1969	15.0[b]	131.0[b]	11.5
1970	17.0[b]	173.0[b]	9.8
1971	20.0[b]	197.0[b]	10.2
1972	21.5[a]	175.2[a]	12.3
	24.0[b]	175.0[b]	13.7
1973-74	38.0[c]	318.1[c]	11.9
1974-75	25.6[c]	380.6[c]	6.7
1975-76	24.0[c]	418.4[c]	5.7

Notes:
[a] Riviere. 1977.
[b] Nelson, et al. 1975.
[c] Europa. 1981b. The figures represent all food imports, not just rice. The relative proportion of rice to other grains imported has been declining steadily. In 1978 about 58 percent of imported foodgrain was rice (USDA 1981).

During plentiful times, the average diet relies heavily upon rice. Inferior grains such as fonio, maize, and millet; roots and tubers such as cassava, taro, manioc, and sweet potatoes; and occasional quantities of pulses, fruits, meats, fish, and dairy products comprise most of the diet. Table 39, although outdated, shows the distribution of food products comprising an average diet just after independence. Since the index of per capita food production has remained almost unchanged since that time, the diet listed in Table 39 is probably similar in composition to the present diet.

Because of the inadequacy of the levels of ingestion of various nutrients, many Guineans continue to manifest symptoms of malnutrition. Among the most common diet-deficiency disorders are goiter, dental caries, kwashiorkor, and various vitamin-deficiency diseases. In some regions levels of presence of goiter and dental caries exceed 50 percent, occasionally reaching above 70 percent in areas where specific dietary deficiencies remain cultural norms, or where certain nutrients are physically unavailable. In addition to engendering overtly nutritional diseases, malnutrition exhibits a familiar interrelationship with other environmental diseases. By attenuating the subject's physical strength, malnutrition frequently permits infections to be more serious than in healthy individuals. This infection-nutrition link is particularly common among juveniles, and is responsible for the inordinately elevated mortality rate among infants and children.

4.4 Pollution and Misuse of Land[40/]

As Section 4.1 discussed, lack of specific information regarding environmental problems is itself Guinea's most important environmental shortcoming. Nowhere is this paucity of available data more apparent than with regard to land misuse and pollution. By all indications, Guinea like its neighbors, is prone to certain abusive practices. Mining, farming, forestry, livestock herding, and disease eradication measures all contribute to a gradual degradation of the nation's environment. The results of these activities are familiar throughout the developing world:

40/ Sources: Bakhareva and Mukha. 1973.
Harrison Church. 1980a.
-----. 1980b.
Lal. 1974.
Moody. 1974.
Nelson, et al. 1975.
O'Keefe. 1975.
Oyebande. 1975.
Persson. 1977.
Pollock. 1974.
Schnell. 1968.
USAID. 1975a.
-----. 1977.
de Vos. 1975.
White and Gleave. 1971.
Zech. 1980.

Table 39. Nutritional Equivalents of Per Capita Food Availability, 1959 to 1961

Foods	Daily Intake gr.	Calories	Prot. gr.	Fat gr.	Calcium mgm.	Phos. mgm.	Iron mgm.	Vit. A I.U.	Thiam. mgm.	Ribo-flavin mgm.	Niacin mgm.	Asc. Acid mgm.
Corn (yellow)	44	165	4.3	1.8	4	140	1.4	100	.20	.05	.9	—
Rice (paddy)*	182	646	12.8	2.0	14	231	2.6	—	.22	.05	4.0	—
Rice (milled)	12	42	.8	.1	1	23	.2	—	.02	—	.4	—
Sugar	15	53	—	—	—	—	—	—	—	—	—	—
Manioc	50	508	4.2	.9	20	17	.7	—	.02	0.2	.3	9
Sweet potatoes**	122	116	1.3	.4	39	42	1.2	7380	.13	.05	1.0	39
Taros	26	22	.4	.1	35	—	.7	—	.05	.03	.2	7
Pulses***	20	66	4.3	.4	27	64	1.0	—	.09	.04	.6	—
Peanuts	12	64	3.0	5.1	7	40	.3	4	.09	.02	1.7	—
Vegetables****	44	10	.6	.1	100	40	1.0	30	.05	.12	.8	140
Pineapples	5	1	—	—	1	—	—	—	—	—	—	3
Citrus fruit*****	60	18	.3	.1	20	9	.1	300	.05	.02	.1	20
Meat	12	19	1.8	1.3	1	18	.5	—	—	.02	.3	—
Fish	12	7	1.0	.3	3	20	1.0	—	—	—	1.0	—
Vegetable Oils	33	291	—	32.9	—	—	—	—	—	—	—	—
Milk	17	11	.6	.6	30	17	—	20	—	.04	—	—
Wheat flour	7.4	26	.9	.1	3	30	.2	—	.04	.01	.3	—
Millet	102.0	333	9.5	2.9	28	—	(4.0)	(200)	.33	.15	2.1	—
		2398	45.8	49.1	333	691	10.9	8034	1.29	.80	13.7	218

— = traces or absence.
( ) = imputed values.
*100 gm. paddy = 70 gm. polished.
**deep orange type.
****Dolichos lablab.*
*****Manioc leaves.*
******Citrus reticulata.*

Note: Weights rounded up to the nearest decimal. Nutrient values camputed on the basis of Food Composition Tables for Latin America, Food and Agriculture Organization of the United Nations.

Source: May and McClellan. 1968.

pollution, depletion, and erosion of fertile soil; degeneration and loss of vegetative cover; encroachment of desertified terrain; and pollution of groundwater sources.

In Guinea all of the above processes have been observed. Unfortunately, however, there exists little scientific literature documenting the progression, extent, or severity of these phenomena. There is nevertheless agreement that most of these problems can be attributed to human action. At 2.9 percent per annum, Guinea's population growth rate is among Africa's (and the world's) highest. This factor alone, creating pressure upon urban centers and their environs, accounts for substantial damage to the nation's environment. Increasing demand for food (crops and meat products), building materials, firewood, land for habitation, and bauxite for scarce foreign exchange have been straining the country's delicate ecosystem.

Soil, originally one of Guinea's most abundant resources, is perhaps the principal target of the accumulated abuse due to population pressure. Agriculture and livestock breeding, forestry, mining, building, and hydroelectric development all take a serious toll in soil resources. In areas where any of these activities have occurred, topsoil has been lost irretrievably, giving way to infertile laterite. Subsistence farming, particularly shifting cultivation within foreshortened cycles, has been responsible for overburning of vegetation, a first step in a degenerative cycle described as follows: forest savanna with trees treeless savanna sterile steppe (Lal 1974).

Shifting cultivation in formerly densely forested areas is often accompanied by indiscriminate tree felling for use as fuel, and clearing of wooded tracts for residential areas or industrial operations (especially mining). Controlled fires employed to clear specified areas frequently burn out of control, causing even greater damage than intended. Previously forested areas, generally subjected to heavy seasonal precipitation (2.1.3.1), are no longer protected from rainfall-induced erosion. Rich topsoils held in place by the formerly extensive tree cover, begin to wash away when trees are gone.

In the nonforested savanna regions to the north, soil erosion has two other causes. The first of these is the gradual but observable, southward drift of the dry Sahel zone. The prolonged drought of the early to mid 1970s demonstrated the susceptibility of Guinea's northernmost strip (along the borders with Senegal and Mali) to this desertification. Shortages of water due to climatic changes have been aggravated by inadequate range management. Secondly, in these northern Guinean regions, Fulani and other herdsmen graze their cattle in traditionally developed modes. Transhumance among these communities has been little influenced by ecological considerations, and overgrazing is not an uncommon result of their activities. Figure 47 illustrates the overgrazing

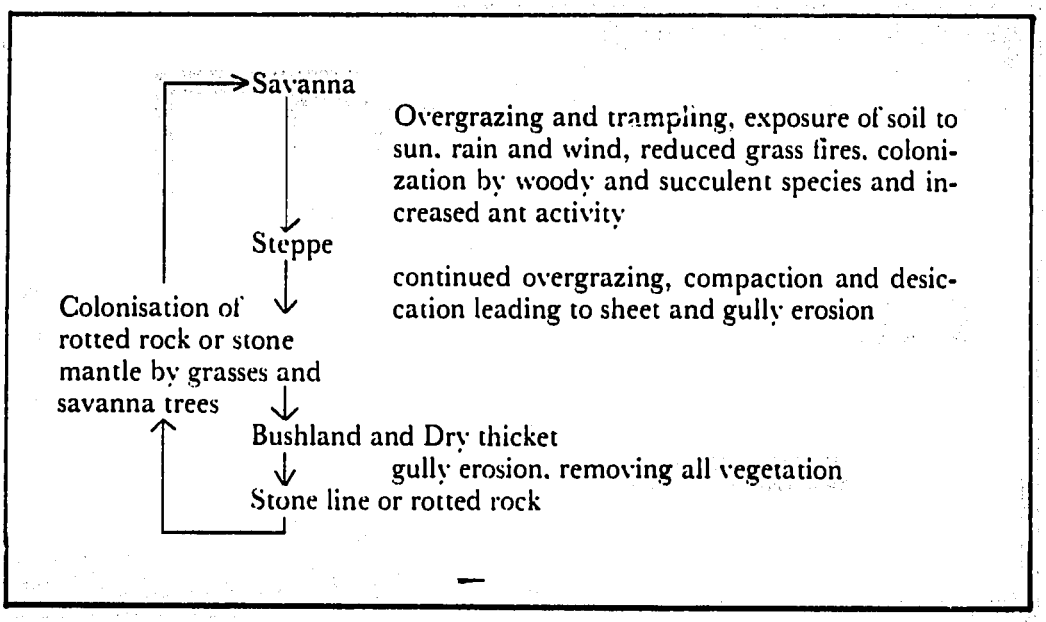


Figure 47. Overgrazing Cycle

Source: de Vos. 1975.

cycle. In these livestock raising areas, too, cutting of shrubs and trees for firewood has loosened topsoil and accelerated erosive processes.

Although such deforestation occurs to a serious degree throughout the country, the magnitude of the problem is not as large as in some regions of neighboring Senegal, Mauritania, Mali, and Niger. In northern Guinea, according to a 1981 FAO fuelwood availability survey, fuelwood is in short supply, but the scarcity is not yet deemed critical; in the southern Forest Region, the situation is considered satisfactory.

Other land misuse problems in Guinea concern pollution. As elsewhere, exposure to infectious disease has prompted the use of various toxic substances. Insecticides, larvicides, rodenticides, and herbicides are employed to some degree. Although the important agricultural pests and disease vectors have been identified, the exact levels and trends of usage of these chemicals have not been monitored by external agencies, and the Guinean government has not issued statistics regarding their application. Nor are figures available on the amounts of weed control substances employed.

Perhaps the most important pollutants presently in use are not chemicals designed to control pests and weeds, but byproducts of mining processes. Bauxite, Guinea's principal mineral resource, is converted to aluminum at several facilities near the large mining complex at Fria. To date no data have appeared on the effects of tailings on the surrounding land, groundwater, surface water, or air. There is evidence, however, that effluents of iron oxide and caustic soda derived from aluminum ore treatment are being discharged into the estuary of the Konkouré, north of Conakry (Omo-Fadaka 1978). As Guinea increasingly develops its latent mineral and hydroelectric resources, pollution of drainage basins and groundwater can be expected to rise. As problems arising from such pollution become more severe, and as Guinea sheds its isolationist attitude, more surveys, studies, and compensatory measures may result.

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Appendix I

Demographic, Economic, and Administrative Characteristics

Table 1. Demographic Statistics[a]

Statistic	Year(s)	Value	Source(s)
Total population (millions)	1980	5.4	b
Average annual population growth rate (percent)	1970-80	2.9	b
Population density per sq km of land	1980	22.0	b
Population density per sq km of cropland	1979	343.9	b, c
Percentage of population in urban areas	1980	19.0	b
Urban population growth rate (percent)	1970-80	6.1	b
Percentage adult literacy	1977	20.0	b
Per capita share of GNP (US $)	1980	290.0	b
Average annual growth of per capita GNP	1960-80	0.3	b

[a] See Table 34 in text for health-related statistics
[b] World Bank. 1982.
[c] FAO. 1981a.

Table 2. Population by Age Group and Sex, 1981

Age group	Number of persons (in thousands)		
	Female	Male	Total
0-14	1,227.2	1,220.9	2,448.2
15-64	1,494.6	1,465.8	2,960.4
65+	89.8	72.6	162.5
Total	2,811.6	2,759.3	5.571.1

Source: USAID. 1982c

Table 3. Economic Characteristics

Statistic	Year(s)	Value
Gross National Product (GNP)		
Total (millions of US $)	1980	1,566.0
Per capita (US $)	1980	290.0
Gross Domestic Product (GDP), (millions of US $)	1980	1,670.0
Agricultural sector, total (millions of US $)	1980	617.9
Agricultural sector, growth rate (percent)	1970-80	37.0
Industrial sector, total (millions of US $)		551.1
Industrial sector, growth rate (percent)		33.0
Manufacturing subsector, total (millions of US $)		66.8
Manufacturing subsector, growth rate (percent)		4.0
Services sector, total (millions of US $)		501.0
Services sector, growth rate (percent)		30.0
Labor force, total number of persons of working age (15-64 years), (millions	1980	2.9
Agriculture (percent)		82.0
Industry (percent)		11.0
Services (percent)		7.0
Average annual growth of labor force (percent)	1970-80	2.2

Source: World Bank. 1982.

Table 4. Economically Active Population, 1960 and 1970

	1960			1970		
	Males	Females	Total	Males	Females	Total
Agriculture, etc. . .	784	609	1,393	884	699	1,584
Industry . . .	76	20	96	118	41	159
Services. . . .	81	9	90	114	14	128
TOTAL . .	942	637	1,579	1,116	754	1,870

Source: Europa. 1981b.

Table 5. Annual Budgets, 1965 to 1973

	Annual Average 1965—67	1968	1969	1970	1971	1972	1973
Current Revenue							
Domestic Revenue							
Direct taxes	3,046	3,500	3,260	3,490	3,520	3,610	3,700
Indirect taxes	6,020	6,700	6,800	6,990	7,170	7,260	7,530
Other tax revenue	1,320	1,230	1,410	1,640	1,270	1,480	1,520
Nontax revenue	4,366	5,160	5,806	5,460	5,396	6,080	5,750
Errors and omissions	358	70	...	...	...	...	...
Subtotal	15,710	16,600	17,276	17,580	17,356	18,430	18,500
Foreign grants	873	150	400	300	4,020	2,300	2,300
Total	16,583	16,750	17,676	17,880	21,376	20,730	20,800
Current (Ordinary Budget) Expenditure							
Defense	3,070	3,500	3,630	3,720	6,480	7,210	7,470
Agriculture	113	120	105	110	90	120	130
Education	3,534	3,850	4,320	4,570	2,080	2,210	2,300
Health	1,453	1,650	1,735	1,680	1,490	1,670	1,820
Other	5,990	6,380	6,810	7,070	7,120	6,690	6,480
Total	14,160	15,500	16,600	17,150	17,260	17,900	18,200
Current surplus (+) or deficit (−)	+2,423	+1,250	+1,076	+730	+4,116	+2,830	+2,600
Capital Investment (Plan) Expenditure							
Agriculture	853	550	410	350	380	960	2,900
Mining, Industry, and power	4,350	7,180	2,920	2,860	2,150	3,070	8,800
Transport and communications	4,710	6,320	1,460	2,680	1,990	3,190	7,600
Education and housing	1,080	780	270	720	540	630	3,500
Health	150	110	56	170	320	780	1,200
Other	460	1,660	1,760	1,950	216	1,300	2,800
Total	11,603	16,600	6,876	8,730	5,596	9,930	26,800
Overall deficit (−)	−9,180	−15,350	−5,800	−8,000	−1,480	−7,100	−24,200
Financing of the Deficit							
Foreign borrowing	5,860	6,850	5,200	6,500	1,200	4,400	20,000
Domestic borrowing	3,320	8,500	600	1,500	280	2,700	4,200
Foreign grants and loans, total	6,733	7,000	5,600	6,800	5,220	6,700	22,300
Foreign grants and loans, as percent of investment spending	58.02	42.17	81.44	77.89	93.26	67.47	74.63

Source: Nelson, et al. 1975.

Table 6. Public Finances, 1964 to 1973

Budget headings	1964–1965	1965–1966	1966–1967	1967–1968	1968–1969	1969–1970	1970–1971	1971–1972	1972–1973
A. National budget									
Total expenditures	22,570	25,080	29,640	32,100	23,476	25,880	22,856	27,830	45,000
Revenues									
Tax receipts	15,340	15,860	15,930	16,600	17,276	17,580	17,356	18,430	18,500
Domestic loans	630	2,620	6,710	850	600	1,500	280	2,700	4,200
Foreign gifts	1,230	830	560	150	400	300	4,020	2,300	2,300
Foreign loans	5,370	5,770	6,440	6,650	5,200	6,500	1,200	4,400	20,000
B. Fiscal revenues	15,340	15,860	15,930	16,600	17,276	17,580	17,356	18,430	18,500
Direct taxes	2,640	3,150	3,350	3,500	3,260	3,490	3,520	3,610	3,700
Indirect taxes	6,460	6,700	6,700	6,700	6,800	6,990	7,170	7,260	7,530
Other fiscal taxes	1,480	1,410	1,070	1,230	1,410	1,640	1,270	1,480	1,520
Other nonfiscal taxes	4,760	3,600	4,740	5,100	5,806	5,460	5,396	6,080	5,750
C. Operating budget	12,530	14,680	15,270	15,500	16,600	17,150	17,260	17,900	18,200
Defense	2,590	3,190	3,430	3,500	3,630	3,720	6,480	7,210	7,470
Agriculture	110	110	120	120	105	110	90	120	130
Education	3,280	3,740	3,580	3,850	4,320	4,570	2,080	2,210	2,300
Public health	1,420	1,660	1,280	1,650	1,735	1,680	1,490	1,670	1,820
Miscellaneous	5,130	5,980	6,860	6,380	6,810	7,070	7,120	6,690	6,480
D. Investment budget	10,040	10,400	14,370	16,600	6,876	8,730	5,596	9,930	26,800
Agriculture	380	380	1,800	550	410	350	380	960	2,900
Education and housing	310	310	2,620	780	270	720	540	630	3,500
Public health	80	80	290	110	56	170	320	780	1,200
Transport and communications	4,420	4,420	5,290	6,320	1,460	2,680	1,990	3,190	7,600
Industry and energy	4,710	4,710	3,630	7,180	2,920	2,860	2,150	3,070	8,800
Miscellaneous	140	500	740	1,660	1,760	1,950	216	1,300	2,800

Source: Rivière. 1977.

Table 7. Ministries in the Central Government, May 1981

Ministry
* Agriculture and Agricultural Cooperatives
Banks and Insurance
Economic and Financial Affairs
* Energy
* Environment and Town Planning
European Economic Community (EEC) Delegation
Finance
Foreign Affairs and Cooperation
* Higher Education and Scientific Research
Industry
Information
* Interior
Internal Trade
International Cooperation
Islamic Affairs
Justice
Labor
* Livestock and Fishing
* Mining and Geology
People's Army
Planning and Statistics
Posts and Communications
Primary and Secondary Education
* Public Health
* Public Works
Small and Medium Scale Enterprises
* Social Affairs
State Control
* Technical Education and Professional Training
* Transport
Youth, Sport and Popular Culture

* Possibly involved in environmentally related issues. See Appendix IV, Table 1 for other organizations and agencies relating to the environment.

Source: Europa. 1981c.

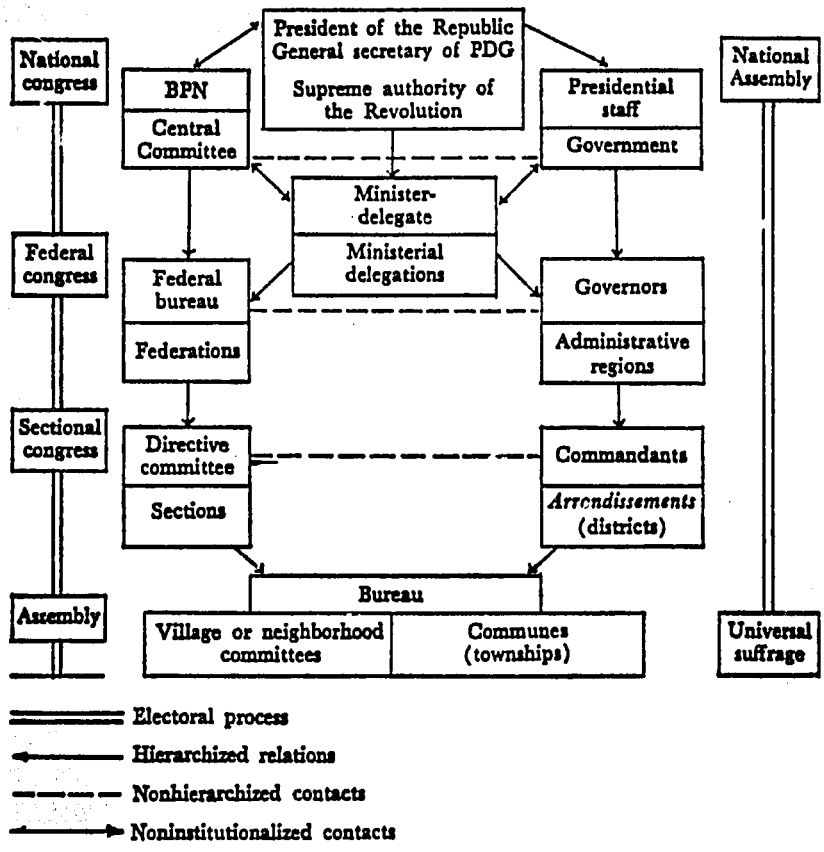


Figure 1. Political and Administrative Organization of Government, 1972

Source: Rivière. 1977.

Appendix II

Agricultural Statistics

Table 1. Agricultural Production by Region and by Crop, 1975

A. Average in 1000 ha
B. Production 100 metric tons
C. Yields (t/ha)
D. Production per capita (kg per year)

REGIONS ADMINISTRATIVES		RIZ				FONIO				MAIS				GRAINS TOTAUX (y compris sorgho et mil)		
		A	B	C	D	A	B	C	D	A	B	C	D	A	B	D
LOWER GUINEA	BOFFA	11,10	14,99	1,35	168	4,00	2,00	0,50	22	0,20	0,23	1,15	3	15,30	17,22	193
	BOKE	13,75	20,01	1,46	130	6,15	3,08	0,50	21	0,45	0,52	1,16	4	20,35	23,61	163
	FORECARIAH	14,65	15,02	1,03	141	3,20	1,60	0,50	15	0,60	0,69	1,15	6	18,45	17,31	162
	FRIA	3,75	0,99	0,26	28	2,49	1,26	0,50	36	0,10	0,12	1,20	3	6,34	2,36	67
	INDIRECKA	13,70	10,00	0,73	82	4,39	2,20	0,50	18	0,27	0,31	1,15	3	18,36	12,51	103
	KINDIA	20,05	27,97	1,40	176	6,86	2,93	0,60	18	1,24	1,43	1,15	9	27,14	25,33	203
	TELIMELE	18,69	4,11	0,22	24	5,15	2,58	0,50	15	1,85	2,13	1,15	12	25,69	8,02	51
	CONAKRY	8,50	9,99	1,18	205	2,15	1,08	0,50	22	0,78	0,90	1,15	18	11,43	11,97	245
MIDDLE GUINEA	LABE	1,09	1,04	0,55	4	15,47	7,74	0,50	26	6,84	7,87	1,15	27	24,20	16,65	57
	DALABA	7,19	2,98	0,41	23	8,27	4,14	0,50	32	2,34	2,69	1,15	21	17,80	9,81	76
	GACUAL	10,10	11,41	1,13	97	5,59	2,80	0,50	24	1,90	1,90	1,15	19	17,59	16,40	140
	KOUBIAKA	19,10	6,47	0,34	101	4,71	2,36	0,50	37	3,25	3,25	1,15	58	34,06	12,57	196
	MALI	8,60	3,01	0,35	18	10,00	5,00	0,50	29	3,56	3,55	1,15	24	22,15	12,09	71
	MAMOU	8,95	2,02	0,32	16	8,60	4,30	0,50	25	3,00	3,00	1,15	20	20,55	10,57	61
	PITA	6,58	2,99	0,45	16	10,96	5,48	0,50	29	5,34	6,14	1,15	33	22,88	14,61	78
	TOUGUE	4,00	1,16	0,29	13	5,16	2,58	0,50	28	1,85	1,85	1,00	23	11,01	5,07	64
UPPER GUINEA	DABOLA	10,30	6,28	0,61	82	4,54	2,27	0,50	29	0,52	0,69	1,15	6	15,44	9,15	119
	FARANAH	18,20	17,29	0,95	143	5,75	2,88	0,50	24	2,12	2,41	1,15	28	26,07	22,61	187
	KANKAN	28,70	16,93	0,59	109	11,14	5,57	0,50	36	3,50	4,01	1,15	26	43,34	26,53	171
	SIGUIRI	29,90	14,50	0,48	60	6,43	3,22	0,50	15	5,87	6,75	1,15	32	42,20	24,47	115
	KOUROUSSA	13,67	7,72	0,56	79	5,40	2,70	0,50	28	1,49	1,71	1,15	17	20,56	12,13	124
	KEROUANE	3,15	6,50	1,74	148	2,31	1,16	0,50	31	0,35	0,40	1,14	11	5,81	7,06	190
	DINGUIRAYE	11,00	8,53	0,78	89	4,00	2,00	0,50	21	4,90	5,64	1,15	59	20,90	16,17	169
FOREST GUINEA	BEYLA	25,00	27,00	0,93	145	4,55	2,28	0,50	12	1,03	1,18	1,15	6	30,58	30,46	163
	GUECKEDOU	23,45	26,62	1,14	160	-	0,00	0,50	-	1,27	1,46	1,15	9	24,72	28,08	169
	KISSIDOUGOU	37,00	31,56	0,83	196	1,00	0,90	0,50	6	0,74	0,85	1,15	6	40,34	33,31	207
	MACENTA	20,55	21,27	1,01	156	0,37	0,19	0,51	1	0,96	1,10	1,15	8	21,88	22,56	165
	N'ZEREKORE	21,95	27,55	1,26	154	-	0,00	0,51	-	2,28	2,62	1,15	15	24,23	30,17	169
	YOMOU	10,48	21,27	2,03	329	-	0,00	0,51	-	0,25	0,29	1,16	5	10,73	21,56	334
	BRIGADES	33,80	6,32	0,19	-	-	-	-	-	-	-	-	-	33,80	6,32	-
	TOTALS	460,43	373,30	-	-	148,42	74,29	-	-	58,84	67,69	-	-	683,69	500,28	-
	AVERAGES	-	-	0,80	107,17	-	-	0,50	20,66	-	-	1,15	17,38	-	-	145

Table 1. (continued)

REGIONS ADMINISTRATIVES		ARACHIDES				MANIOC (SEC)				CAFE				DIVERS			
		A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
LOWER GUINEA	BOFFA	5,80	3,77	0,65	42	1,05	0,12	0,11	1	-	-	-	-	0,46	3,24	7,20	26
	BOKE	4,85	3,15	"	22	2,25	0,27	0,12	2	-	-	-	-	1,00	7,20	7,20	48
	FORECARIAH	3,36	2,18	"	20	1,59	0,19	"	2	-	-	-	-	0,72	5,40	7,50	40
	FRIA	2,75	1,79	"	51	0,50	0,07	"	2	-	-	-	-	0,10	1,35	7,22	28
	GUECKEDOU	5,05	3,80	"	31	1,05	0,12	"	1	-	-	-	-	0,41	2,95	7,20	24
	KINDIA	9,06	5,89	"	37	3,20	0,38	"	2	-	-	-	-	1,20	8,64	7,20	46
	TELIMELE	3,95	2,57	"	15	3,00	0,35	"	2	-	-	-	-	1,25	9,00	7,20	52
	CONAKRY	2,15	1,27	"	26	1,25	0,15	"	3	-	-	-	-	0,27	1,94	7,19	3
MIDDLE GUINEA	LABE	5,58	6,63	"	12	4,81	0,67	"	2	-	-	-	-	1,85	13,33	7,20	30
	DALABA	2,59	1,68	"	13	3,60	0,42	"	3	-	-	-	-	1,85	6,34	7,20	57
	GALOAL	6,32	4,11	"	35	1,66	1,20	"	2	-	-	-	-	0,35	2,52	7,20	25
	KOUNDARA	4,13	2,68	"	42	2,25	0,27	"	4	-	-	-	-	0,49	3,53	7,20	64
	MALI	3,25	2,11	"	12	1,33	0,16	"	1	-	-	-	-	0,60	4,32	7,20	29
	MAMOU	4,20	2,67	"	16	1,50	0,19	"	1	-	-	-	-	0,90	7,06	7,20	63
	PITA	2,35	1,58	"	8	5,70	0,67	"	4	-	-	-	-	0,91	6,65	7,20	37
	TOUGUE	3,22	2,09	"	23	1,22	0,14	0,11	2	-	-	-	-	0,42	3,02	7,19	33
UPPER GUINEA	BAFOLA	3,63	2,36	"	31	1,10	0,13	0,12	2	-	-	-	-	0,10	0,72	7,20	9
	FARANAH	4,06	3,16	"	26	2,50	0,30	"	2	0,27	0,09	0,33	0,7	0,55	3,96	7,20	29
	KANKAN	8,23	5,35	"	35	9,55	1,13	"	7	-	-	-	-	1,62	11,66	7,20	44
	SIGUIRI	8,84	5,75	"	27	5,89	0,70	"	3	-	-	-	-	1,23	8,86	7,20	63
	KOUROUSSA	3,13	2,03	"	21	2,72	0,32	"	3	-	-	-	-	0,30	2,16	7,20	21
	KEROUANE	0,46	0,30	"	8	1,00	0,21	"	6	0,15	0,05	0,33	0,8	0,20	1,44	7,20	24
	DINGUIRAYE	6,36	4,13	"	43	3,10	0,37	"	4	-	-	-	-	0,49	3,53	7,20	32
FOREST GUINEA	BEYLA	3,27	2,13	"	11	4,00	0,67	"	3	0,64	0,21	0,33	1,6	1,22	8,78	7,20	68
	GUECKEDOU	1,06	0,69	"	4	2,38	0,28	"	2	9,76	3,17	0,32	10	0,45	3,24	7,20	18
	KISSIDOUGOU	3,60	2,34	"	15	2,60	0,31	"	2	15,43	5,01	0,32	31	0,85	6,12	7,20	38
	MACENTA	2,54	1,65	"	12	1,10	0,13	"	1	6,20	2,02	0,33	144	0,40	2,88	7,20	20
	N'ZEREKORE	2,20	1,43	"	8	4,42	0,52	"	3	7,12	2,31	0,32	8	0,57	4,10	7,19	14
	YOMOU	0,41	0,27	0,66	4	1,05	0,12	0,11	2	3,35	1,09	0,33	15	0,10	1,30	7,22	18
	BRIGADES	1,69	2,27	0,65	-	8,04	0,95	0,12	-	-	0,00	0,00	-	0,28	2,02	7,21	-
	TOTALS	121,19	78,78	-	-	87,18	10,31	-	-	12,92	13,95	-	-	20,33	47,10	-	-
	AVERAGES	-	-	0,65	27,44	-	-	0,12	2,53	-	-	-	3,38	-	-	6,71	37

Table 1. (continued)

	REGIONS ADMINISTRATIVES	BANANE				ANANAS				AGRUMES et AUTRES FRUITS				FRUITS TOTAUX			
		A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
LOWER GUINEA	BOFFA	0,8	3,60	4.5	40	0,76	1,00	2,51	4	1,25	16,25	13	134	2,00	21,73	20,01	170
	BOKE	1,20	6,76	4.6	40	1,09	2,73	2,60	19	2,95	30,36	13	257	6,32	46,04	20,00	316
	FORECARIAH	1,26	5,67	4.5	63	0,72	1,00	2,60	17	2,00	26,00	13	196	3,98	33,47	20,00	266
	FRIA	0,25	1,13	4,62	32	0,15	0,30	2,53	11	1,35	17,65	13	390	1,76	19,06	20,05	433
	DUBREKA	0,72	3,24	4,60	26	0,53	1,33	2,61	11	1,10	15,34	13	126	2,43	19,91	20,01	163
	KINDIA	1,05	0,33	4,50	53	1.40	3,42	2,44	22	2,05	37,05	13	205	6,10	48,00	19,94	201
	TELIMELE	1,25	5,72	4,50	33	0,95	2,30	2,61	14	2,72	35,36	13	200	4,92	43,46	20,09	255
	CONAKRY	0,52	2,34	4,60	40	0,39	0,90	2,61	20	0,66	8,60	13	15	1,57	11,90	20,01	83
MIDDLE GUINEA	LABE	0,42	1,09	4,50	6	0,30	0,75	2,60	3	2,23	20,99	13	84	2,96	31,63	20,00	93
	DALABA	0,16	0,72	4,60	6	0,26	0,66	2,60	5	0,74	9,62	13	87	1,16	10,99	20,00	98
	GAOUAL	0,33	1,49	4,52	13	0,20	0,70	2,50	6	0,65	8,45	13	86	1,26	10,64	20,02	105
	KOUNDARA	0,20	0,90	4,50	14	0,16	0,40	2,60	6	0,71	9,23	13	142	1,07	10,63	20,00	162
	MALI	0,16	0,72	4,60	4	0,15	0,30	2,63	2	0,60	7,64	13	62	0,89	6,64	20,03	58
	MAMOU	0,40	2,16	4,50	13	0,31	0.78	2,52	6	1.40	10,20	13	137	2,19	21,14	20,02	155
	PITA	0,75	3,30	4,61	18	0,66	1,40	2,50	7	1,43	10,59	13	106	2,74	23,37	20,01	131
	TOUGUE	0,14	0,63	4,60	7	0,16	0,30	2,63	4	0,25	3,25	13	36	0,64	4,26	20,03	47
UPPER GUINEA	DABOLA	0,70	0,32	4,60	4	0,16	0,40	2,60	6	0,17	2,21	13	29	1,03	2,93	20,10	38
	FARANAH	0,16	0,72	4,60	6	0,34	0,05	2,50	7	0,68	7.15	13	62	1,05	0,72	20,00	65
	KANKAN	0,59	2,66	4,50	17	1,35	3,30	2,50	22	1,05	24,05	13	91	3,79	30,09	20,00	130
	SIGUIRI	0.54	2,43	4,50	11	0,00	2,00	2,60	9	1,04	23,92	13	171	3,10	20,35	20,00	191
	KOUROUSSA	0,15	0,60	4,63	7	0,21	0,63	2,62	6	0,76	9,10	11,97	89	1,12	10,31	19,02	101
	KEROUANE	0,11	0,60	4.55	13	0,60	0.15	2,50	4	1,33	17,29	13	208	2.04	17,94	20,05	305
	DINGUIRAYE	0,35	1,50	4,61	17	0,45	1,13	2,61	12	0,75	9,76	13	89	1,65	12,46	20,02	118
FOREST GUINEA	BEYLA	1,75	7,00	4,50	42	0,55	1,30	2,61	7	1,40	19,24	13	137	3,70	28,60	20,01	106
	GUECKEDOU	1,27	5,72	4,50	34	1,25	3,13	2,50	19	0,96	12,40	13	72	3,48	21,33	20,00	125
	KISSIDOUGOU	1,13	5,09	4,50	32	0,32	0,00	2,50	6	0,76	9,75	13	60	2,20	16,64	20,00	97
	MACENTA	2,20	9,90	4,60	73	0,19	0,48	2,63	4	0,49	6,37	13	45	2,08	16,76	20,11	122
	N'ZEREKORE	1,00	0,10	4,50	45	0,29	0,73	2,62	4	1,02	13,26	13	46	3,11	22,09	20,02	95
	YOMOU	0,37	1,67	4,51	26	0,50	0,13	2,60	2	0,16	2,00	13	29	1,03	3,00	20,11	67
	BRIGADES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TOTALS	21.07	94.93	-	-	14.17	35.41	-	-	35.06	455.00	-	-	71.91	585.36	-	-
	AVERAGES			4.50	25.20			2.51	9			12.96	119.28			19.99	251.29

Source: McGrath, et al. 1980.

Table 2. Soil Moisture Regimes

DETERMINATION OF SOIL MOISTURE REGIME ACCORDING TO FRANKLIN NEWHALL SYSTEM OF COMPUTATION

FOR GUIN PAGE 1

NAME OF STATION	MEAN SOIL TEMPERATURE ANN	SUMM	WINT	TEMPERATURE REGIME	CUMULATIVE DAYS MSC IN ONE YEAR IS DRY	M/D	MOI	CUMULATIVE DAYS MSC WHEN SOIL TEMP >5 DRY	M/D	MOI	MAX.CONSECUTIVE DAYS THAT MCS IS MOIST IN SOME PARTS IN ONE YEAR	WHEN SOIL TEMP > 8	DRY AFTER SUMMER SOLST.	MOIST AFTER WINTER SOLST.	MOISTURE REGIME
BOKE.GUINEA	29.6	28.4	29.2	ISO HYPERTH.	109	56	195	109	56	195	251	251	0	0	USTIC
CONAKRY	28.9	27.3	29.6	ISO HYPERTH.	110	25	225	110	25	225	250	250	0	0	USTIC
KANKAN	28.4	27.3	27.3	ISO HYPERTH.	98	80	182	98	80	182	249	249	0	0	USTIC
KINDIA	27.8	25.7	28.9	ISO HYPERTH.	95	38	227	95	38	227	255	255	0	2	USTIC
LABE	24.8	24.4	23.7	ISO HYPERTH.	66	72	222	66	72	222	294	294	0	27	USTIC
MACENTA	26.7	26.2	26.1	ISO HYPERTH.	0	18	342	0	18	342	360	360	0	45	UDIC
MAMDOU	26.0	24.5	26.2	ISO HYPERTH.	50	67	243	50	67	243	310	310	0	18	USTIC
SIGUIRI	29.3	28.2	28.1	ISO HYPERTH.	140	48	172	140	48	172	206	206	0	0	USTIC

COMPUTED BY FORTRAN PROGRAM VW08, APR 1981 DATE 11/22/81

DETERMINATION OF SOIL MOISTURE REGIME ACCORDING TO FRANKLIN NEWHALL SYSTEM OF COMPUTATION

FOR GUIN PAGE 1

NAME OF STATION	MOISTURE REGIME	CON.D. M/D T>8	TEMPERATURE REGIME	TENTATIVE SUBDIVISION OF MOISTURE REGIME	CONS DAYS MOIST(2+3) SUM.	WINT	CUM.DAYS MOIST(2+3) SUM.	WINT	CONS.DAYS COMP.MOIST SUM.	WINT	CUM.DAYS COMP.MOI. SUM.	WINT
BOKE.GUINEA	USTIC	251	ISO HYPERTH.	TYPIC TROPUST.	180	45	180	71				
CONAKRY	USTIC	250	ISO HYPERTH.	TYPIC TROPUST.	180	45	180	70				
KANKAN	USTIC	249	ISO HYPERTH.	TYPIC TROPUST.	180	45	180	82				
KINDIA	USTIC	255	ISO HYPERTH.	TYPIC TROPUST.	180	45	180	85				
LABE	USTIC	294	ISO HYPERTH.	UDIC TROPUST.	180	69	180	114				
MACENTA	UDIC	360	ISO HYPERTH.	TYPIC UDIC					180	105	180	162
MAMDOU	USTIC	310	ISO HYPERTH.	UDIC TROPUST.	180	75	180	130				
SIGUIRI	USTIC	206	ISO HYPERTH.	TYPIC TROPUST.	180	15	180	40				

COMPUTED BY FORTRAN PROGRAM VW08, APR 1981 DATE 11/22/81

Source: Van Wambeke. 1982.

Table 3. Agricultural Research Facilities

Facility	Location
University/Faculty of Agriculture	Conakry
Faculty of Agriculture (in progress)	Foulaya
Agricultural education, research, and extension complex (in progress)	Faranah
Experimental and Local Adaptation Station (ELAS)	Boffa
ELAS	Foulaya
ELAS	Kankan
ELAS	Kobba
ELAS	Macenta

Sources: NAS. 1974.
USAID. 1982b.

Table 4. Pests of Important Crops

Coffee (Coffea canephora, C. excelsa)

Epicampoptera marantica (Tams.), *Drepanidae*
E. glauca Hamp., *Drepanidae*
Virachola dorisona Hew., *Lycaenidae*
Dichocrocis crocodora Meyr., *Pyralidae*
Sylepta aurantiacalis Hmps., *Pyralidae*
Leucoptera coffeella Guer., *Lyonetiidae*
Cephanodes hylas L., *Sphingidae*
Parasa viridia Wlk., *Cochlidiidae*
Bixadus sierricola White, *Cerambycidae*
Xylosandrus compactus Eichh., *Scolytidae*
Hypothenemus hampei (Ferr.), *Scolytidae*
Apate monachus F., *Bostrychidae*
A. cerebrans Pall., *Bostrychidae*
Pterandrus anonae (Graham), *Trypetidae*
Ceratitis capitata Wied., *Trypetidae*
Toiritbrum inscriptum, *Trypetidae*
Planococcoides njalensis (Laing), *Pseudococcidae*
Coccus viridis (Green), *Coccidae*
Saissetia coffeae Wlk., *Coccidae*
S. nigra Nietn., *Coccidae*
Bellicositermes natalensis Hav., *Termitidae*
Oecophylla longinoda Latr., *Formicidae*
Lygidocoris mimeticus Reut. et Popp., *Miridae*
Fledermäuse

Cacao (Theobroma cacao)

Rattus (*Hylomycus*) *simus* (Allen et Coolige), *Rodentia*
Sahlbergella singularis Hagl., *Miridae*
Toxoptera aurantii (Fonds.), *Aphididae*
Tyora tessmanni (Aulm.), *Psyllidae*
Planococcoides njalensis (Laing), *Pseudococcidae*
Oecophylla longinoda Latr., *Formicidae*
Characoma stictigrapta Hmps., *Noctuidae*
Lophocrama phoenicochlora Hmps., *Noctuidae*
Glenea giraffa Dalm., *Cerambycidae*
Marmara spp., *Gracilariidae*

Cola (Cola nitida)

Characoma stictigrapta Hmps., *Noctuidae*
Lophocrama phoenicochlora Hmps., *Noctuidae*
Sylepta semilugens Hmps., *Pyralidae*
S. polycimalis Hmps., *Pyralidae*
Sahlbergella singularis Hagl., *Miridae*
Tyora tessmanni (Aulm.), *Psyllidae*
Stictococcus spp., *Coccidae*
Planococcoides njalensis (Laing), *Pseudococcidae*
Ferrisia virgata (Ckll.), *Pseudococcidae*
Saissetia nigra Nietn., *Coccidae*
Oecophylla longinoda Latr., *Formicidae*
Bellicositermes natalensis Hav., *Termitidae*
Ceratitis (*Pterandrus*) *colae* Silv., *Trypetidae*
Balanogastris kolae Desbr., *Curculionidae*
Diaprorbinus pujoli Hoffmann, *Curculionidae*
Glenea giraffa Dalm., *Cerambycidae*
Cricetomys e. emini Wroughton, *Cricetidae*

Tea (Camellia sinensis)

Bellicositermes natalensis Hav., *Termitidae*
Zonocerus variegatus L., *Acrididae*
Dysdercus superstitiosus F., *Pyrrhocoridae*
Lygidocoris uniformis Reut., *Miridae*
L. mimeticus Reut. et Popp., *Miridae*
Helopeltis westwoodi White, *Miridae*

Table 4. Pests of Important Crops (cont.)

Tobacco (Nicotiana spp.)

Heliothis armigera (Hb.), *Noctuidae*
Bemisia tabaci Gen., *Aleyrodidae*
Gryllotalpa africana Pat. Beauv., *Gryllidae*
Zonocerus variegatus L., *Acrididae*
Nezara viridula L., *Pentatomidae*
Meloidogyne incognita (Kofoid et White) Chit., *Heteroderidae*

Pepper (Piper nigrum)

Planococcoides njalensis (Laing), *Pseudococcidae*
Ferrisia virgata (Ckll.), *Pseudococcidae*
Planococcus citri (Risso), *Pseudococcidae*
Anonaepestis tamsi Bradley, *Pyralidae*
Zonocerus variegatus L., *Acrididae*
Helopeltis westwoodi White, *Miridae*
Odoniella spp., *Miridae*

Cinchena ledgeriane

Deilephila nerii L., *Sphingidae*
Diaphana vernalis, *Pyralidae*
Pborma pepon Karch., *Cochlidiidae*
Helopeltis bergrothi Reut. var. *lalande*, *Miridae*
H. westwoodi White, *Miridae*
Lycidocoris mimeticus Reut. et Popp., *Miridae*
L. uniformis, *Miridae*
Pentilioforma spp., *Miridae*

Oilpam (Elaeis guineensis)

Heliosciurus gambianus punctatus (Temminck), *Sciuridae*
Xerus erythropus maestus (Thomas), *Sciuridae*
Grammomys buntingi (Thomas), *Muridae*
Augosoma (Dynastes) centaurus F., *Scarabaeidea*
Oryctes monoceros Ol., *Scarabaeidae*
O. owariensis Beauv., *Scarabaeidae*
Pachnoda marginata Jans., *Scarabaeidae*
Rhynchophorus phoenicis F., *Curculionidae*
Temnoscboita quadripustulata (Fab.), *Curculionidae*
Pimelephila ghesquierei Tams., *Pyralidae*
Aspidiotus destructor Sign., *Diaspididae*

Groundnuts (Arachis hypogaea)

Xerus erythropus maestus (Thomas), *Sciuridae*
Tryonomys swinderianus (Temminck), *Thryonomyidae*
Atherurus africanus, *Hystericidae*
Aphis craccivora Koch, *Aphididae*
Mylabris hybrida Mars., *Meloidae*
Zonocerus variegatus L., *Acrididae*
Anoplocnemis curvipes F., *Coreidae*
Bellicositermes natalensis Hav., *Termitidae*

Table 4. Pests of Important Crops (cont.)

Banana (Musa spp.)

Radopholus similis Cobb, *Hoplolaimidae*
Meloidogyne javanica (Treub) Chit., *Heteroderidae*
Cosmopolites sordidus Germ., *Curculionidae*
Nacoleia octosema (Meyr.), *Pyralidae*
Fledermäuse

Mango (Mangifera indica)

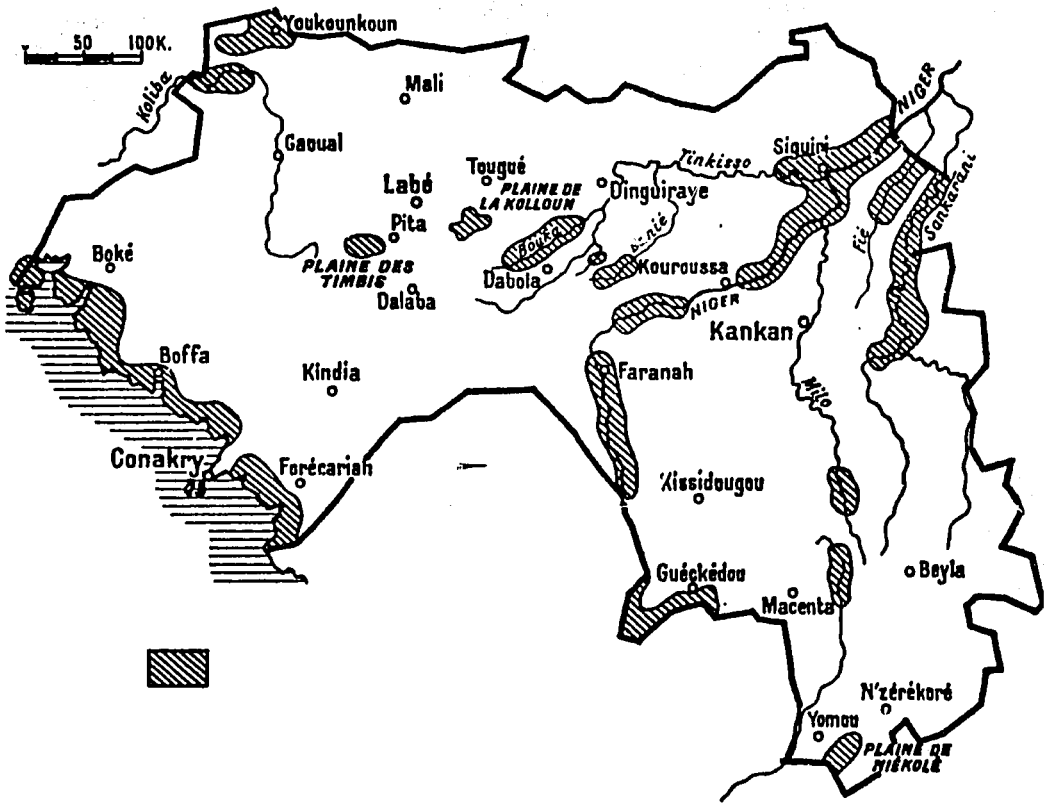
Anoplocnemis curvipes F., *Coreidae*
Pachnoda marginata Jans., *Scarabaeidae*
Ferrisia virgata (Ckll.), *Pseudococcidae*
Aerocercops spp., *Gracillariidae*
Fledermäuse

Citrus (Citrus spp.)

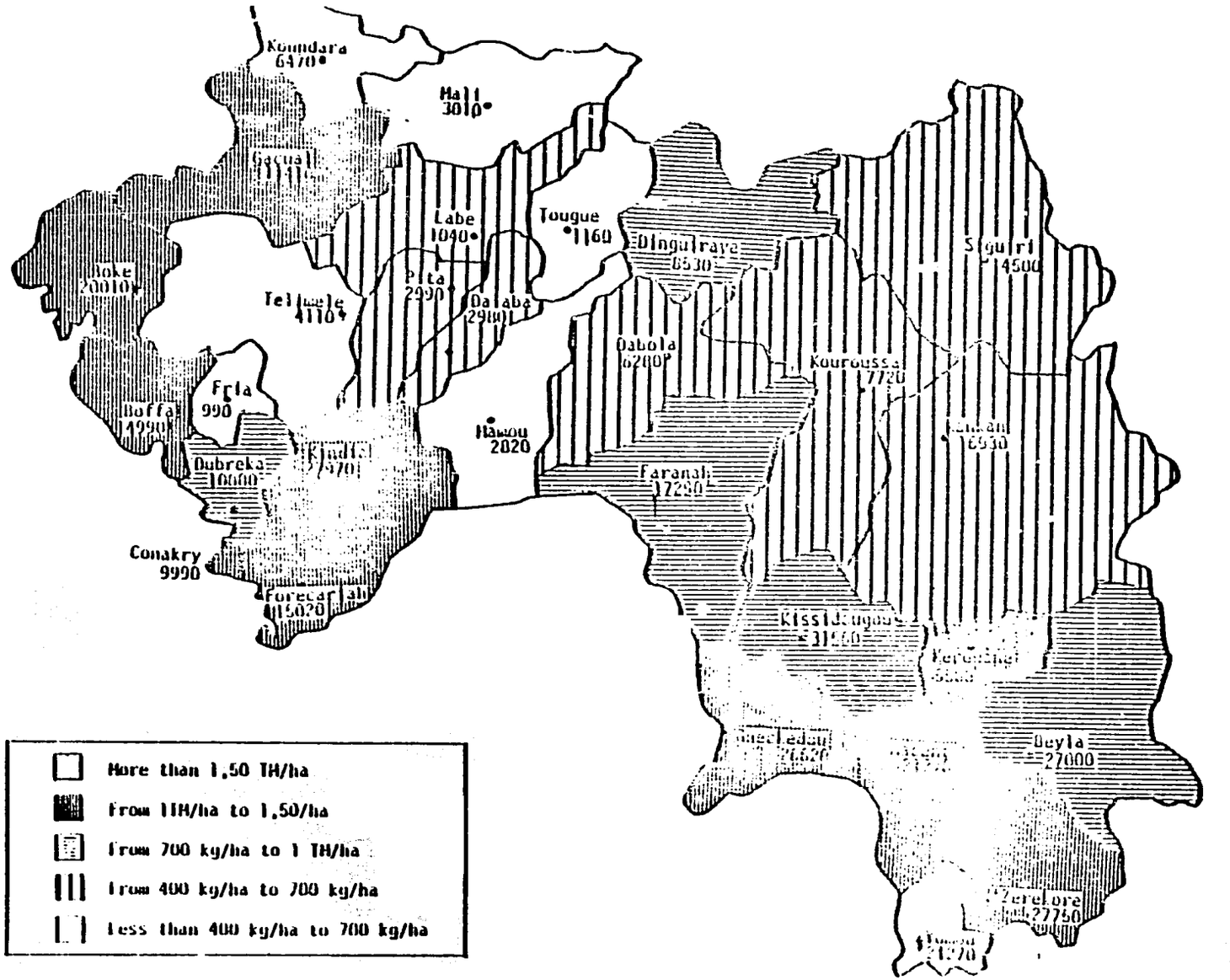
Cryptophlebia leucotreta (Meyr.), *Tortricidae*
Papilio demodocus Esp., *Papilionidae*
Ophideres princeps L., *Noctuidae*
O. fullonica Cl., *Noctuidae*
Lyonetia spp., *Lyonetiidae*
Pterandrus anonae (Graham), *Trypetidae*
Anoplocnemis curvis F., *Coreidae*
Zonocerus variegatus L., *Acrididae*
Distantiella collarti Schout., *Miridae*
Eotetranychus spp., *Tetranychidae*
Parlatoria zizyphi Lucas, *Diaspididae*
Lepidosaphes beckii Newm., *Diaspididae*
L. gloverii Pack., *Diaspididae*
Ceroplastes sinensis Del Guerc., *Coccidae*

Source: Zech. 1980.

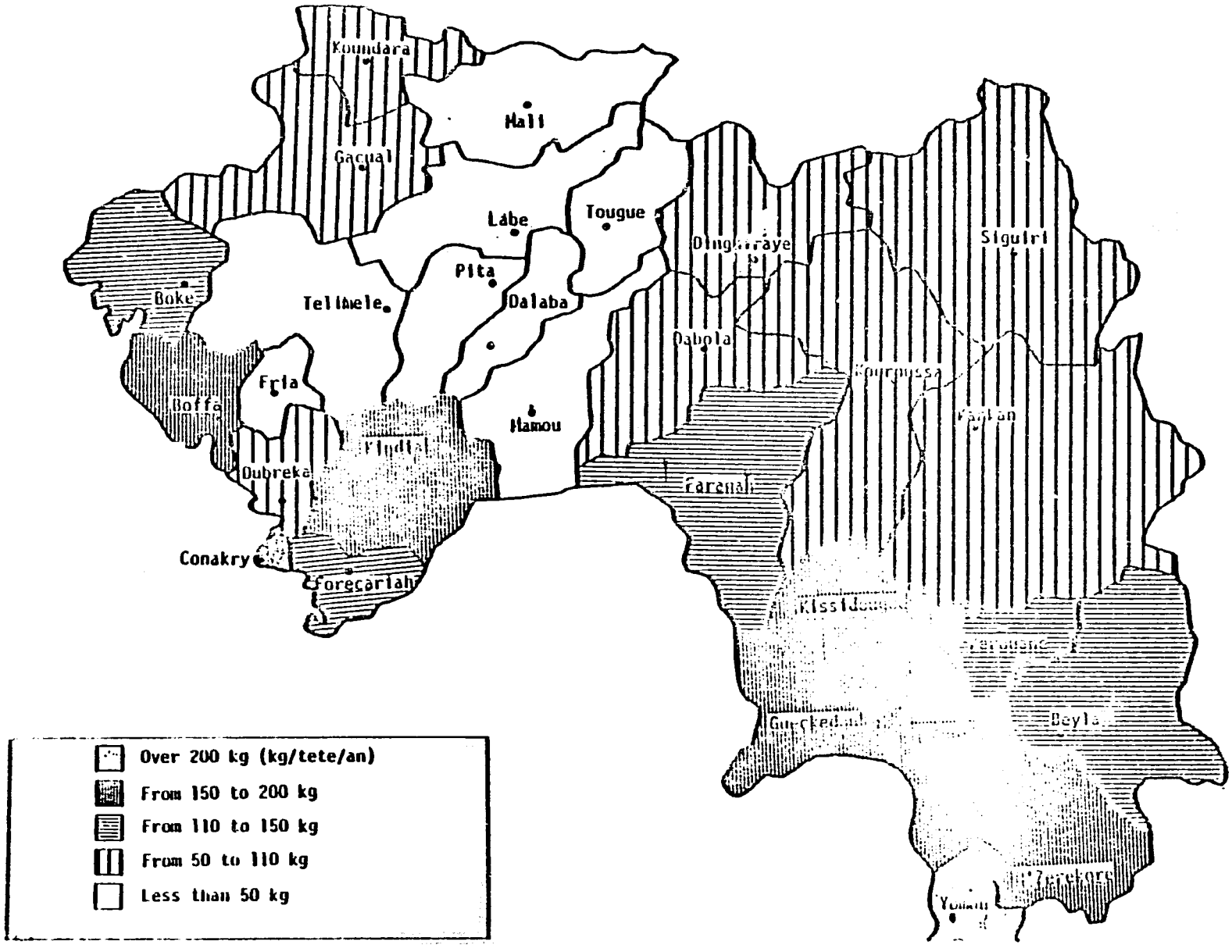
Figure 1. Areas Suitable for Irrigated Riziculture



Source: Suret-Canale. 1970.



Source: McGrath, et al. 1980.



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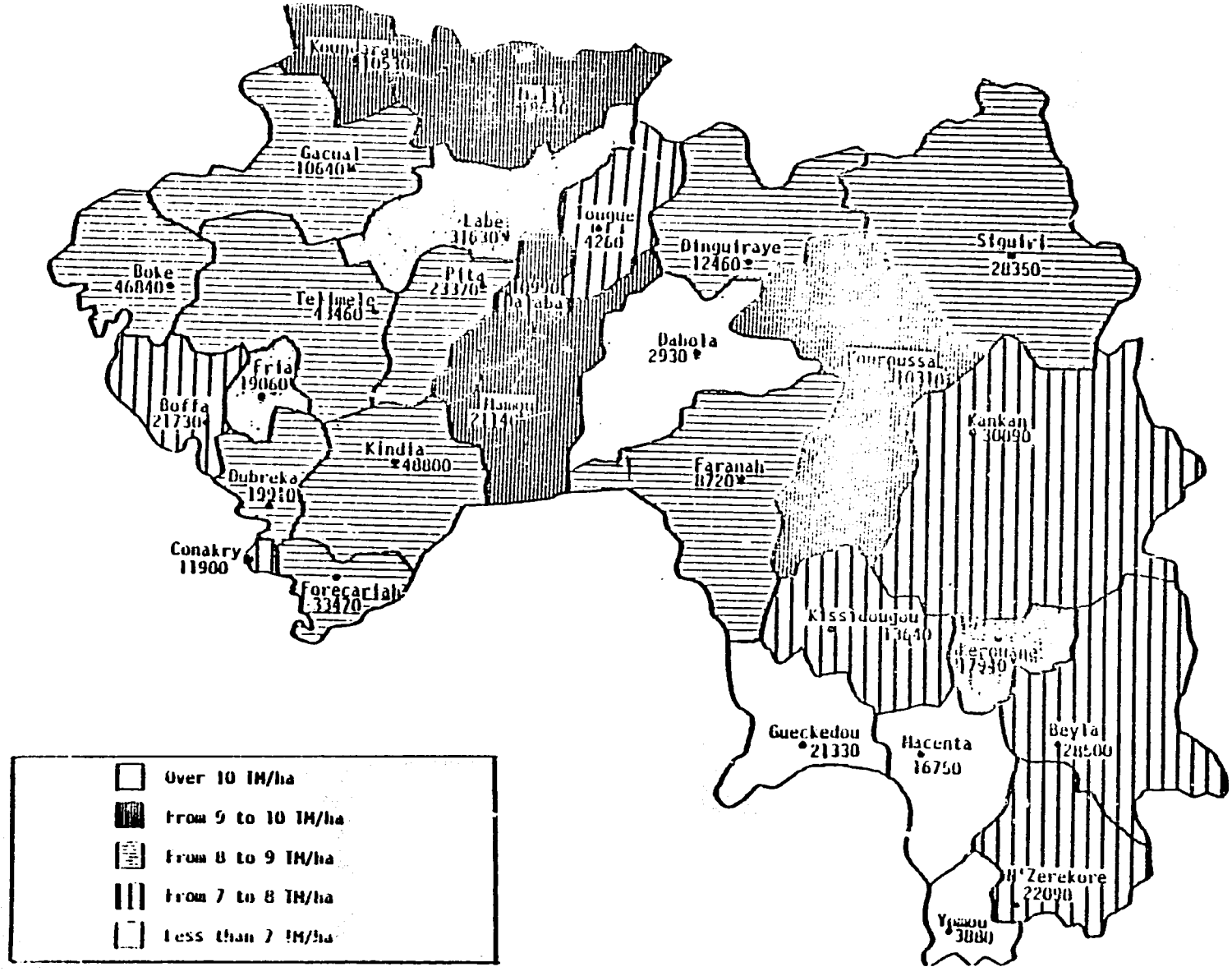
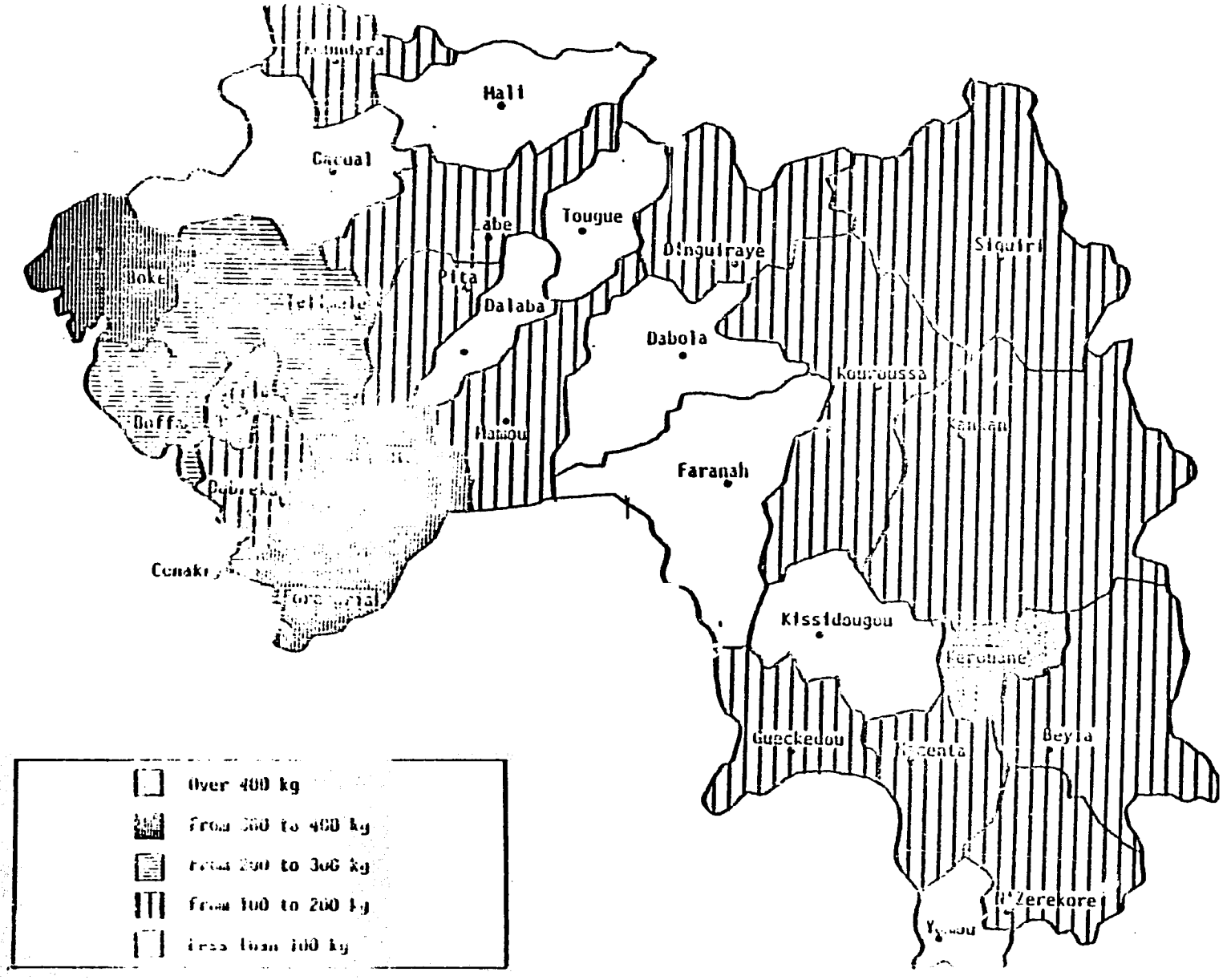


Source: McGrath, et al. 1980.



Source: McGrath, et al. 1980.

Appendix III

Foreign Assistance Programs

Table 1. Total Foreign Assistance, 1962 to 1973

Type of Assistance	Amount (in billions of Guinean francs)									
	1962-64	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70	1970-71	1971-72	1972-73
Grants		1.23	0.83	0.56	0.15	0.40	0.30	4.02	2.30	2.30
Loans		5.37	5.77	6.44	6.65	5.20	6.50	1.20	4.40	20.00
Total	57.5	6.60	6.60	7.00	6.80	5.60	6.80	5.22	6.70	22.30

Source: Riviere. 1977.

Table 2. Foreign Assistance by Donor, 1953 to 1971

Source of Aid	1953–62	1963–66	1967–68	1969	1970–71	Total 1953–71
International Organizations						
World Bank Group[1]	...	...	...	64.5	9.0	73.5
UN Development Program (UNDP)	0.4	7.3	3.4	2.6	3.1	16.8
Other UN sources	0.2	0.5	0.4	0.1	0.8	2.0
Total	0.6	7.8	3.8	67.2	12.9	92.3
Bilateral Official Sources						
Commitments of Capital by Communist Countries						
Soviet Union	76.0	...	...	92.0	...	168.0
Eastern Europe[2]	25.0	...	...	...	...	25.0
People's Republic of China (PRC)	26.0	30.0	...	...	10.0	66.0
Total[3]	127.0	30.0	...	92.0	10.0	259.0
Soviet military aid	n.a.	n.a.	n.a.	n.a.	n.a.	25.0
United States[4]						
Official loans	...	10.4	...	...	...	10.4
Supporting assistance grants	3.5	20.5	...	...	...	24.0
Other grants	4.9	9.8	2.2	0.8	0.2	17.9
Food for Peace	6.0	17.1	3.4	7.5	12.1	46.1
Peace Corps	...	3.0	0.2	0.2	0.4	3.8
Total	14.4	60.8	5.8	8.5	12.7	102.2
United States military aid	...	0.9	...	...	...	0.9
Federal Republic of Germany (West Germany)						
Economic	5.0	12.7	2.6	0.3	n.a.	n.a.
Military	n.a.	n.a.	n.a.	n.a.	n.a.	7.0
Italy	0.01	1.3	0.3	...	n.a.	n.a.
Belgium	...	...	0.03	...	n.a.	n.a.
United Kingdom	...	0.06	...	...	n.a.	n.a.
Switzerland	0.01	0.1	0.01	...	n.a.	n.a.
Canada	...	0.6	0.3	...	n.a.	n.a.
Other	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Export-Import Bank	...	...	...	22.8	0.4	23.2
Other suppliers' credits	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Private Overseas Direct Investment (PODI)	n.a.	n.a.	n.a.	n.a.	n.a.	150.0
TOTAL	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

... means none; n.a. means not available.

[1] Includes International Bank for Reconstruction and Development (IBRD, commonly known as the World Bank); International Development Association (IDA); and International Finance Cor (IFC).

[2] Excludes Yugoslavia, an important aid partner.

[3] Apparently includes only medium-term and long-term capital commitments; excludes sizable short-term credits under bilateral clearing agreements.

[4] United States figures, like communist figures, are for authorizations or commitments, not all of which are necessarily disbursed in the period in question.

Source: Nelson, et al. 1975.

Agency	Period	Nature of Assistance	Amount spent in Guinea (US $ million, unless otherwise specified)
USAID	FY 1976	Faculty of Agriculture, Foulaya (FAF)	0.32*
USAID	FY 1976	Faranah Agricultural Complex (FAC)	0.39*
USAID	FY 1977	FAF	0.32*
USAID	FY 1977	FAC	0.21*
USAID	FY 1978	FAF	0.32*
USAID	FY 1978	FAC	0.21*
USAID	FY 1976-78	FAF (Total)	0.96*
USAID	FY 1976-78	FAC (Total)	0.81*
USAID	FY 1976-86	Niger River Basin Planning	n.a.
USAID	FY 1977-83	Strengthening Health Delivery Systems	n.a.
USAID	FY 1977-84	Semiarid Foodgrain Research and Development	0.20**
USAID	FY 1980-84	Mother-Child Health Care	0.46**
USAID	FY 1981-85	Community Forestry	0.46**
France	1978	Hydroelectric Generation Study (Grandes Chutes)	0.32
France	1978-79	Solar Renewable Energy	0.21
JNDP	1979	Fossil Fuels/Petroleum Production and Distribution	n.a.
IBRD	1981	Offshore Exploration	n.a.
IDA	1981	Livestock Development	17.50
IDA	1981	Electric Power Facility Improvement	28.50
IDA	1981	Total bank loans (3 loans)	75.20
IDA	1981	Total credits (9 projects)	112.00
IDA	1981	Total loans and credits (12 projects)	187.20
ADB/ADF	1981	Improvement of Rice Production in Siguiri Region	FUA 8.00 million
ADB/ADF	1981	Water and Electricity Supply	2.30

Agency	Period	Nature of Assistance	Amount spent in Guinea (US $ million, unless otherwise specified)
ADB/ADF	1981	Exploitation of Irrigated Areas	3.00
IDA	1981-82	Electrical Distribution in Conakry	28.50
West Germany	1981-82	Improvement of Electrical Production and Distribution in Conakry	14.40
Caisse Centrale de Cooperation Economique (CCCE), France	1981-82	Feasibility Study of Konkoure Dam	4.50
Varions	1981-82	Mini Hydroelectric Power Studies	approx. 1.00
FAO	Five years (?)	Watershed Management (Kokoulo River Basin, in Middle Guinea)	5.00
USAID	FY 1981-82	Forestry/Fuel-Nursery	0.50
Committee of Islamic Solidarity with the Sahel Peoples	1982	Rural Development	n.a.
USAID	FY 1984	Agricultural Research, Training and Extension	1.80**
USAID	FY 1984	Mother-Child Health and Family Planning	0.50**
USAID	FY ?-1984	Mother-Child Health and Family Planning (cumulative funding)	4.50**
USAID	FY 1984	Renewable Energy Technology	n.a.**

* Anticipated funding level, as of 1975.
**Projected funding level, in 1982.

Sources: Africa Research Bulletin. 1980-82
USAID. 1975b.
-----. 1982b.
-----. 1982d.
-----. 1982e.
World Bank. 1981b.

Table 4. Description of Selected Recent Foreign Assistance Projects

Project	Description
Faranah Agricultural Complex (USAID)	Agricultural education, research, and extension/demonstration complex in Faranah. Includes: (a) Institute for Adaptive Research; (b) Regional School of Agriculture; and (c) Extension demonstration farm.
Faculty of Agriculture, Foulaya (USAID)	Establishment of a National Agronomic Research Institute. Includes a pilot extension system at Tindo.
Agricultural Research, Training and Extension (USAID)	Project strengthens research/education/extension complex of national faculty of agronomy and national agricultural research institute. Upgrades research facilities, trains researchers, engges in adaptive research. Ensures continuation of quality research by training successors in U.S. Designs rotational training and research assignments for local staffs. Upgrades facilities and curriculum at regional vocational school of agriculture. Establishes agro-pastoral demonstration farm to serve as pilot production and training center, to provide practical and research training for vocational school. Project trains agricultural researchers, extension agents, administrators in integrated approach.
Mother-child Health and Family Planning (USAID)	This project is based on the pilot accelerated impact project for mother-child health financed in FY 80 and launched in FY 81. The AIP is one of two pilot projects centered in Middle Guinea and planned for expansion into full-scale projects covering a large part of the region during the planning period. The projects aim at increasing productivity through improvements in family health and erosion control and fuelwood generation (community forestry).

Table 4. Description of Selected Recent Foreign Assistance Projects (continued)

Project	Description
	The project will address these problems in Middle Guinea by (1) providing continuing education for various levels of MCH workers including those at rural health posts and traditional birth attendants; (2) planning, implementing and evaluating community health/nutrition education programs; (3) developing a baseline data collection system; (4) helping implement the Expanded Program of Immunization (EPI); and (5) promoting birth spacing as an integral part of mother-child and family health. The project will be carried out through the Maternal-Child Health Service of the Ministry of Social Affairs.
Renewable Energy Technology (USAID)	Technical advice to be provided by Volunteers in Technical Assistance (VITA). Includes: (a) improved wood and charcoal stoves; (b) institution of a Rural Energy Fund.
Offshore Exploration (IBRD)	Regional project. Includes: (a) gathering of new geological and geophysical data; (b) strengthening of national planning capacity; (c) exploration activities.
Livestock Development (IDA)	Through a livestock development project - including vaccinations, provision of drugs, medicines, and mineral licks, and upgrading of the livestock husbandry and veterinary support services - milk and meat production will be increased, nutrition improved, and the standard of living of cattle owners upgraded. In addition, a planning unit for livestock development will be established. Total cost: $21 million.

Table 4. Description of Selected Recent Foreign Assistance Projects (continued)

Project	Description
Electric Power Facility Improvement (IDA)	The project is part of a program to rehabilitate and expand power facilities in Conakry and the surrounding areas and to strengthen the management and operations of the Societe Nationale d'Electricite. A training program, technical assistance, and consulting services are included, as are the rehabilitation of the power distribution network and construction of related facilities. Total cost: $32.5 million.
Exploitation of Irrigated Areas (ADB/ADF)	Set up four district arable and stock farms; help exploit irrigated agricultural areas. Project expected to benefit 2,235 families.

Sources: Africa Research Bulletin. 1980-82.
USAID. 1975b.
-----. 1982a.
-----. 1982b.
World Bank. 1981b.

Appendix IV

Organizations, Agencies, and Regional Agreements Relating to the Environment

Name (Acronym)	Nature of enterprise	Ownership (if available)
Central Ministries		
Agriculture and Agricultural Cooperatives		
Energy		
Environment and Town Planning		
Higher Education and Scientific Research		
Interior		
Livestock and Fishing		
Mining and Geology		
Public Health		
Public Works		
Social Affairs		
Technical Education and Professional Training		
Transport		
Other Public Sector Organizations		
Centre des Recherches Rizicoles (CRR; Center for Rice Research)		
Centre Guineen de Recherches Fruitieres (CGRF; Guinean Center for Fruit Research)		
Ecole de la Sante (School of Health)		
Ecole Superieure d'Administration (ESA; Higher School of Administration)		
Institut Polytechnique Gamal Abdel Nasser (G.A. Nasser Polytechnic Institute)		
Institut National des Recherches et de Documentations de Guinee (INRDG; Guinean National Institute for Research and Documentation)		
Institut National d'Hygiene (INH; National Institute of Hygiene)		
Institut des Recherches Biologiques Appliques (IRBA; Institute for Applied Biological Research)		
Institut des Recherches Fruitieres (IRH; Institute for Research on Fruits)		
Institut Polytechnique Kankan, Julius Nyerere (IPK; Julius Nyerere Polytechnic Institute at Kankan)		
National Economic Council (NEC)		
Section de Recherches sur le Quinquina et les Cultures de Montagnes (Section for Research on Cinchona and Mountain Plants)		
Service Meteorologique National de Guinee (SMNG; Guinean National Meteorological Service)		

Name (Acronym)	Nature of enterprise	Ownership (if available)
Companies (Public sector, private sector, or jointly owned)		
Compagnie d'Agriculture de Commerce et d'Industrie d'Afrique (CACIA)	Agriculture, commerce, industry	
Compagnie du Mineral de Fer de Guinee (MIFERGUI) - Simandon	Iron ore exploitation	50% state-owned
Compagnie du Mineral de Fer de Guinee (MIFERGUI) - Nimba	Iron ore exploitation	50% state-owned
Compagnies des Bauxites de Guinee (CBG)	Bauxite exploitation	49% state-owned
Cooperatives Agricoles de Production (CAP)	Agricultural cooperative	Member-owned
Cooperatives de Production Agricole et le Consommation (COPAC)	Agricultural and marketing cooperative	Member-owned
Conserves de Guinee (CG)	Vegetable and fruit cannery	
Distribution Eaux de Guinee (DEG)	Water distribution	Public
Entreprise Nationale de Transports Routiers, d'Acconage, de Transit et de Consignation Maritime (ENTRAT)		
Entreprise Nationale d'Importation de Materiel et Produits pour l'Agriculture (AGRIMA)	Importation of agricultural products	Public
Entreprise Nationale Guineenne d'Exploitation du Diamant (EGED)	Diamond exploitation	Public
Entreprise Jean Lefebre (EJL)	Highway construction	Private
Entreprise Nationale de Briquerie et de Ceramique (ENBC)	Brick and ceramic manufacture	Public
Entreprise Nationale d'Alimentation Generale (ALIMAG)	Nutrition	Public
Etablissements Escalas et Compagnie Sarl (EECS)	Agricultural produce	
Ets. el Hadj Toure Sekou Sadibou (FRUITAGUINEE)	Chocolate milk and fruit juice manufacture	Private
FRIGUIA	Aluminum plant	49% state-owned
Office des Bauxites de Kindia (OBK)	Bauxite mining	Public
Office d'Amenagement de Boke (OFAB)	Mining	
Office Nationale des Hydrocarbures (ONAH)	Hydrocarbon manufacture	Public
Office Nationale de la Banane et des Fruits de Guinee (ONBFG)	Fruit growing and marketing	Public
Office du Commercialisation du Betail (OBETAIL)	Livestock raising and processing	Public
Societe Guineenne des Etablissements Duffour et Igon (SOGEDI)	Natural gas and hydrocarbon distribution	
Societe Guineo-Arabe d'Alumine (SGAA)	Aluminum production	Joint Guinean and six Arab gov'ts.
Societe Anonyme pour le Developpement de l'Industrie de l'Aluminium de Tougue-Dabola (SADA)	Aluminum production	
Societe Africaine des Peches Maritimes (AFRIMAR)	Fishing enterprise	Joint

Name (Acronym)	Nature of enterprise	Ownership (if available)
Companies (cont.)		
Societe Africaine des Peches Maritimes (AFRIMAR)	Fishing enterprise	49% state-owned
Societe des Bauxites de Dabola (SBD)	Bauxite exploitation	51% state-owned; 49% owned by U.S., Yugoslavia and Algeria
Societe de Transports Maritimes (SOTRAMAR)	Maritime transportation	
Societe Guineenne des Petroles (SOGUIP)	Petroleum production and distribution	49% state-owned, 51% owned by U.S. and Yugoslavia
Societe Industrielle des Fruits Africains (SIFRA)	Fruit production and marketing	
Societe Miniere Guinee-Alu-Suisse (SOMIGA)	Mining	Public
Societes Mutuelles de Developpement Rural (SMDR)	Rural Development	Public
Societe Guineenne de Transports (SGT)	Transportation	Public
Societe Navale Guineenne (SNG)	Maritime shipping	Public
Societe Industrielle, Commerciale et Agricole de Guinee (SIGAG)	Industry, commerce, and agriculture	
Societe Agricole de Guinee (SAG)	Agriculture; banana trade	
Societe Industrielle d'Exploitation des Granits Guineens (SIGRAG)	Granite exploitation	Joint
Societe Nationale d'Electricite (SNE)	Electricity production	Public
Societe Guineenne d'Installations Electriques (GUINELEC)	Electricity supply	Public
Societe Guineo-Koweitienne de Peche (SOUGUIKOP)	Fishing enterprise	49% state-owned
Societe Nippo-Guineenne de Peche (SONIGUE)	Fishing enterprise	49% state-owned
Societes Indigenes de Prevoyance (SIP)	Agricultural cooperatives	Public

*Private enterprise was legalized in 1979 in Guinea.

Sources: Duic. 1978.
Europa. 1981c.
Nelson, et al. 1975.
OAU. 1977.
O'Toole. 1978.
Riviere. 1977.
UNESCO-ECA. 1966.

Table 1. Domestic Organizations and Agencies

Name (Acronym)	Nature of enterprise	Ownership (if available)
Central Ministries		
Agriculture and Agricultural Cooperatives		
Energy		
Environment and Town Planning		
Higher Education and Scientific Research		
Interior		
Livestock and Fishing		
Mining and Geology		
Public Health		
Public Works		
Social Affairs		
Technical Education and Professional Training		
Transport		
Other Public Sector Organizations		
Centre des Recherches Rizicoles (CRR; Center for Rice Research)		
Centre Guineen de Recherches Fruitieres (CGRF; Guinean Center for Fruit Research)		
Ecole de la Sante (School of Health)		
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Institut des Recherches Biologiques Appliques (IRBA; Institute for Applied Biological Research)		
Institut des Recherches Fruitieres (IRH; Institute for Research on Fruits)		
Institut Polytechnique Kankan, Julius Nyerere (IPK; Julius Nyerere Polytechnic Institute at Kankan)		
National Economic Council (NEC)		
Section de Recherches sur le Quinquina et les Cultures de Montagnes (Section for Research on Cinchona and Mountain Plants)		
Service Meteorologique National de Guinee (SMNG; Guinean National Meteorological Service)		

Name (Acronym)	Nature of enterprise	Ownership (if available)
Companies (Public sector, private sector, or jointly owned)		
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Cooperatives Agricoles de Production (CAP)	Agricultural cooperative	Member-owned
Cooperatives de Production Agricole et le Consommation (COPAC)	Agricultural and marketing cooperative	Member-owned
Conserves de Guinee (CG)	Vegetable and fruit cannery	
Distribution Eaux de Guinee (DEG)	Water distribution	Public
Entreprise Nationale de Transports Routiers, d'Acconage, de Transit et de Consignation Maritime (ENTRAT)		
Entreprise Nationale d'Importation de Materiel et Produits pour l'Agriculture (AGRIMA)	Importation of agricultural products	Public
Entreprise Nationale Guineenne d'Exploitation du Diamant (ENGED)	Diamond exploitation	Public
Entreprise Jean Lefebre (EJL)	Highway construction	Private
Entreprise Nationale de Briquerie et de Ceramique (ENBC)	Brick and ceramic manufacture	Public
Entreprise Nationale d'Alimentation Generale (ALIMAG)	Nutrition	Public
Etablissements Escalas et Compagnie Sarl (EECS)	Agricultural produce	
Ets. el Hadj Toure Sekou Sadibou (FRUITAGUINEE)	Chocolate milk and fruit juice manufacture	Private
FRIGUIA	Aluminum plant	49% state-owned
Office des Bauxites de Kindia (OBK)	Bauxite mining	Public
Office d'Amenagement de Boke (OFAB)	Mining	
Office Nationale des Hydrocarbures (ONAH)	Hydrocarbon manufacture	Public
Office Nationale de la Banane et des Fruits de Guinee (ONBFG)	Fruit growing and marketing	Public
Office du Commercialisation du Betail (OBETAIL)	Livestock raising and processing	Public
Societe Guineenne des Etablissements Duffour et Igon (SOGEDI)	Natural gas and hydrocarbon distribution	
Societe Guineo-Arabe d'Alumine (SGAA)	Aluminum production	Joint Guinean and six Arab gov'ts.
Societe Anonyme pour le Developpement de l'Industrie de l'Aluminium de Tougue-Dabola (SADA)	Aluminum production	
Societe Africaine des Peches Maritimes (AFRIMAR)	Fishing enterprise	Joint

Name (Acronym)	Nature of enterprise	Ownership (if available)
Companies (cont.)		
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Societe de Transports Maritimes (SOTRAMAR)	Maritime transportation	
Societe Guineenne des Petroles (SOGUIP)	Petroleum production and distribution	49% state-owned, 51% owned by U.S. and Yugoslavia
Societe Industrielle des Fruits Africains (SIFRA)	Fruit production and marketing	
Societe Miniere Guinee-Alu-Suisse (SOMIGA)	Mining	Public
Societes Mutuelles de Developpement Rural (SMDR)	Rural Development	Public
Societe Guineenne de Transports (SGT)	Transportation	Public
Societe Navale Guineenne (SNG)	Maritime shipping	Public
Societe Industrielle, Commerciale et Agricole de Guinee (SIGAG)	Industry, commerce, and agriculture	
Societe Agricole de Guinee (SAG)	Agriculture; banana trade	
Societe Industrielle d'Exploitation des Granits Guineens (SIGRAG)	Granite exploitation	Joint
Societe Nationale d'Electricite (SNE)	Electricity production	Public
Societe Guineenne d'Installations Electriques (GUINELEC)	Electricity supply	Public
Societe Guineo-Koweitienne de Peche (SOGUIKOP)	Fishing enterprise	49% state-owned
Societe Nippo-Guineenne de Peche (SONIGUE)	Fishing enterprise	49% state-owned
Societes Indigenes de Prevoyance (SIP)	Agricultural cooperatives	Public

*Private enterprise was legalized in 1979 in Guinea.

Sources: Duic. 1978.
Europa. 1981c.
Nelson, et al. 1975.
OAU. 1977.
O'Toole. 1978.
Riviere. 1977.
UNESCO-ECA. 1966.

Table 2. Regional and International Organizations and Agencies

African Development Bank (ADB)

Central Division for International Technical Cooperation (CDITC)

Commission for the East Central Atlantic Fisheries (CECAF)

International Bauxite Association (IBA)

International Development Association (IDA)

Organization of African Unity (OAU)

Organisation des États Rivérains du Sénégal (OERS; Organization of Senegal River States)

Société Commerciale de l'ouest Africain (SCOA; Commercial Society of West Africa)

Union Chimique de l'ouest Africain (UCOA; Chemical Union of West Africa)

United Nations (UN; including FAO, UNDP, UNEP, UNESCO, WHO, WMO)

West African Regional Group

West African Rice Development Association (WARDA)

Sources: Duic. 1978.
ECA. 1972.
Nelson, et al. 1975.
OAU. 1977.
Rivière. 1977.

Table 3. Regional Agreements

Agreement	Subject	Date
Niger Basin Accord (UN Registration No. 8506)	Water use	1963
Niger Basin Accord (UN Registration No. 8507)	Water use	1964
Organization of Senegal River States Accord (OERS); (Guinea has not signed the 1972 Senegal Basin agreement between Senegal, Mali, and Mauritania setting up the Senegal River Development Organization, or OMVS)	Water use	1968-69
Adidjan African Environmental Treaty	Environmental protection	1981

Sources: Caponera. 1979.
Ress. 1981.

Appendix V

Acronyms Employed in Text (not including Appendices)

ADB	African Development Bank
ADF	African Development Fund
AFRIMAR	Société Africaine des Pêches Maritimes (African Maritime Fishing Company)
ARB	Africa Research Bulletin
BAP	(Non-Mechanized Production Brigades)
BMP	Brigades Méchanizées de Production (Mechanized Production Brigades)
CECAF	Commission for the East Central African Fisheries
CIDA	Canadian International Development Agency
ECA	Economic Commission for African (UN)
EEC	European Economic Community
ENDA	Environment Development Action (UNEP)
FAO	Food and Agriculture Organization (UN)
FAPA	Fermes Agro-Pastorales d'Arrondissement (District-level Agropastoral Farms)
FWS	U.S. Fish and Wildlife Service (U.S. Department of the Interior)
GDP	Gross Domestic Product
GNCU	Guinean National Commission for UNESCO
GNP	Gross National Product
ICPB	International Council for Bird Preservation
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IUCN	International Union for Conservation of Nature and Natural Resources
MAB	Man and the Biosphere (UNESCO)
NAS	National Academy of Sciences (USA)
OAU	Organization of African Unity
ORSTOM	Office de la Recherche Scientifique et Technique Outre-Mer

PDG	Parti Democratique de Guinée (Democratic Party of Guinea, or Guinean Democratic Party)
PRL	Pouvoir Révolutionnaire Local (Local Revolutionary Authority)
SIDA	Swedish International Development Authority
SNR	Strict Natural Reserve
SONIGUE	Société Nippo-Guinéenne de Pêche (Nippo-Guinean Fishing Company)
SOUGUIKOP	Société Guinéo-Koweitienne de Pêche (Guinean-Kuwaiti Fishing Company)
UNDESA	United Nations Department of Economic and Social Affairs
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
USGPO	U.S. Government Printing Office
WHS	World Heritage Site
WMO	World Meteorological Organization (UN)

Appendix VI

Selected Bibliography

1. Climate, Demography, Economy, Geography, History, and General Reference

2. Agriculture and Land Use

3. Water Resources

4. Geology, Soils, Mineral, and Energy Resources

5. Vegetative Resources and Management

6. Faunal Resources and Management

7. Conservation, Environmental Problems, and Public Health

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