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Nigeria

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NATIONAL INTELLIGENCE SURVEY

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Military Geography

NATIONAL INTELLIGENCE SURVEY PUBLICATIONS

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This chapter was prepared for the NIS by the Defense Intelligence Agency. Research was substantially completed by November 1972.



NIGERIA

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Military Geography

A. Location and description (U/OU)

The Federal Republic of Nigeria is located on the west coast of Africa near the geographical center of the continent (Figure 50). Lagos, the capital, is nearly 1,300 nautical miles from Dakar, Senegal; about 1,900 nautical miles from the Strait of Gibraltar and the important mining areas in Zaire and Zambia; and slightly over 2,000 nautical miles from the Suez Canal.

Nigeria has an area of about 357,000 square miles and is slightly larger than South Dakota, Colorado, Nebraska, and Wyoming combined. The country extends a little less than 660 miles¹ north-south and about 700 miles east-west. The population was estimated to be 58,020,000 as of July 1972.

1. Topography

About 90% of Nigeria consists of savanna- and forest-covered plains and scattered uplands (Figure 1). The remainder is a narrow belt of forested or grass-covered hills and mountains along the eastern border. Most of the country is drained by the Niger-Benue river system, which discharges generally southward into the Bights of Biafra and Benin by way of a large, poorly drained delta. This is part of the generally swampy and marshy coast. The few streams elsewhere drain chiefly northeastward into Lake Chad, a large body of water of varying salinity that lies mostly within neighboring Chad. The principal culture features are towns and villages, which are most numerous in the south; cultivated fields chiefly in the north; mines located mainly in the central section; and oil wells in and near the Niger Delta. A moderately dense network of rail lines, roads, and tracks connects populated places in the south; relatively few roads and tracks, however, cross the northern and central plains and hills and the eastern highlands.

Plains have chiefly flat to gently rolling surfaces of lateritic clay, sand, and silty sand; the plains in the north (Figure 2) are flat to rolling and sandy, and

¹Distances are in statute miles unless nautical miles are specifically stated.

those in the south are extremely flat (Figure 3) and composed of peat or organic clay. Slopes are chiefly less than 2%, and interstream areas in most places reach a maximum height of 200 feet above adjacent stream bottoms; in scattered dissected sections along margins of the Niger and Benue valleys and principal uplands, slopes are between 2% and 10%, and interstream areas rise 250 to 500 feet above nearby streambeds. Elevations in the plains are less than 50 feet along the coast, 50 to 1,000 feet in the interior, and 600 to 2,000 feet in the north. The plains are interrupted chiefly by scattered uplands, which extend northeast-southwest across the area, and by low sand dunes in the northeast. The uplands consist of hills (Figure 4) that have rounded or flat summits 600 to 1,400 feet above the surrounding plains; slopes in the hills are largely 10% to 30% but locally reach 100%. The Jos Plateau contains scattered mountains, which have mainly rounded crests and rise 2,000 to 2,800 feet above the nearby plains and valley floors. Elevations are between 3,300 and 4,900 feet, and slopes commonly exceed 30% in these mountainous areas. In the northern and central plains, the vegetation is mainly tall- and short-grass (Sudan) savanna; however, marsh is extensive along Lake Chad in the northeast. A belt of short-grass savanna (Figure 5) extends across extreme northern Nigeria and widens in the east. Short-grass savanna is composed of clumps of grass 3 to 4 feet high; widely scattered, flat-topped, thorny acacia trees 20 to 25 feet high and with trunks 1 to 2 feet in diameter; and a few baobabs, which have trunks 5 to 10 feet in diameter. Tall-grass savanna (Figure 6) comprises clumps of grass 3 to 10 feet high and many patches of brush; scattered clumps of acacia trees as tall as 40 feet; belts of broadleaf deciduous trees, 50 to 100 feet high, along streams and watercourses; and cultivated plots of sorghum, corn, millet, and peanuts near villages. On the plains along Lake Chad, the marsh vegetation consists of dense papyrus reeds and other herbs, 3 to 10 feet high. A narrow belt of broadleaf deciduous forest forms a transition between the savanna plains and the dense broadleaf evergreen forest on the southern plains. Within the areas of broadleaf deciduous forest

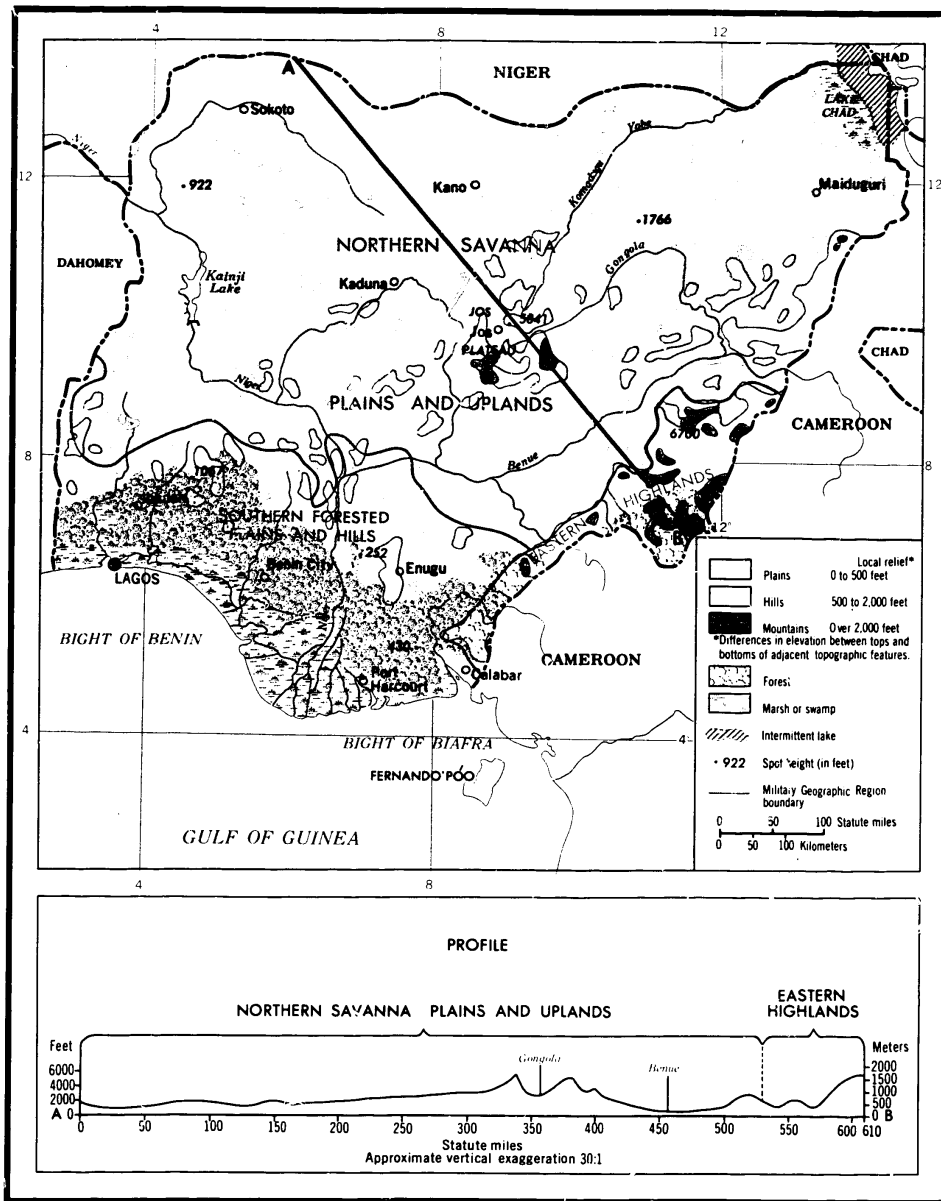


FIGURE 1. Military geographic regions and terrain (C)



FIGURE 2. The plains in the north are flat to rolling and mostly covered by tall- and short-grass savanna. Flat-topped thorny acacia trees are widely scattered. (U/OU)

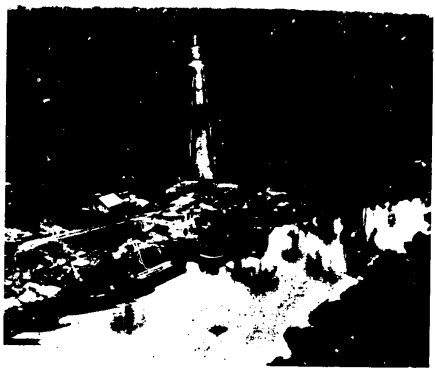


FIGURE 3. The southern plains primarily are flat and covered by forests. In this area north of Port Harcourt, there are large, dense stands of palms. (U/OU)

(Figure 7), the trees are chiefly 50 to 100 feet high, have trunks 1 to 5 feet in diameter, and are commonly leafless from early February through April. A dense undergrowth of evergreen shrubs, herbs, and vines covers the forest floor in many areas, and in abandoned clearings grass reaches heights of 3 to 10 feet. Many clearings contain cultivated plots of cassava, corn, yams, bananas, and dryland rice. A belt of dense broadleaf evergreen forest, brush, and cultivated vegetation extends across the well-drained parts of the southern plains and scattered hills; mangrove and fresh-water swamp covers the tidal and poorly drained coastal sections of the plains, including the Niger Delta. The broadleaf evergreen forest (Figure 8) has a generally dense continuous canopy, except where cultivation is recent. Trees are mainly 50 to 120 feet high, and some may reach 150 feet; trunks are 1 to 6 feet in diameter and commonly buttressed. In places, an understory of oil palms consists of trees 30 to 45 feet high. Undergrowth is commonly sparse or lacking, but in abandoned clearings dense brush, composed of small trees, shrubs, and vines, reaches heights of 5 to 25 feet; the same varieties of cultivated crops are grown in the broadleaf evergreen forest as in the broadleaf deciduous forest. Tidal mangrove swamp (Figure 9) is dense and has a generally continuous canopy; here, trees are 20 to 100 feet high, have trunks 1 to 3 feet in diameter, and are supported by tangled aerial prop roots 5 to 8 feet high; undergrowth is generally sparse. On the landward margin of the mangrove is fresh-water swamp, which contains heavily buttressed trees with much the same characteristics as the broadleaf evergreen varieties on well-drained plains; associated with the trees are large stands of palms. Undergrowth is generally dense and composed of thickets of shrubs, vines, and prickly creepers; floating grass, 3 to 5 feet high, grows on the fresh-water stretches of some of the streams.

The uplands along the eastern margin of Nigeria consist of hills and a few mountains (Figure 10) and have a predominantly northeast-southwest orientation. The hills commonly have broad rounded summits, and the mountains are sharp crested and in places contain volcanic peaks. Ridges are interrupted in many places by transverse valleys that are steep sided and narrow in upper sections and broad and flat to gently rolling in the low-lying sections. The uplands are covered chiefly by tall- and short-grass savanna in the northeastern half and by dense broadleaf deciduous and evergreen forest in the southwestern half; shifting cultivation in small clearings occurs in the forested areas. In parts of the uplands located at elevations above 6,000 feet, the forests are replaced by

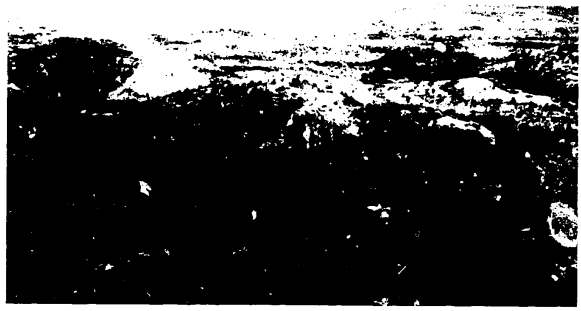


FIGURE 4. Most hills in the southwest have rounded or nearly flat summits less than 1,500 feet above the surrounding plains. Tall-grass savanna and brush cover most of the hilly area in this part of the country. (U/OU)



FIGURE 5. Short-grass savanna covers large parts of northern Nigeria and consists of clumps of grass 3 to 4 feet high, scattered flat-topped thorny acacia trees, and a few baobabs (U/OU)



FIGURE 6. Tall-grass savanna covers most of the Jos Plateau, which is a rugged, mostly hilly area. The grass is 3 to 10 feet high and is interspersed with brush, acacia trees, and palms. (U/OU)

patches of short bunchgrass, thickets of bamboo, dense shrubs 6 to 10 feet high, and scattered gnarled trees as tall as 25 feet. Hill crests are commonly 800 to 1,800 feet above adjacent valley floors, and the crests and peaks of the mountains are 2,400 to 3,600 feet above the bottoms of adjacent valleys. Crests of ridges reach an average elevation of 4,000 feet, and slopes range mainly from 10% to 30% in the hills and from 30% to 45% in the mountains.

The principal drainage features in Nigeria are numerous large perennial and intermittent streams, perennially and seasonally wet areas, coastal lagoons, and Lake Chad. The largest streams are the Niger



FIGURE 7. Broadleaf deciduous forests occur in a narrow, east-west belt in the southern part of the country. The forests have a dense undergrowth of evergreen shrubs and vines, such as shown here, along road cuts and other open areas. (U/OU)

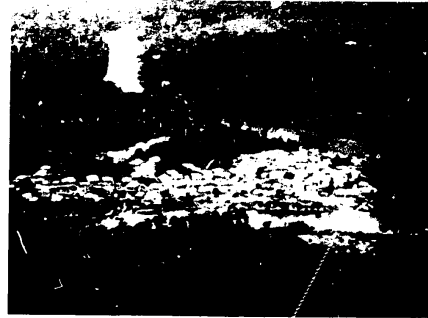


FIGURE 8. Dense broadleaf evergreen forests cover large parts of the southern plains. Trees may reach 150 feet high and have buttressed trunks 6 feet in diameter.



FIGURE 9. Trees in the tidal mangrove swamps are dense and as much as 100 feet tall, with trunks up to 3 feet in diameter; trunks are supported by tangled aerial prop roots 5 to 8 feet high (U/OU)

(Figure 11) and its principal tributary, the Benue (Figure 12), which rise outside of the area and drain generally southward to the Bights of Benin and Biafra. A few streams in the west and southeast flow directly southward to the sea, and several chiefly intermittent streams, the largest of which is the Komadugu Yobe, drain northeastward into Lake Chad. Most of the southward-flowing streams have relatively straight courses in broad valleys, generally low, gently sloping,

sandy, rocky, or muddy banks, and mostly sandy bottoms; in several places within and adjacent to upland areas, the Niger, Benue, and several other streams are restricted to narrow, steep-sided valleys, where banks are rocky, high, and steep, and bottoms are gravelly and boulder strewn. During the high-water period, early March to mid-November in the southern part of the drainage area and early May through September in the northern part, most streams are more than 500 feet wide and more than 15 feet deep in their middle and lower courses and are between 60 and 250 feet wide and between 3 1/2 and 15 feet deep in the upper stretches. The Niger and Benue in places exceed a mile in width and are chiefly more than 40 feet deep. During the high-water period, seasonally wet areas are flooded extensively along the major streams, in the upper delta of the Niger, and along the inner margins of the coastal area; large parts of the perennially wet area along the coast are also inundated, especially at high tide. During the period of low water, late November through February in the south and early October through April in the north, most streams are between 60 and 500 feet wide in their upper and middle stretches and over 500 feet in their lower stretches; the Niger and Benue range in width between 500 and 6,000 feet. Low-water depths are generally less than 3 1/2 feet except along the lower Niger and in a short stretch of the lower Benue; sandbars (Figure 13) are exposed in the lower and middle courses of most streams. Northeastward-flowing streams have broad, meandering courses, low to moderately high and gently sloping banks, and sandy or muddy bottoms. Most of the streams are over



FIGURE 10. Uplands in the southeastern part of Nigeria are cut by narrow, steep-sided valleys and have dissected slopes covered by broadleaf deciduous and evergreen forests. Roads through the uplands are narrow and winding. (C)



FIGURE 11. The broad Niger winds across the western and southern parts of Nigeria and in places contains numerous islands (U/OU)



FIGURE 12. The Benue in this stretch near the Cameroon border has low, gently sloping banks and is subject to flooding during high water, early May through September (U/OU)

250 feet wide and are chiefly over 3 1/2 feet deep during the high-water period, early May through September. The Komadugu Yobe has numerous channels in the upper and middle courses, which in many places exceed 500 feet in width and are as much as 20 feet deep during the high-water period; in the lower course, the river is shallow, has low banks, and is less than 250 feet wide, even during high water. During this period, seasonally wet areas are most extensive near Lake Chad and along the upper Komadugu Yobe. During the low-water period, late October through April, most streams dry up or become a series of shallow pools, and a majority of the seasonally wet areas are also dry or crusted with mud. During September, however, the wet area around Lake Chad expands to an area of as much as 3,000 square miles. The lake varies in size both seasonally and annually. It is generally shallow but in places may reach depths of 10 feet. The shore is very low, flat, and muddy or sandy, and the bottom is mostly sand or mud. During months other than September the lake decreases in depth to less than 3 1/2 feet, and numerous low ridges of sand are exposed.

Towns, villages, cultivated fields, mines, oil wells, and transportation facilities are the chief culture features and are most numerous in the southern, northwestern, and north-central sections of the country. The large towns, Ibadan, Lagos, and Port Harcourt, are each composed of an African and a European section. In the European section (Figure 14), the streets are regularly spaced, permanently surfaced, and lined by buildings up to 20 stories high and constructed of concrete, brick, or stone; roofs of most buildings are corrugated iron or tile. The native

FIGURE 13. During the low-water period, early October through April, the course of the Gongola becomes braided and numerous sandbars are exposed. Banks are low and gently sloping in this stretch. (U/OU)



sections are compounds of rectangular structures enclosed by thin walls of mud or matting 6 to 12 feet high; the compounds are intersected by a maze of unsurfaced lanes and alleys. In the north, the town of Kano and most villages are composed of buildings that are either round or rectangular in shape and have walls and nearly flat roofs of mud construction (Figure 15). The larger towns are surrounded by mud walls 20 to 50 feet high and 10 to 20 feet thick. Villages in the south are composed of huts that are long and rectangular, have mud walls, and are covered with thatched, sloping roofs although corrugated metal ones are becoming more common. Villages in the central and eastern areas are typically composed of round, mud-walled huts with conical thatched roofs (Figure 16). In the Jos area, the huts are commonly connected by a protective mud and stone wall, and the compound is in turn surrounded by a thorny hedge 10 to 12 feet high. Cultivated fields are most extensive in the Jos Plateau and in the vicinity of Kano and Sokoto. These consist of small, permanently cultivated plots of corn, sorghum, millet, and small grains; there are numerous abandoned fields. Tin and columbite mines, located chiefly in the Jos area, consist of large open pits and waste dumps (Figure 17), generally scattered among villages. Producing oil wells are in scattered fields located chiefly in the northern and eastern parts of the Niger Delta. Roads and rail lines form a moderately dense transportation network in the south and a generally sparse pattern in the north. Rail lines and permanently surfaced roads connect Lagos, Ibadan, and Port Harcourt with towns and villages in the southern and central sections and with Kano in the north. Unsurfaced roads, tracks, and trails are the principal links between villages everywhere and between most towns in the north.

2. Climate

Nigeria has a tropical climate with hot days, warm nights, and distinct wet and dry seasons (Figure 18). The seasons are controlled by the northward advance and southward retreat across Nigeria of the intertropical convergence zone (ICZ), a transition zone between dry air from the Sahara and moist air from the South Atlantic. The wet season is longest and wettest along the southeast coast and becomes progressively shorter and dryer toward the northern border. It extends from March through November on the southeast coast, with average monthly rainfall 6 to 17 inches, but lasts only from June or July through September in the far north, with average amounts 4 to 12 inches per month. An exception to this regime is the brief dry period which prevails over the western coast during August. Except for brief transitional periods preceding and following the wet season, the remaining months are comparatively dry.

The wet season is characterized by mostly cloudy skies, frequent showers, good visibility except in heavy showers, and light southwesterly winds. Thunderstorms are frequent and often intense. Their maximum incidence is usually during the first and last thirds of the season, occurring about 20 to 25 days per month in the southeast and decreasing to 10 to 20 days per month or less in the far north. The dry season typically has mostly scattered clouds, visibility occasionally restricted by haze or dust, and light northeasterly or variable winds. Thunderstorm frequency in the dry season varies from about 10 per month on the southeast coast to near zero in the far north. Temperatures and relative humidities are uniformly high throughout the year along the coast, with small diurnal variations; most temperatures are in the 70's (°F.) or 80's. In the interior, however,

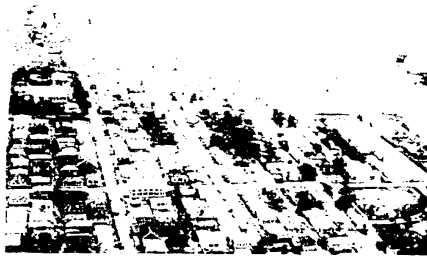


FIGURE 14. The European section of most large towns has a grid pattern of surfaced streets. Buildings generally are constructed of concrete, brick, or stone, and roofs are corrugated iron or tile. (C)

diurnal variations in temperature and seasonal variations in relative humidity increase from south to north. In the far north mean maximum temperatures range from the high 80's to near 110°F., while mean minimums range from the 50's to the 70's. Mean relative humidities in the far north vary from 60% to 80% in the wet season to as low as 15% to 25% in the dry season.

B. Military geographic regions (C)

Nigeria has three military geographic regions—the Northern Savanna Plains and Uplands, the Southern Forested Plains and Hills, and the Eastern Highlands (Figure 1). Although the combination of environmental conditions would have a relatively uniform



FIGURE 15. Native dwellings in Kano. In the north, buildings in towns and villages usually are constructed of mud and have rectangular shapes, contained in random compounds. (C)

FIGURE 16. In the central and eastern areas of the country, native villages consist of round huts with mud walls and conical thatched roofs (C)



FIGURE 17. The extensive alluvial deposits of the Jos Plateau are the chief source of tin; open-pit mining methods are used (U/OU)



effect on military operations within each region, there would be marked differences between adjacent regions. General health hazards to troops in all regions are meningococcal meningitis, malaria, tuberculosis, worm infection, yaws, leprosy, smallpox, dysenteries, and filariasis.

1. Northern Savanna Plains and Uplands

This region, which covers the northern two-thirds of Nigeria, consists largely of plains with flat to rolling savanna-covered or cultivated surfaces that are crossed by the southward-flowing Niger and Benue rivers. The plains are interrupted by scattered hilly and mountainous areas, which are mainly cultivated or covered by tall- and short-grass savanna. The Niger and Benue river valleys, as well as those of some of their principal tributaries, contain areas adjacent to the streams that are seasonally poorly drained. These major streams commonly overflow their banks and cause considerable flooding during the high-water period, early May through September in the north and mid-April through mid-October in the south. Year-round areas of marsh cover the northeastern margin of the region adjacent to and west of Lake Chad. The most densely populated sections are the agricultural and mining areas in the Jos Plateau and the agricultural areas in the north-central and northwestern parts of the plains. Villages and larger towns, such as Kane, are connected by a sparse network of roads, mostly unpaved.

Conditions for conventional ground operations are generally good. Cross-country movement of vehicles and foot troops would be possible in most of the region, but during the wet period, June or July through September, movement would be difficult or precluded by soft soils and flooded or wet areas. The marshes around Lake Chad are a serious year-round obstacle to movement in the northeast. Other

perennial obstacles to movement are steep slopes of the scattered hills and mountains. Vehicles and foot troops would be able to move with comparative ease on the roads and tracks but would have difficulty on muddy and slippery road surfaces and in inundated stretches, generally from early May through November. Bottlenecks would be the numerous narrow, wooden, low-capacity bridges and the many fords and ferries. Offroad dispersal of vehicles generally would be easy but, during the wet period, would be hindered or precluded by soft soils or by areas under water. Roads generally could be constructed with relative ease except in the Jos Plateau, where grades would be steep and alignments restricted. Sand and gravel for roadbuilding are available in substantial quantities, but hard rock suitable for crushing is restricted to scattered outcrops in the south, and the only timber is along the streams. Concealment and cover would be scarce in most of the region. Opportunities for concealment are available mainly in the narrow belts of broadleaf deciduous forest along streams except early February through April, the leafless period, and in tall grass except during October through April, when the grass is burned off. Cover from flat-trajectory fire would be available from surface irregularities in the scattered hilly and mountainous areas and in the dissected margins of large river valleys. Bunkers could be constructed in much of the region, but poor drainage precludes construction in the marshy northeastern section near Lake Chad and in the poorly drained areas adjacent to the major rivers. Sites suitable for the construction of tunnel-type installations exist only in the Jos Plateau and in scattered hills to the west.

Conditions for airborne and airmobile operations are generally good. The extensive areas of flat to rolling grassy plains afford numerous parachute drop zones and sites for landing helicopters. Restrictions would be imposed only in the scattered hills and mountains, the poorly drained sections near Lake

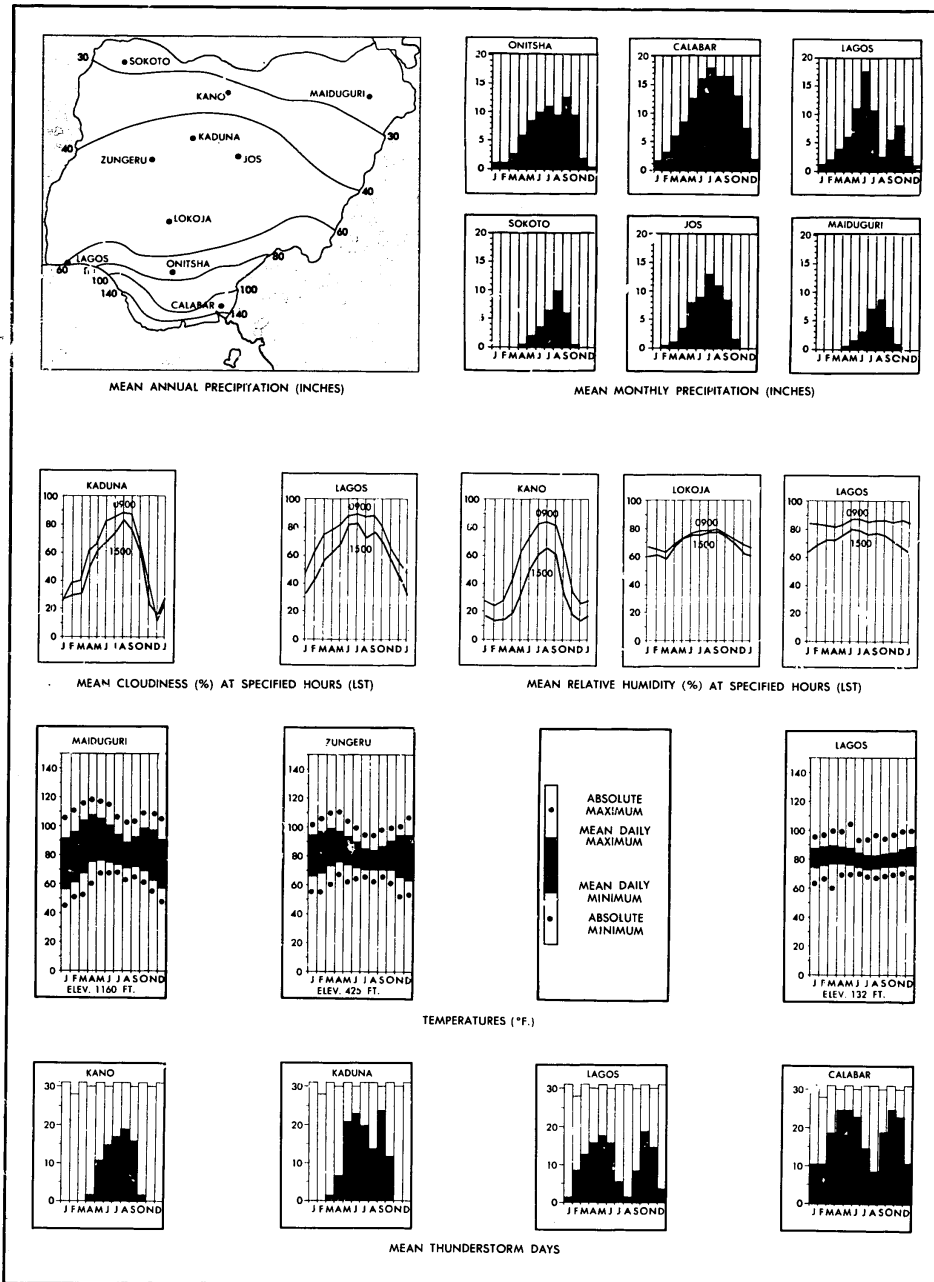


FIGURE 18. Precipitation, cloudiness, humidity, and thunderstorms (U/OU)

Chad, and along the major rivers. Sites suitable for landing assault-type aircraft are the airfields at Kano, Kaduna, Sokoto, Jos, and Maiduguri. Airfield construction is possible on many sites within the region, but sites are few in the uplands and poorly drained areas. Most approaches and runway orientations would be unrestricted, and construction problems would be relatively few. The major difficulties would stem from the lack of adequate quantities of suitable rock for crushing and from poor drainage conditions for more than half of the year (early May through November) in the south.

Conditions are generally poor for irregular force operations. Concealment and cover are generally scarce, and although conditions for cross-country movement of foot troops would be mainly good, they are seasonally poor. Concealment from air observation is available chiefly from broadleaf deciduous trees along streams and watercourses except when the trees lose their leaves early February through April. The principal sources of concealment from ground observation and cover from flat-trajectory fire are steep hill and mountain slopes and dissected surfaces along the margins of large valleys. Cross-country movement of foot troops would be generally easy on the flat to rolling savanna plains that make up much of the region. Movement would be difficult or precluded at all times in the scattered central and eastern hills and mountains and in the marshy area near Lake Chad; seasonal hindrances to movement are wet or soft soils and flooded areas adjacent to major streams. Towns and villages are few and widely scattered except in the Jos Plateau and in the vicinity of Kano and Sokoto; unsurfaced roads, tracks, and trails form a sparse transportation network. The principal sources of food are near the populated areas and consist of cultivated crops and herds of livestock. Supplies of water are seasonally abundant from swollen streams but are meager during the dry season; streams and wells are biologically contaminated throughout the year. Shelter and fuel materials are limited to trees along some streams and to scattered scrub and acacia trees. Airdrops of food and supplies would be relatively easy on the savanna plains; however, air-supply operations would be seriously hampered or precluded by scattered hills and mountains, by dissected plains along the margins of river valleys, by dust and haze during the dry season, and by seasonal flooding along stretches of major streams.

2. Southern Forested Plains and Hills

This region of flat to rolling plains and scattered hills is crossed by numerous large streams, including the broad lower Niger. The plains are covered by dense forest and swamp that extend northwest-southeast across the region. Dense mangrove tidal swamp, largely part of the extensive delta of the Niger, extends along the coast, is interlaced with tidal streams, and, in places, is interrupted by lagoons. Fresh-water swamp fringes the inner margins of the tidal swamp and, where the plains are adequately drained, gives way to extensive dense forest of broadleaf evergreen trees. The rolling to hilly inner margins of the region have a mantle of broadleaf deciduous forests. Flooding of streams is widespread as early as the beginning of March and as late as mid-November. Despite the dense forests and adverse natural conditions, the region contains numerous settlements and three of the largest urban areas in the country—Lagos, Ibadan, and Port Harcourt. These three urban areas are interconnected by permanently surfaced roads and connected with the interior by two rail lines.

Conditions are poor for conventional ground operations. Movement across country and the dispersal of vehicles and foot troops from the roads would be seriously hindered or precluded by dense forest and by poor drainage conditions. During the rainy period, movement would be additionally hindered by soft soils. Although the transportation network is moderately dense in most places, few roads extend through the swamps to the coast. Vehicles and foot troops could move fairly easily on the main roads but would be hindered by numerous narrow wooden bridges and stretches of road that are sometimes under water for periods from early March to mid-November. The numerous ferries are bottlenecks. Road construction would encounter serious problems because of dense forests, poor drainage conditions, and the lack of hard rock for crushing. Construction would be further hampered by seasonally adverse conditions, including flooding and washouts. Concealment and cover would be readily available in the dense swamp and forest, but concealment would be lacking in the broadleaf deciduous forest during the leafless period, early February through April. Good cover from flat-trajectory fire also would be available in modern buildings within the larger towns of the region. Poor drainage conditions make bunker construction difficult in parts of the region, and nearly everywhere conditions are unsuited for the construction of tunnel-type installations because of the low relief.

Conditions are generally poor for airborne and airmobile operations. Parachute and helicopter landing sites are restricted to large clearings in the area of broadleaf deciduous forest and to airfields. Sites most suitable for landing assault-type aircraft are the airfields at Lagos, Ibadan, Benin City, Enugu, Port Harcourt, and Calabar. Airfield construction generally would be difficult because of the need for clearing dense forest, the lack of rock for construction, and heavy rains which cause construction delays.

Conditions are excellent for irregular force operations. Concealment and cover would be available throughout the region. Concealment from both air and ground observation would be excellent in the dense forest, where the trees form a dense canopy and many have large trunks; in the broadleaf deciduous forest, however, the trees are leafless early February through April. Cover from flat-trajectory fire also would be available in the forest and from irregular surfaces in scattered hills. Cross-country movement of small units of foot troops would be possible in the well-drained forest but would be extremely difficult or precluded among the tangled aboveground roots in the mangrove swamp and seasonally on wet soils everywhere. Most of the major towns in the country and a fairly dense transportation network consisting of permanently surfaced roads, two rail lines, and unsurfaced roads, tracks, and trails are in the better drained sections of the region. The principal sources of food are cultivated clearings of cassava, yams, bananas, and dryland rice. Supplies of fresh water are available in much of the region from early March to mid-November; in the coastal and tidal swamp areas, however, the water is saline or brackish at all times. Shelter and fuel materials are readily available throughout the region. Airdrops of food and supplies would be limited to clearings in the forest areas, but even here approaches would be restricted by tall trees and, in places, scattered hills.

The coast of Nigeria is generally unsuited for large-scale amphibious operations. Offshore approaches are mostly clear, but nearshore approaches are partly obstructed by scattered rocks and shoals and by shifting sandbars and mudflats near mouths of rivers and streams. The few usable beaches are located on deltaic barrier islands along the western part of the coast. These beaches are mostly composed of sand and are as much as 13 1/2 miles in length. Exits are cross-country or by tracks and unsurfaced roads on the islands; only one island is connected to the mainland by bridges.

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3. Eastern Highlands

This elongated region is largely composed of hills and mountains; the hills have broad rounded summits and mainly savanna vegetation, and the mountains have sharp crests and are covered by savanna in the northeast and by dense broadleaf evergreen and deciduous forest in the southwest. Streams have cut northwest-southeast trending valleys across the region. Settlements are generally few and widely spaced and are connected by a sparse network of predominantly unsurfaced roads and trails.

Conditions are poor for conventional ground operations. Cross-country movement of foot troops and vehicles would be severely restricted or precluded by the rugged surfaced and dense forest in much of the region. Additional hindrances to movement are created by soft soils from early May through November. Movement on the few existing roads would be hindered by narrow earth surfaces, steep grades, sharp curves, and many low-capacity bridges and ferries. Dispersal of vehicles and foot troops from the roads would be extremely difficult because of the steep slopes and, in the southwest, because of dense forest. Road construction would be difficult; steep slopes and rough surfaces restrict alignments and require sharp curves, steep grades, and many cuts, fills, and bridges. In addition, extensive clearing of forest in the south would be necessary. Construction materials and water are readily available in most of the region. Concealment opportunities are good in the southwestern half of the region, where there are dense broadleaf evergreen and deciduous forests; however, possibilities are largely lacking in the short-grass savanna of the northeast and during the leafless period of the broadleaf deciduous forest, early February through April. Cover from flat-trajectory fire would be afforded by surface irregularities in much of the region. Tunnel-type installations with adequate overhead cover and short adits could be built in all but the extreme northeastern and southwestern parts of the region, where there is insufficient rock cover. The construction of bunkers would be limited to scattered valleys because of shallow soils elsewhere.

The region is poorly suited for airborne and airmobile operations. There are few open areas suitable for parachute and helicopter landings and no sites for the landing of assault-type aircraft. Airfield construction would be severely limited or precluded by the rugged terrain in most of the region. The orientation of runways would be greatly restricted and the approaches hazardous.

The region is fairly well suited for irregular force operations. Conditions for concealment and cover are fair to good, and small groups of foot troops could move across country in much of the region; however, movement would be difficult in places. Concealment from air observation would be excellent in the dense forest that covers the southwestern half of the region except during early February through April, when

trees in the broadleaf deciduous forest are leafless. Concealment is poor at all times in the savanna, which covers most of the northeastern half of the region. Numerous opportunities for concealment from ground observation and cover from flat-trajectory fire are provided by the many surface irregularities and by high, steep streambanks. In the northeastern half of the region, cross-country movement of irregular forces



FIGURE 19. Strategic areas, internal routes, and approaches (C)

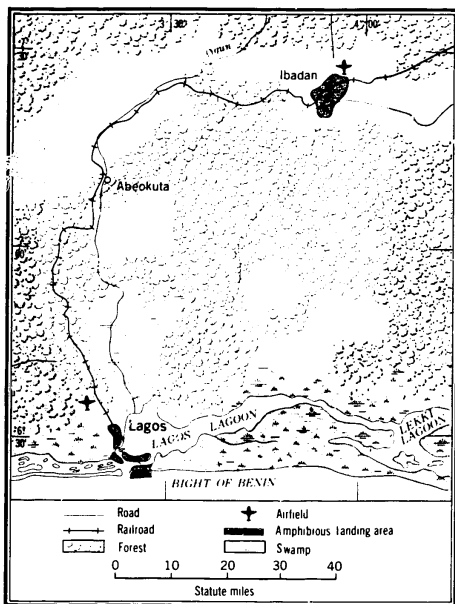


FIGURE 20. Lagos-Ibadan strategic area (C)

would be hindered by steep, savanna-covered hill slopes; in the southwestern half, cross-country movement would be moderately to severely hindered and, in places, precluded by the steep hill and mountain slopes that are covered by widespread dense forest. The road pattern is sparse and consists of a few permanently surfaced roads and numerous unsurfaced

roads, tracks, and trails. Towns and settlements are few and widely scattered. Sources of food are limited to small patches of cultivated crops and small coffee and cacao tree plantations. Airdrops of food and supplies would be greatly hindered by the dense stands of tall trees in the southwestern half of the region; however, parachute drops could be made in the more open savanna areas in the northeast.

C. Strategic areas (C)

Nigeria has three strategic areas—Lagos-Ibadan, the Niger Delta, and Kano (Figure 19). These areas are the centers of transportation, communications, commerce, industry, government, and population for their respective sections, and, as a group, they also contain most of the known oil reserves, the main seaports, and the major airfields of the country.

1. Lagos-Ibadan

This area (Figure 20) is the focus of political and cultural activities in Nigeria and contains the two largest cities in the country. Lagos (Figure 21), the capital, the largest seaport, and the most important city in Nigeria, has a population which has been estimated as high as 1 million. It normally handles two-thirds of the total sea trade of Nigeria. The city contains the largest industrial complex in Nigeria, which includes textile mills, flour mills, facilities for the production of rubber tires and tubes, steel fabrication plants, and ship repair yards. Lagos has a full range of telecommunications, including telephone, telegraph, radiotelephone, shortwave radio, and television facilities. The highway repair shops are the most important in the country. Lagos is



FIGURE 21. Lagos has numerous modern multistory buildings and wide paved streets. Its long waterfront handles most of the sea trade of Nigeria. (U/OU)

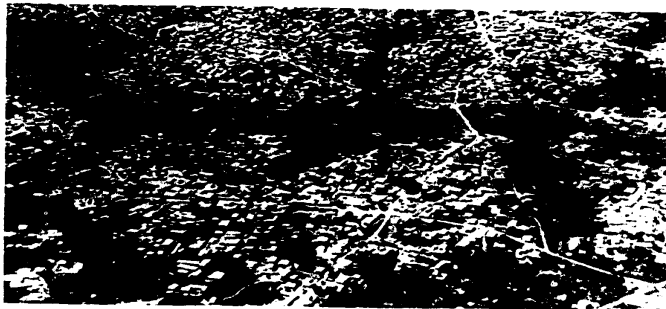


FIGURE 22. The sprawling city of Ibadan has no definite building or street pattern (U/OU)

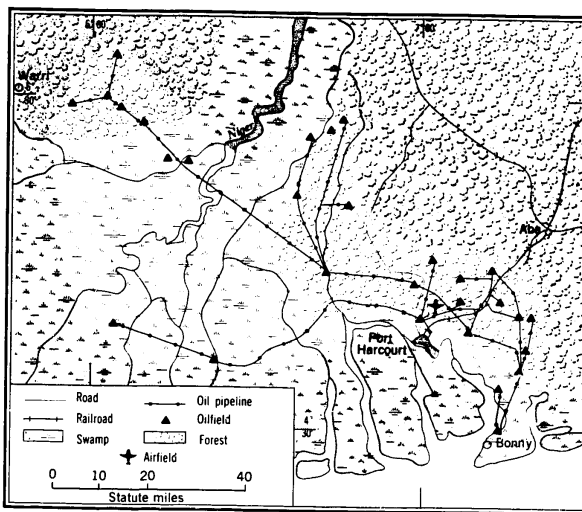


FIGURE 23. Niger Delta strategic area (C)

the principal distribution center for refined petroleum products and has a storage capacity of over 2.3 million barrels. Distribution from Lagos is mainly by water and rail. An airfield northwest of the city is one of the largest in the country. Lagos is served by international routes to Europe, the United States, and western and Equatorial Africa. Ibadan (Figure 22), which has a population of roughly 750,000, is the focus of a large cocoa-marketing region. The city also has the best educational and hospital facilities in Nigeria and one of the country's several medical schools. Industries include Nigeria's largest tobacco factory, canning

factories, a tire recapping plant, metalworking facilities, and several plastic-processing companies.

2. Niger Delta

This area, located in the northern and eastern parts of the Niger Delta (Figure 23), is the oil-producing center of the country. Drilling facilities consist primarily of onshore rigs, although some offshore drilling rigs, mounted on platforms or barges, are also in use. Flow stations for removing sediments, gas, and water are located at the major fields. Pipelines connect the fields with a refinery (Figure 24) located east of

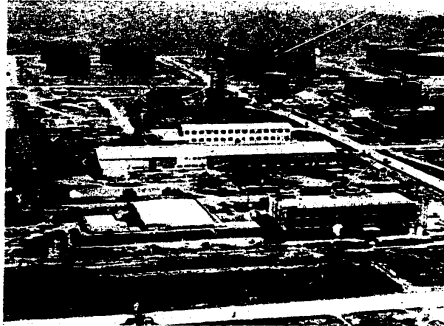


FIGURE 24. Petroleum refinery near Port Harcourt: (C)

Port Harcourt, with the major crude oil storage and shipping terminal at Bonny and with several smaller terminals in the eastern delta area. The crude oil storage facilities at Bonny have a capacity of over 4 million barrels. Both roads and railroads connect the strategic area with the mining and agricultural areas in northern Nigeria. Port Harcourt (Figure 14), with a population of roughly 200,000, is the second-ranking port of Nigeria and the principal sea outlet for the eastern part of the country. Industrial facilities include the oil refinery, an aluminum rolling mill, a metal products factory, a glass manufacturing plant, a plant producing industrial gases, a cement plant, and factories producing a variety of consumer goods.

3. Kano

This area contains Kano (Figures 25 and 26), the largest town in northern Nigeria and the center of agricultural marketing, transportation, and religion in that part of the country. Kano, which has a population of about 350,000, is the focus of the peanut-growing and livestock-raising industries. The city is situated at a significant crossroads of interior west Africa and is the religious center of the predominantly Muslim north. The most important of the small industries produce textiles, peanut oil, canned meat, leather goods, and shoes. The major international airfield north of the city is a staging point in routes serving northern, western, and southern Africa as well as Europe and the United States.

D. Internal routes (C)

The internal routes (Figure 19) provide the easiest avenues of movement between the best land approaches and the three strategic areas and between

the strategic areas. An amphibious landing area affords direct access to the Lagos-Ibadan strategic area. In some stretches of all routes, offroad dispersal and cross-country movement of vehicles and foot troops would be hindered or precluded by flooding and soft soils during early March to mid-November in the extreme south, mid-April to mid-October in the central section, and early May through September in the north. Figure 27 contains descriptions of the internal routes.

E. Approaches

The perimeter of Nigeria consists of 2,507 miles of land boundaries and 530 miles of coastline. The land boundaries are entirely demarcated, unfortified, and undisputed. Nigeria claims jurisdiction over its offshore waters for 30 nautical miles. Other data on boundaries are presented in Figure 28. (U/OU)

1. Land (C)

Conditions for cross-country movement are poor to unsuited at all times along the southwestern and eastern borders and fair to seasonally poor along the northern and western border sections. Dense forest, swamps, or marsh are the chief year-round obstacles on the southern plains and hills, and steep hills and mountains and the broad Chari river are the principal deterrents to vehicular cross-country movement in the east; seasonal hindrances are soft soils, high water in streams, and flooding. The best means of land access are shown on Figure 19 and described in Figure 29.

2. Sea (C)

Sea approaches to Nigeria are through the Gulf of Guinea. Conditions are unfavorable for large-scale amphibious operations. Offshore approaches are mostly clear; nearshore approaches are partly obstructed by scattered rocks and shoals, and, near river mouths, by sandbars and mudflats. Nearshore bottom slopes range from flat to moderate; bottom materials are mud and sand. High swell from the south and southwest is prevalent throughout the year and, in places, breakers occur as far as 2 nautical miles offshore. Surf 4 feet or higher may occur at any time of the year, but maximum occurrence (60%) is during July through September along the western part of the coast. Tides are semidiurnal, with a spring range of 3 1/2 to 9 feet. Most of the coast is fringed by sandy shores; however, the only beaches with exits for vehicles are near Lagos. In general, the beaches are

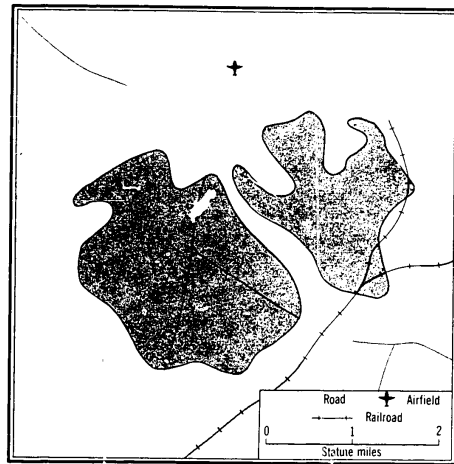


FIGURE 25. Kano strategic area (C)

composed of sand, are up to 13 1/2 miles in length, and have steep to moderate gradients; all beaches are on barrier islands backed by extensive swamps. Exits are by cross-country movement or by a few tracks and unsurfaced roads on the islands. Two 4-lane bridges connect the islands near Lagos to the mainland. The amphibious landing area shown on Figure 19 provides access to the Lagos-Ibadan strategic area.

The amphibious landing area is located on the western part of the coast, near Lagos (Figure 20). Seaward of the 5-fathom curve, offshore approaches

are mostly clear; shoreward, the nearshore approaches are clear except for a sewer outlet and groin off the western part of the beach. The landing area is flanked to the west by shoals, wrecks, and a jetty. Nearshore bottom materials are sand and mud; gradients are mostly flat and generally preclude LST dry-ramp landings. Climatic conditions are generally favorable for landings; however, heavy rain squalls in July and August and occasional windborne dust in January and February restrict visibility. Early morning fog is an additional hindrance during July, August, January, and February. Surf 4 feet or higher occurs a minimum of 25% of the time during January through March and a maximum of 45% during July through September. Tides are semidiurnal, with a spring range of 3 1/2 feet. The landing area has a total length of 1 1/2 miles and is interrupted by a rock groin 300 yards from the western end. The beach is composed largely of sand, which is firm in the wetted area and soft where dry. Beach widths range from 30 to 70 yards at low water and 20 to 40 yards at high water; gradients are moderate to steep in the low-water zone and steep in the high-water zone. The beach is on a flat, sandy, barrier island backed by a lagoon and mangrove swamps. The island is mostly covered by grass and scattered trees; a belt of trees and a village are close behind the beach. Exits are by cross-country movement or by tracks and unsurfaced roads leading to village streets. Movement to the interior is restricted to bridges.

3. Air (U/OU)

Air approaches² from the west are over Dahomey, Togo, most of Ghana, and eastern Upper Volta; from

²The discussion zone for air approaches extends approximately 300 nautical miles beyond the borders of Nigeria.



FIGURE 26. Most buildings in Kano are in random compounds, are either round or rectangular, and have mud walls and roofs (C)

FIGURE 27. Internal routes (C)

ROUTE	ROAD	RAILROAD	OFFROAD DIPPERAL AND CROSS-COUNTRY MOVEMENT
Dahomey border to Lagos-Ibadan strategic area. Across flat, poorly drained, densely forested coastal plain.	Two lanes, in poor condition; bituminous surface.	None	Difficult or precluded in dense forest and prevalingly poorly drained sections.
Niger border to Kano strategic area. Traverses flat, short-grass savanna plains.	Two lanes, in good condition; bituminous surface.	None	Hampered only for short periods early June through August, when stream channels filled or overflow banks.
Chad and northeastern Cameroon borders to Kano strategic area. In eastern part, through scattered marsh and areas seasonally under water; remainder across flat to rolling, short-grass savanna plains.	Two lanes, in fair to good condition; laterite surface between border and Maiduguri, one to two lanes bituminous surface between Maiduguri and Kano. Several one-lane bridges; between border and Maiduguri, sections of road impassable for short periods when under water early May through September.	None	Generally easy, but difficult on flood plains and other areas where soils soft during early May through September.
Between southeastern Cameroon border and Niger Delta strategic area. Across flat to rolling densely forested and swampy plains.	One to two lanes, in fair condition; laterite surface between border and point 95 miles east of Enugu; bituminous surface in remainder. Numerous one-lane bridges and narrow sections.	None	Hampered or precluded by dense forest and swampy areas.
Between Lagos-Ibadan and Kano strategic areas. Traverses mainly flat to rolling plains covered by short- and tall-grass savanna and, in southern section, by dense forest. Plains interrupted by scattered hills and local dissection near large rivers.	One to two lanes, in fair to good condition; bituminous surface. Numerous narrow wooden bridges, 2,028-foot combination road and rail bridge across Niger River.	Single-track 36"-gauge rail line between strategic areas parallels road in stretch northeast of Ilorin.	Generally easy except in area of dense forest in south and on dissected edges of broad river valleys, particularly Niger.
Between Lagos-Ibadan strategic area and Cameroon-Niger Delta route. Across flat, densely forested coastal plains; scattered hills east of Ibadan.	One to two lanes, in fair to good condition; bituminous surface. Short stretches under water at times, June through October. Bridge across broad Niger River. Has 2 spans of 1-L.A.W. Bailey G.R. at eastern end.	None	Difficult or precluded because of dense forest and undergrowth; additional local obstacles steep slopes in hills east of Ibadan.
Between Ibadan-Kano route and Cameroon-Niger Delta route. Traverses flat, forested plains and low hills in south; rolling tall-grass savanna plains and hills in central section; and flat tall- and short-grass savanna plains in north.	One to two lanes, in fair to good condition; bituminous surface in north and south, mainly gravel surface in central hilly and dissected areas. Numerous bridges, and 2,520-foot combination road and rail bridge across Benue at Makurdi.	Part of single-track 36"-gauge rail line between Port Harcourt and Kano extends through route for about 50 miles north and south of Makurdi, and also between Zaria and Funtua.	Hampered or precluded by dense forest in south and steep slopes in southern and central hills. Generally easy much of year in north. In hilly areas, also hindered much of year by numerous small streams and predominantly poorly drained ground.

FIGURE 28. Boundaries (U/OU)

BOUNDARY	LENGTH (Miles)	TERRAIN
Dahomey.....	480	Flat plains covered by dense mangrove forest in southern 10 miles; rolling and dissected plains covered by broadleaf evergreen forest in central section; and flat to rolling, tall- and short-grass savanna plains in north.
Niger.....	930	Flat to gently rolling plains covered by short-grass savanna. Eastern 105 miles formed by Komadugu Yobe.
Chad.....	47	Flat marshy plains and part of Lake Chad.
Cameroon.....	1,050	Mainly mountains and hills covered by short- and tall-grass savanna in north and dense forest, scrub, and alpine grass in south; in Benue valley and near coast, crosses poorly drained plains.

FIGURE 29. Land approaches (C)

APPROACH	ROAD	RAILROAD	OFFROAD DISPERSAL AND CROSS-COUNTRY MOVEMENT
From Porto-Novo, Dahomey. Across flat, marsh- and swamp-covered coastal plains.	Two lanes, in good condition; bituminous surface. Two long one-lane bridges.	Single-track 3'3 3/4"-gauge rail line in western part.	Largely precluded by dense vegetation and poor drainage conditions.
From Zinder, Niger. Traverses flat to rolling short-grass savanna plains.	One to two lanes, in fair condition; gravel surface.	None.....	Generally easy most of year; stretches may be periodically impassable from inundation, early May through September.
From Fort-Lamy, Chad. Across mainly flat, poorly drained, marshy and savanna plains.	Two lanes, in fair condition December through April; in poor condition May through November; laterite surface. Bridge 1,160 feet long across Chari river just east of Fort-Lamy.	None.....	Difficult or precluded at all times in marshes and mudflats near Chari river; generally easy on savanna plains during December through April, when ground mainly dry; severely hindered or precluded by soft soils and extensive flooding, May through November.
From Mamfe, Cameroon. Through densely forested hills and mountains and rolling plains.	One to two lanes, in poor condition; natural earth or laterite surface. Sharp curves, steep grades.	None.....	Difficult or precluded in dense forest and on steep slopes of hills and mountains.

the north over southern Niger and southeastern Mali; from the east over southwestern Chad, most of Cameroon and Rio Muni, and the westernmost part of the Central African Republic; and from the south over the waters of the Gulf of Guinea. In all approaches throughout the year, the mean speeds of upper winds are generally less than 45 knots. Easterly winds are predominant everywhere in all seasons except during winter in the northern approaches, where westerlies

prevail above about 20,000 feet. Aircraft icing may become a serious hazard in towering cumulus and cumulonimbus clouds above about 16,000 feet, the mean height of the freezing level all year.

In the approaches from the west, north, and east, the least favorable weather for flight occurs during the period when the intertropical convergence zone (ICZ) lies within or north of these approaches. The duration of this period varies from about March through

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November in the southernmost parts of these approaches to mainly June through September in the northern parts. During these months convective cloudiness is widespread and usually reaches a maximum in July and August, when average cloud cover is mostly 60% to 90%. Thunderstorms also reach maximum activity at this time. However, the peak of activity varies from a single maximum in the middle of the period in the northern approaches, to double maximums near the beginning and end of the period in the southern reaches of the eastern and western approaches. During these peaks of activity thunderstorms occur on about 10 to 20 days per month at most places and the risk of severe turbulence and aircraft icing is greatest. In the remaining months, varying from October through April in the northern sections to December through February in the

southern parts, clear to partly cloudy skies prevail and hazards to flight are at a minimum. In the northern sections, however, dust and haze of the harmattan (dry, dust-laden wind) may occasionally restrict visibility at levels to about 10,000 feet.

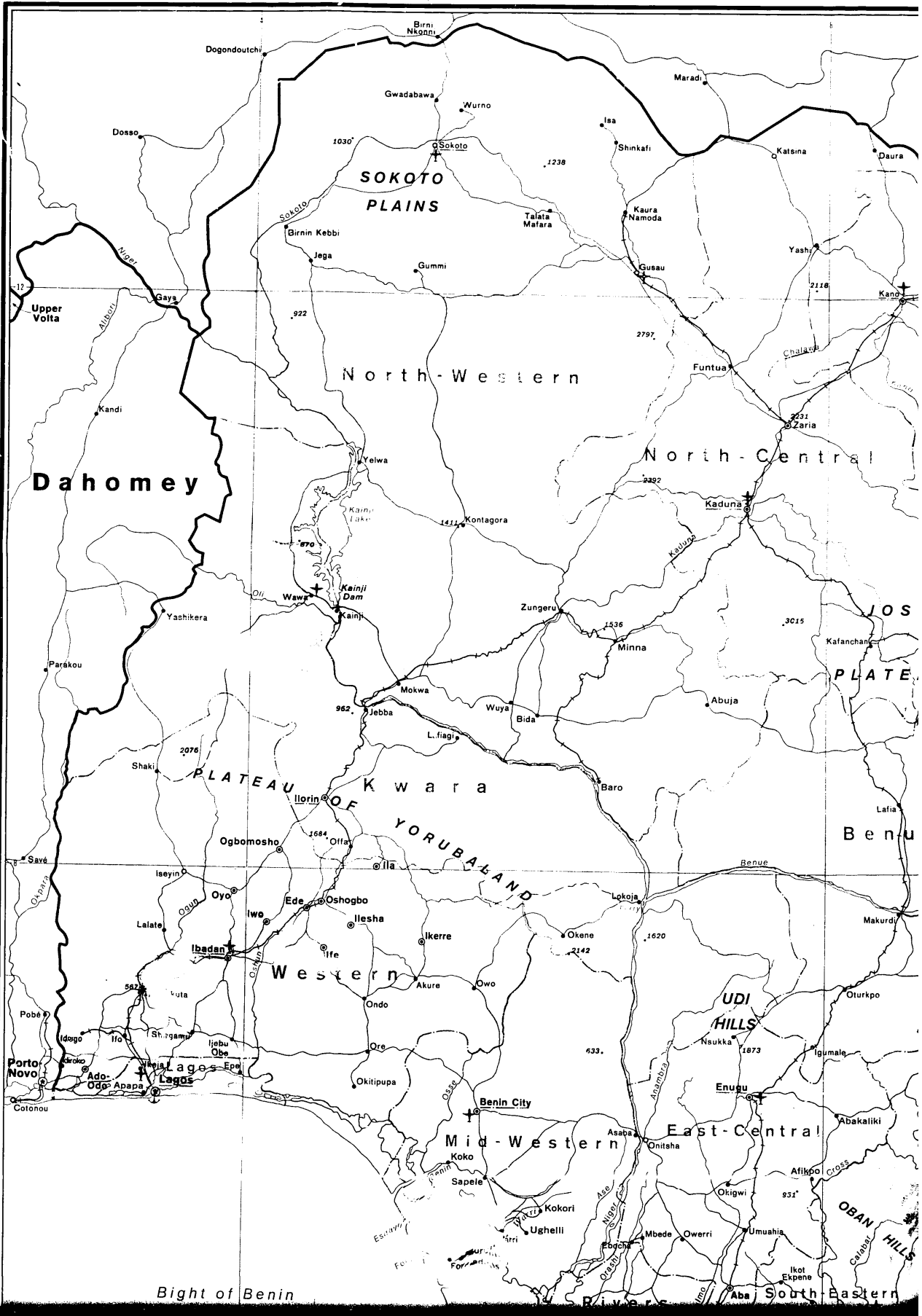
In the approach from the south, over the Gulf of Guinea, moderate cloudiness (50% to 70%) persists throughout the year and reaches a slight maximum in June through September. Weather conditions are infrequently hazardous to flight except during thunderstorms, when strong gusty winds and severe icing and turbulence are threats to the safety of the aircraft. Intense squall lines moving in a westerly direction are especially dangerous. Thunderstorms occur on 5 to 15 days per month in September or October through May or June; they decrease in frequency away from the coast. July and August are practically free of thunderstorm activity.

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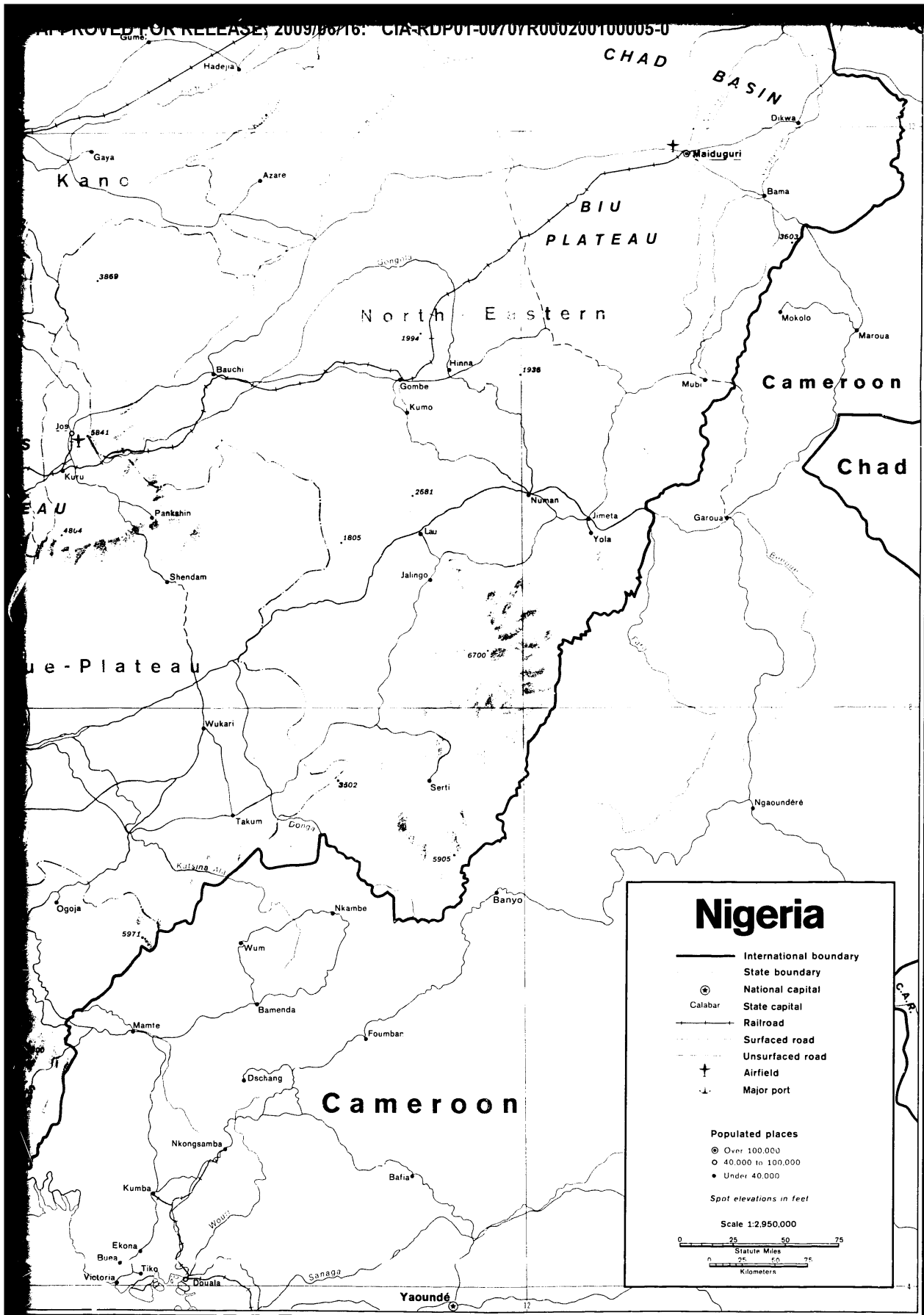




Nigeria

- International boundary
- - - State boundary
- ⊙ National capital
- ⊙ Calabar State capital
- +— Railroad
- Surfed road
- - - Unsurfaced road
- + Airfield
- ⌋ Major port

Populated places



Terrain and Transportation Figure 30

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NO FOREIGN DISSEM

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