Nigeria

Profile of Agricultural Potential

ODNRI

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2. DRY SUB-HUMID ZONE

Physical Environment

This much-disturbed, formerly wooded plain extending across northern Nigeria is gently dome-shaped, rising to over 600 m west and south of Kano from less than 300 m on the eastern and western borders. The geology is dominated by sedimentary formations to the east, giving rise to sandy soils of low fertility, and by Basement Complex formations in the centre-west, forming a range of somewhat more fertile soils but affected by the presence of ironstone and gravel. Alkaline soils also occur locally.

Although annual rainfall ranges from 600 to 1 000 mm, droughts are common and the dry harmattan winds carrying dust from the north increase the desiccating effect of high day temperatures during the long dry season. The area is largely tsetse free.

Land Use

Population distribution has a significant affect on land use. Around the major cities, and particularly Kano, cultivation is permanent in response to high population densities. On a state-wide basis, Kano has a population of 276/km^2 while Borno has only 59/km^2. In the Kano area the natural vegetation has been replaced by a 'parkland' of economic farm trees, notably the locust bean tree, Parkia clappertoniana, and Acacia albida. This traditional agroforestry system provides fruit in the dry season and some soil fertility replenishment from leaf litter. Soil fertility is otherwise maintained by adding human and animal waste and ash. Within the mixed cropping regimes practised, the main staples are sorghum and millet with the latter dominant in the north-west. Other crops include beans, cowpeas, groundnuts and cotton. Reduced fallow due to land pressure has brought about declining yields of the main food crops on land under permanent cultivation. The improved varieties available are not adapted to mixed cropping and have not therefore been taken up by farmers.

Small-scale irrigation, flood recession cultivation and the seasonal exploitation of high watertables are widespread on floodplains. Rice, maize and vegetables are grown; onions in particular do well. The Sokoto-Rima Valley alone has up to 80 000 ha of rice, much of which can be lost through flooding. Larger irrigation schemes are also under development in the Sokoto-Rima Valley, along the Kano River and on the clay plains south of Lake Chad. These schemes, based on wheat and other cereals, rice and cotton are operated by the River Basin Development Authorities.

The zone, being tsetse free, provides wet-season grazing for many transhumant Fulani herds of cattle. Sheep, goats, camels, horses and donkeys also occur in considerable numbers and there is a lively export trade in cattle and sheep to the south. Despite this, numbers are excessive, because cattle are seen as a source of wealth which can be increased indefinitely based on an unlimited area of common grazing. The rate of grazing renewal is limited however and overgrazing leads to denudation and soil erosion. The Sokoto-Rima river basin is particularly badly affected in this respect.

Development Potential

Most of the land is already over-utilised within a fragile ecosystem, and prospects for introducing improved agronomic practices appear limited. This zone, perhaps more than others, suffers from the failure both of adaptive research to provide appropriate varieties and combinations of fertilizers for the small farmer, and of extension to advise on agronomic practices. Agroforestry systems

Overseas Development Administration

NIGERIA
PROFILE OF AGRICULTURAL POTENTIAL

Overseas Development Natural Resources Institute, Central Avenue, Chatham Maritime,
Chatham, Kent ME4 4TB, United Kingdom

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ADDENDUM

During the preparation of this report two additional states were created, Katsina in the north and Akwa Ibom in the south-east. The map below shows the location of the states with their capital cities.

NIGERIA
LAND RESOURCE ZONES

NIGER
CHAD
BENIN
CAMEROON
ATLANTIC OCEAN
Lake Chad

SOKOTO
KANO
BORNO
KADUNA
BAUCHI
KWARA
PLATEAU
GONGOLA
OYO
BENUE
OGUN
ONDO
BENDEL
ANAMBRA
IMO
CROSS RIVER
RIVERS
FEDERAL CAPITAL TERRITORY

Sokoto
Gusau
Katsina
Kano
Maiduguri
Zaria
Kaduna
Bauchi
Jos
Minna
Abuja
Ilorin
Yola
Makurdi
Ibadan
Abeokuta
Akure
LAGOS
Benin City
Enugu
Warri
Owerri
Aba
Port Harcourt
Calabar

Sokoto
Niger
Kaduna
Niger
Hadejia
Gongola
Benue
Benue

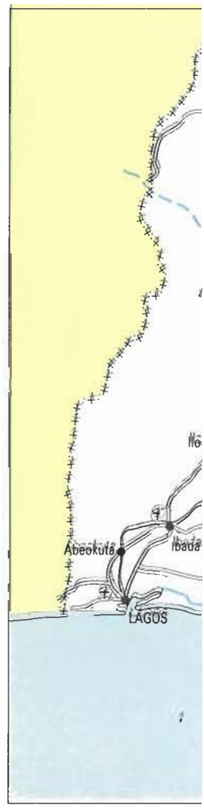
Northern limit of bimodal rainfall
Northern limit of bimodal rainfall

4°
8°
12°

SCALE 1:4,000,000
0 50 100 150 200 km

International boundary
State boundary
State capital
Main all-weather road
Duration of rainy season (days) 90

Semi Arid Zone	1
Dry Sub Humid Zone	2
Sub Humid Zone	3
Humid Zone	4
Very Humid Zone	5
Flood Zone	6
Plateau Zone	7
Montane Zone	8
Tsetse infested area	



CRP/NIG/1

8° 12°

NIGER

CHAD

Lake Chad

CAMEROON

Katsina

Kano

Zaria

Bauchi

Jos

Abuja

Makurdi

Maiduguri

Yola

Enugu

Calabar

Hadejia

Gongola

Benue

KANO

BORNO

BAUCHI

PLATEAU

GONGOLA

BENUE

CROSS RIVER

Northern limit of bimodal rainfall

90 120 150 180 210 240 270 300 330

1 2 3 4 5 6 7 8

SCALE 1:4,000,000

0 50 100 150 200 km

International boundary

State boundary

State capital

Main all-weather road

Duration of rainy season (days) 90

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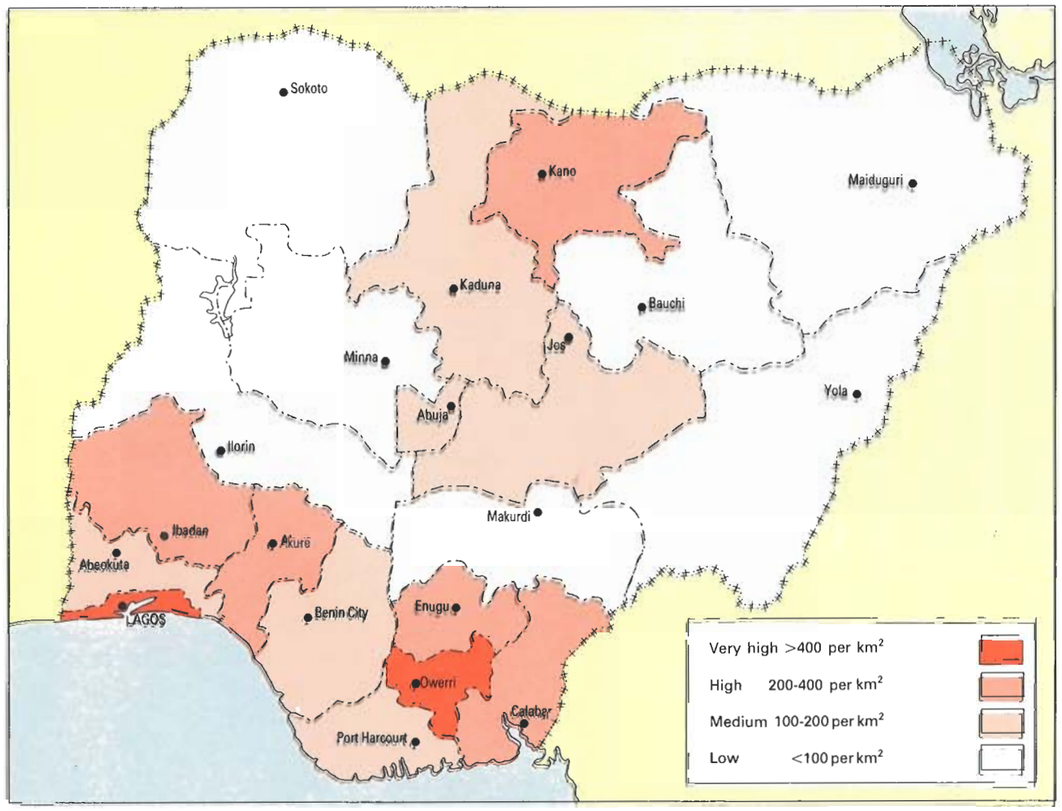
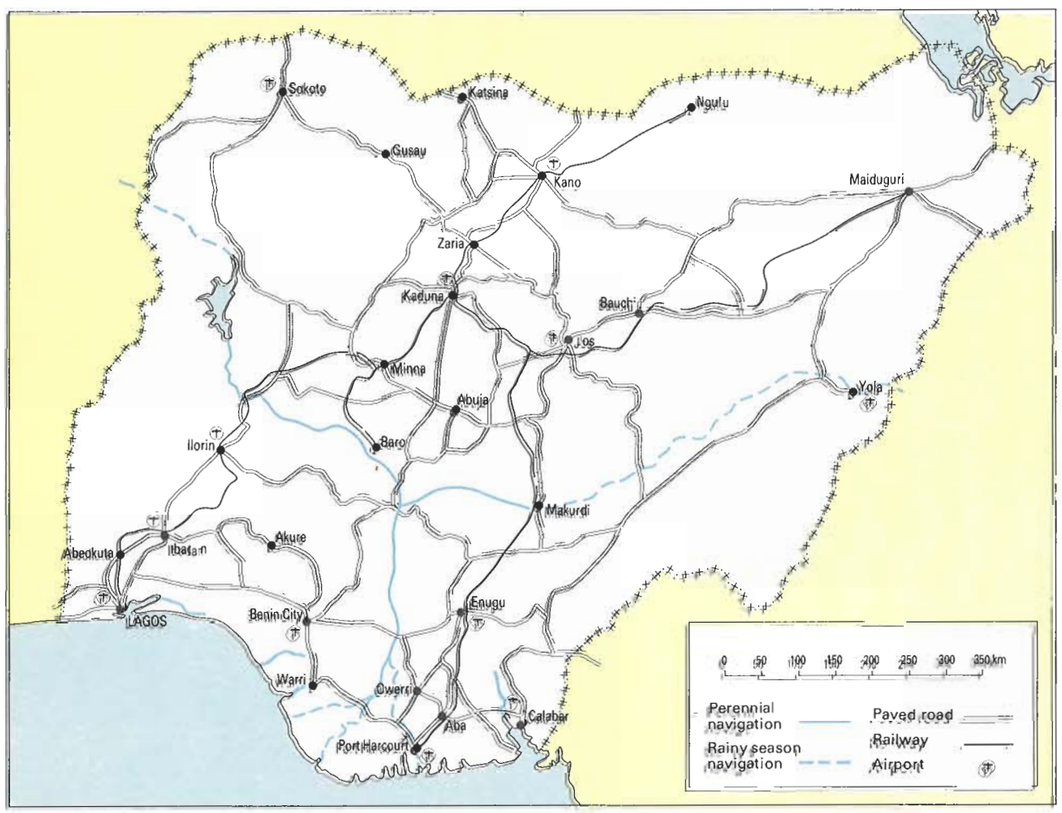
Tsetse infested area	

Population Density in Nigeria



Communications in Nigeria



INTRODUCTION

This Profile of the agricultural potential of Nigeria was prepared by the Land Resources Department of ODNRI at the request of ODA's West and North Africa and Mediterranean Department, to provide a frame of reference for assessing existing and possible future aid strategies in the natural resources sector. The profile is the product of a rapid desk study involving the use of available reports and maps together with satellite imagery. Acknowledgement is due to a variety of organisations and individuals including multilateral organisations, commercial consultants and ODA staff.

The country has been subdivided into eight Land Resource Zones, six representing latitudinal divisions of the low-relief land surface in accordance with gradual climate and vegetation changes, and two separating areas of greater elevation rising to over 1 000 m above sea level (Map 1). The main river system of the Niger and Benue roughly separates the Hausa north from the Yoruba west and the Ibo east.

Some figures relating to the rural economy are given below.

Total land area	:	924 000 km^2
Total potential cultivable land area	:	520 000 km^2
Area under cultivation (excluding fallow)	:	180 000 km^2
Forest Reserve	:	96 000 km^2

Population: Approx 115 million (no reliable census data since 1963)
Population annual growth rate : 3.3%.

Major Agricultural Exports

Value N million

	1983	1984	1985	1986
Cocoa	226.2	182.8	230.0	149.7
Palm Kernel	16.6	8.4	7.9	12.4
Rubber (natural)	14.9	16.6	20.7	34.4
Groundnuts	1.3	0.2	0.2	2.0

AGROCLIMATIC DATA

Zone	Rainfall[1] quantity mm	Wet season(s)				Mean monthly temperatures °C	
		Kind	Months[2]	Length in days	Max[3]	Normal[4] range	Min[5]
1	400–600	Unimodal	.jAs	90	40	32–22	13
2	600–1 000	Unimodal	.jJAs	90–150	39	31–21	12
3	1 000–1 300	Unimodal	.mJJAS.	150–200	37	30–23	14
4	1 100–1 400	Bimodal	amJJASO	200–250	37	30–26	18
5	1 200–2 000	Bimodal	.mAMJJASO	250–300	33	28–24	21
6	2 000+	Extended	.FMAMJJASON.	300–360	32	28–25	23
7	1 400–1 500	Unimodal	aMJJAS.	200	31	24–20	14
8	1 400–2 000+	Bimodal	.mAMJJASOn	200–300	36	29–14	5

1 Range of total annual rainfall for most of the zone.

2 Underlined months indicate maxima.
Capital letter indicates month in which rainfall exceeds potential evapotranspiration (PET).
Lower case indicates month in which rainfall exceeds 0.5 PET.
Dot " " " " " " 0.25 PET.

3 The highest monthly mean of maximum daily temperatures.

4 The highest and lowest monthly mean of mean daily temperatures.

5 The lowest monthly mean of minimum daily temperatures.

3. SUB-HUMID ZONE

Physical Environment

This zone comprises the extensive northern Nigerian plain at a general elevation of 400-500 m, interrupted by the Jos Plateau. The upper reaches of the Niger and Benue rivers dissect the zone to east and west. The soils, derived largely from Basement Complex rocks, are of medium fertility but, as in Zone 2, are often of limited depth due to ironstone and gravel. Sedimentary deposits give rise to generally deeper, sandier soils in the upper Niger and Benue troughs. Areas of heavy clay occur on the floodplains, particularly along the upper Benue.

With increasing rainfall (1 000 to 1 300 mm), woodland in the northern part of the zone gradually changes southwards to form a mosaic including lowland rain forest and secondary grassland.

Land Use

This zone, together with the Humid Zone (zone 4) , represents a transition from the northern cereal-based economy to the southern systems based on root crops. Cereals occur throughout the zone, diminishing in importance southwards; root crops are grown in the southern half. The main crops are sorghum, maize and yams. Cotton and groundnuts are common as far south as Kaduna. Local irrigation for vegetables and other high-value crops is practised in fadamas and to a lesser extent along the floodplains of the larger rivers. These extensive plains are underutilised because of their surface irregularity, soil variability and susceptibility to serious flooding. A large-scale irrigation scheme grows sugercane at the Benue-Gongola River confluence.

Fulani herds of cattle, sheep and goats migrate southwards into the Zone at the start of the dry season. Crop residues provide an important source of fodder at this time. During the dry season the risk of trypanosomiasis is significant only in the vicinity of water courses. Increasingly, herds are remaining in these areas throughout the year as grazing pressures increase to the north.

Development Potential

Along with Zone 4, this Zone has the greatest potential for development. Land is available; Kaduna and Plateau States have medium population densities while Niger State has the lowest in the country, 30/km^2. As population pressure increases, agroforestry is likely to offer means for sustaining productivity with declining fallows. Maize is grown more widely as drought-related risk-aversion measures assume less importance. As well as replacing traditional subsistence cereals, commercial production of maize has begun in the wake of the Government structural reform programme. In response to the drive for import substitution, private interests are acquiring land for larger-scale capital intensive farming; technical improvements make maize an obvious choice Sorghum and soya bean are other possibilities. Experience suggests however that Nigeria lacks the expertise successfully to introduce large-scale farming widely.

There is potential for further small-scale irrigation development along fadamas and minor waterways. Major irrigation along the larger rivers is constrained by the need for flood control and levelling. The major floodplains provide later dry-season grazing and there is potential for sedentary pastoralism using trypanosomiasis-tolerant breeds such as Muturu and Ndama. Expansion of the cultivated area using draught Zebu cattle is constrained by tsetse.

the markets and processing facilities of the southern industrialised cities. As elsewhere, appropriate research and improved extension are required to support this development; also inputs and marketing facilities are often lacking.

Agroforestry development should again be promoted to sustain small-scale crop production; there is potential for growing timber as well as fuelwood and poles.

The floodplains represent an important undeveloped resource. The nature of the flooding and the diversity of local conditions suggest that the most appropriate form of development is to adopt improved forms of traditional cropping systems already developed in other areas (e.g. in the Sokoto-Rima Valley). Irrigation from groundwater sources may be feasible locally.

6. SWAMP ZONE

Physical Environment

Zone 6 consists of the Niger delta and the Atlantic littoral and supports a vegetation of mangrove in tidal areas backed by fresh-water swamp forest inland. The mangrove takes various forms from forest to thicket and attains its greatest growth in the delta where heights of 45 m have been noted - the tallest mangrove in Africa.

The soils are alluvial and permanently water-saturated except for abandoned beach ridges.

Land Use

Settlement (population approximately 15/km^2) and dryland cultivation are confined to the few sand ridges. Access is generally by boat. Swamp rice cultivation is developing in the fresh-water swamp area; fishing is important, particularly around the Cross River estuary, and mangrove is exploited for fuelwood and poles. Raphia palm, which occurs in fresh-water areas where primary forest has been removed, is used for weaving and the production of gin.

Development Potential

The nature of the area - wet (annual rainfall greater than 2 000 mm), malarial and inaccessible - constrains development. Flooding is erratic but there is potential for paddy rice cultivation in non-saline areas. Land reclamation through drainage is infeasible locally in tidal areas due to the development of toxic acid sulphate conditions. Exploitation of mangrove should be controlled in the long term interest, and the effects of exploitation on the coastal fishing industry need to be studied. The mangroves provide important breeding grounds for coastal fish.

8. MONTANE ZONE

Physical Environment

Higher land occurs along the Cameroon border, the most distinct areas being the dissected basement-granite and volcanic plateaux of Mambilla and Obudu. Mambilla, the more northerly and larger of the two, rises to over 1 900 m. The comparatively cooler and wetter climate, (over 4 000 mm rainfall at Obudu), combined with grazing and burning, has resulted in a high-altitude grassland vegetation. Montane forests occur along streamlines in the steeper valleys, particularly on Obudu. The soils are generally deep and gravelly except on steep slopes where they are shallow. The area is tsetse free.

Land Use

The population of Mambilla rises to a density of over 300/km^2 in places. The main food crop is maize, with cocoyam, sorghum and vegetables. Perennial crops grown are coffee, tea, avocado, banana and cola. A tea estate has been in operation since 1975 with outgrowers contributing to the output. Traditionally crops are grown in wide valley bottoms and on lower slopes. The uplands are grazed by Fulani cattle herds, initially attracted by the tsetse free environment and persuaded to settle by the highly productive natural pastures. Latterly cattle numbers have increased resulting in competition between farmers and graziers for use of the valleys, particularly during the short dry season. In 1965 the overall stocking rate was estimated to be one beast/ha compared with a desirable area per beast of 5-6 ha to avoid rangeland degradation. Over-grazing and the cultivation of land of marginal suitability has led to erosion. Eucalyptus trees have been planted to provide fuel and poles.

The above does not apply to Obudu which was largely uninhabited until its development as a beef-cattle ranch and tourist area.

Development Potential

The area has considerable potential for a wide range of developments. A land use policy is required for Mambilla, to reduce cattle numbers and regulate land use between cultivators and graziers; and to introduce conservation measures and direct afforestation in steep and dissected areas. Although suited to growing coffee, tea, maize, Irish potatoes and Eucalyptus such developments would conflict with existing forms of land use.

4. Humid	21	Subsistence with mixed cropping roots and cereals. Pastoralism.	Improve traditional farming.	Research and extension	Adapted cereal varieties not available. Draught oxen affected by tsetse.
			Commercial farming based on cereals or roots	Extension Agrochemicals Mechanisation	Lack of farm expertise. Soil limitations Shortage of inputs
			Intensify fadama use - dry season irrigation and residual moisture cropping	Research and extension Well construction	Competition with cattle.
			Large scale irrigation along Niger - Benue	Infrastructure Flood control. Management	Severe flooding. Displace nomad herds.
			Reafforestation	Forestry expertise.	
5. Very Humid	14	Subsistence roots and tree crops. Forestry	Replant traditional tree crops or intercrop with leguminous trees.	Extension support Planting material	Infertile soils.
			Reafforestation.	Forestry expertise	
			Paddy rice	Extension support	Lack of farm expertise
6. Swamp	2	Paddy rice. Mangrove exploitation	Expansion of paddy rice.	Extension support	Lack of farm expertise
			Further mangrove exploit-ation.	Management	Effect on fish breeding.
7. Plateau	2	Subsistence mixed cropping. Pastoralism.	Improve traditional farming	Research and ex-tension	Adapted varieties not available.
			Commercial farming of cereals	Extension Agrochemicals Mechanisation	Lack of farm expertise. Soil limitations Shortage of inputs. Shortage of land.
			Ranching	Grazing control	Displace nomadic herds
			Intensified fadama and minepond use for irrigation.	Research and extension	Competition with livestock.
8. Montane	4	Pastoralism. Subsistence farming. Ranching.	Improve traditional farming.	Research and ex-tension	
			Ranching	Grazing control	Displace pastoralists
			Tea and coffee production	Extension Infrastructure	Remoteness
			Commercial farming, eg. maize, potatoes	Extension Agrochemicals Mechanisation	Displace pastoralists. Lack of farm expertise. Shortage of inputs
			Afforestation.	Forestry expertise	