

Nigeria – Country Profile

Geography

Nigeria located in north of the Gulf of Guinea in Africa bounded by Republic of Benin, Niger, Chad and Cameroon has an area of 923,768 km². It extends northward from the elbow of the Gulf of Guinea between the latitudes 4° and 14°N and is bordered on the west by the Republic of Dahomey, on the north by the Republic of Niger and on the east by the Republics of Chad and Cameroon.

Nigeria can be divided into 10 land regions. They are: (1) Sokoto Plain; (2) the Chad Basin, (3) the Northern High Plains; (4) the Jos Plateau; (5) the Niger-Beneu River Valley; (6) the Western Uplands; (7) the Eastern Highlands; (8) the Southwestern Plains; (9) the Southeastern Lowlands; and (10) the Niger Delta.

The main river is the Niger, entering the country in the north-west and flowing first south-east and then south to Gulf of Guinea. Its major tributary, the Benue, rises in the mountains of the Cameroon Republic. The river cross is the most important river outside the Niger system, which flows into an estuary east of the Niger Delta.

Nigeria is a land of great variety. It has hot, rainy sump lands, dry, sandy areas, grassy plains, and tropical forests. High plateaus and Rocky Mountains rise up in parts of the country.

Physical and Demographic Characteristics of Nigeria

Nigeria occupies an area of 923 768 km². The country lies between latitudes 4o and 14o north of the equator and longitudes 3o and 15o east of Greenwich. There are wide climatic and rainfall variations found in the country due to its location south of the path of the westerly winds in the north and almost out of equatorial doldrums of the south of Nigeria. Consequently, it is in the heart of the trade wind belt with generally "summer" rains and "winter" drought.

Agriculture employs three quarters of the Nigerian working population, but agricultural landholdings are generally small and scattered. The average number of farm plots per household ranges between 2 and 28 plots and between 0.5 and 5.0 ha, increasing in size from the south towards the north. Farming is generally rainfed and of the subsistence variety. The total population of Nigeria according to 1991 census was about 88.5 million people. The population growth rate has been stable at 2.83% while infant mortality has reduced. The estimated growth rates of population for 2000-2010, and 2010-2025 are estimated to reduce to about 2.70, 2.60 respectively.

Rainfall averages over 2000 mm per annum in the southeast, 1000 mm in the centre reducing to as low as 500 mm in the north east. In the same areas the mean annual pan evaporation is 2450 mm and 2620 mm per annum respectively. Similarly, the vegetation of thick mangrove forests and dense rain forests in the south gives way to a near-desert condition in the northeastern corner of the country.

The county is divided into eight agro-ecological zones for the purpose of irrigation practices based on rainfall and temperature which are the most significant parameters.

The major crops grown in the country can be divided into two main groups: food crops (produced for consumption) and export products. Despite the importance of the export crops, the primary policy of agriculture is to make Nigeria self-sufficient in its food and fibre requirements.

Nigeria is listed by FAO among nations that are at the moment technically unable to meet their food needs from rainfed production at low level of inputs and appear likely to remain so even at intermediate levels of inputs at some time between 2000 and 2025.

Land and Agriculture

More than three quarters of the country's agricultural area is rainfed. In development of rainfed agriculture use can be made of the water fraction that otherwise would have returned back to the atmosphere through direct evaporation and transpiration. Increasing, the potential of rainfed agriculture would make a significant impact on the food production. However, precipitation patterns differ across the agro-ecological areas and the potential to improve yields in rainfed agriculture is strongly related to these. Nigeria needs to develop the intermediate low-cost water and soil conservation technologies which include water harvesting and soil tillage, mulching, bunding, terracing, etc.

A recent survey by JICA suggest that 39% of the land mass is potentially suitable for agriculture and out of this between 4.0 and 4.5 million ha (approximately 4.5 to 5.0% of the land) are judged suitable for irrigated agriculture but only 1.1 million ha can be supported fully by the water available, the remaining 3.4 million ha being fadama.

Rainfed Agriculture

In 1987, FAO prepared a working document on the "Need and Justification of Irrigation Development" which undertook a scientific assessment of the size of populations that the agricultural land resources of African countries can support. The report assumed a projected population for Nigeria in year 2025 of 238 million, 47.90 million hectares of potential rainfed land and 2.00 million and 3.73 million hectares potential shorter and longer transport irrigable land. The shorter transport irrigable lands was defined as land close to the source of the irrigation water i.e. transport distances were limited to those within one agro ecological zone. On the other hand, longer transport referred to land further away from source: irrigation water may be transported from one agro-ecological zone to another. The potentials were calculated for three alternate levels of inputs namely, low level of inputs, intermediate level of input and high level of input.

The water resources development for agricultural purposes was in the hands of the private sector for the production of sugar cane with only a minor role by states in the northern region of Nigeria. Irrigation practice was rudimentary, using residual flood waters and moisture in the low lands called fadama (flash flood plains), and supplemented with shaduf (a traditional device that lifts water onto the land). The main crops produced using these traditional methods of irrigation were vegetables and rice.

Water Resources

The water resources potential of the country is estimated to be 250,000 million cubic metres (MCM) comprising 190,000 MCM of surface water with the balance in the form of groundwater. This notwithstanding, water is still a limiting factor to agriculture in much of the country but most especially in the northern semi-arid and dry sub-humid zones lying above latitude 11° North.

Overall, the nation has substantial resources of both rainfed and irrigable land. In view of differences in production potentials in various agro-ecological zones however, irrigation, which is already important will continue to be justified, particularly in the more marginal northern

region, for the local production of high value perishables, and perhaps for rice and some export crops.

As a result of FAO and US Bureau of Reclamation studies in the early 1970s, three pilot public irrigation schemes were developed, all in the sub-arid and dry sub-humid agro-ecological zones, namely: Bakolori Scheme, the Kano River Irrigation Scheme and the Chad Basin Scheme. The success of these pilot schemes coupled with the five-year drought (1970-1975) led to the establishment of 11 River Basin Development Authorities (RBDAs).

Irrigation

The development of water resources especially for irrigation purposes in Nigeria dates back to the Precolonial era. The traditional application of water to land for dry season farming in the Northern Nigeria was one of the earliest attempts made towards increasing agricultural production. This notwithstanding, Nigeria has not developed irrigation to the same extent as other developing nations, particularly in Asia. Only about a million hectare is currently irrigated in Nigeria. By contrast, India, which has about 3.5 times the land mass of Nigeria, irrigates nearly forty-five (45) times as much land.

The initial case for development of irrigation in Nigeria was based in part therefore, on the need to sustain a growth in the food supply that would broadly lead to national food security. It is revealed that between 1976 and 1990, about US\$ 2000 million of public funds were invested in the development of large to medium scale public irrigation projects. Consequently, irrigated agriculture witnessed a spectacular growth, rising from slightly more than 25,000 ha of irrigated farmland in 1975 to the current 974,900 ha. Surface irrigation in its various forms (basins, borders and furrows) issued predominantly for water applications in both public and private irrigation schemes.

Areas under irrigation include areas equipped with full or partial water control, spate irrigation, equipped wetlands and inland valley bottoms (including fadamas), irrespective of their size or management type. From a survey undertaken by FMWR in 1995 it appears that irrigated areas in Nigeria amounts to some 974 900 hectares. However, the exact amount of land under irrigation is difficult to estimate, because there is no clear commonly agreed definition of irrigation that is adopted by all.

Three main categories of irrigation development exist in Nigeria today, namely public irrigation schemes, which are systems under government control (formal irrigation); the farmer-owned and operated irrigation schemes (informal irrigation) that receive assistance from government in the form of subsidies and training; and residual flood plains fadama, where no government aid is supplied and is based on traditional irrigation practices. The most important irrigated crops are rice, wheat, and vegetables. Together they occupy about 90 to 95 per cent of the total water managed area.

At 1998 price, the average cost for irrigation development was estimated at N750,000 per ha. Annual operation and maintenance costs ranged between N5,000 per ha for gravity systems and N22,000 per ha for pumping systems, and up to N30,000 per ha for sprinkler irrigation systems.

Based on past trends and on the present agricultural policy of Nigeria, a tentative scenario depicts irrigation between years 2000 and 2025. The scenario does not foresee a significant increase of irrigated area between now and year 2025. According to projection, land under irrigation has increased at less than 1% per annum in the last decade. It is not foreseen that the situation would change significantly because of many reasons. The harvested irrigated areas

would increase from the estimated current figure of $(974\,500 \times 1.2) = 1\,169\,400$ hectares to about $(1\,567\,422 \times 1.5) = 2\,351\,133$ hectares in 2025.

Because water is essential for agriculture, the most important external environmental effects on agriculture are related to the availability and quality of water.

Surface and subsurface water flows are changing due to changes in land use in Nigeria. Important changes are due to agriculture itself, logging, urbanization and development of infrastructure. These reduce the water retention capacity of the land, especially if combined with drainage and trained rivers for flood protection.

The urbanization will also increase withdrawals for domestic and industrial use resulting in less water being made available for agriculture. Though the quantity of water withdrawal for domestic and industrial uses might be relatively small, the quality of the return flows from both are often seriously degraded.

Food Production, Trade, and Related Water Issues

Meeting Demands for Water and Food in 2025

Irrigation and drainage infrastructure is a vital and necessary leg of the Green Revolution triangle of seeds, fertilizer, and water control. As such, it has played a critical role in the prevention of famines and widespread starvation and in the rising standard of living of millions of farmers in parts of the nation. Nevertheless, the performance of many irrigations and drainage systems is significantly below potential due to a variety of shortcomings.

There is widespread concern about the financial sustainability of irrigation. Investment cost for developing public irrigation schemes were partly or fully subsidized. More importantly, the recurrent costs of operation and maintenance are seldom recovered directly from farmers, resulting in stagnation in further development of irrigated fields. Such short-sighted operation and maintenance policies have reduced the economic life of irrigation facilities and led to impaired water delivery capacities. Nigeria needs to shift emphasis towards rehabilitation and modernization of existing systems, but the cycle of construction-deterioration-rehabilitation has to be broken through greater mobilization of resources from the farmers themselves to ensure adequate O&M of the systems.

Some irrigation schemes were implemented with the object of reducing the dependence on imported rice, and wheat but very few were really successful. Kano River Irrigation Project and the case of Office du Niger in Mali are however a good example of successful irrigation schemes.

A number of initiatives have been undertaken to promote rational lowland development, especially in narrow fadama, strips, which are scattered everywhere in Nigeria. Improved and locally adapted irrigation techniques are being promoted by several research institutes, led by the West African Rice Development Association (WARDA), which manages an Inland Valley Consortium composed of several national and international research institutes. Technical documents have been published both for the humid tropics and the Sahelo-Sudanian zone. Development projects are implemented in most countries with the financial assistance of bilateral and international donors.

Rice production exploiting surface water during or just after the rainy season has been the main objective of most of the projects, whereas shallow aquifers and lowlands areas may also be a reliable source of water for vegetable production during the dry season. New FAO initiatives in

SPFS are underway to promote micro-scale irrigation using low-cost technologies to access water (e.g., hand dug wells) and to pump this water (e.g. treadle or small gasoline driven pumps).

Population growth reduces the per capita availability of fresh water supplies, leading to stress or even scarcity. Under a new classification scheme, a country with an annual renewable fresh water supply per capita of more than 1,700 cubic meters (m³) will experience only occasional local water shortages. A country having a supply of less than 1,000 m³ per capita per year will experience chronic water shortages which will hamper economic development and lead to serious environmental degradation.

Nigeria has sufficient water potential to meet the 2025 requirements, but will have to more than double their efforts to develop water sources to do so. However, finding the financial resources to build enough water development projects to accomplish this will be extremely difficult.

Reallocation and Reuse

It is inevitable agriculture, as the largest water user in many river basins will be called upon to relinquish supplies it currently withdraws from the river to other users. We must not lose sight of the fact, however, that perhaps two-thirds of the water diverted by irrigation typically returns to the river downstream. Water is often used and reused many times on its way from an upper watershed to the sea. Reliable systems of property rights for water are important precursors to orderly transfers of water among users and uses in future.

Technology/Crop Yields

There is an enormous potential in Nigeria through development of irrigation for higher yields, which could possibly be achieved by advances in bio-technology through development of higher producing, pest and drought resistant crops. However, seeing the present state of affairs, there is little likelihood of a substantial breakthrough. Only comparatively small advances in the order of five to ten percent may be expected.

Expanding areas

More production can be realised by developing new areas. Expansion of rainfed agriculture will in most cases include conversion of natural forests, mountain slopes or marginal soils, resulting in disturbed ecosystems and increased erosion. To achieve a same production increment, less land has to be developed if provided with irrigation. However, the best places are already occupied and development of new areas will be more costly. Much attention has to be paid to the rehabilitation of poorly performing systems, especially those degraded due to poor management. Development of drainage systems and improved water management practices could return large areas to productive use.

Rainfed agriculture will remain the main producer of traditional cereals and tubers. Self-sufficiency of traditional cereals is important for the household food security of rural populations. Rainfed production will grow at the rate of the rural population.

Irrigation will grow as fast as the urban demand in fruit, vegetable a rice. However, at the national level, wheat will continue to be imported, while rice production will increase yet the percentage of import may have to be kept at its present level. Local rice production would mostly come irrigated farms and be supplemented from fadamas and rainfed production.

ICID and Nigeria

Nigeria is an active member of ICID since 1970. 4th Afro-Asian Regional Conference was held at Lagos, Nigeria in 1982. Mr. N.O. Papoola (1980-1983), Dr. E.U. Nwa (1984-1987), and Eng. I.K. Musa (2002-2005) were Vice Presidents. Nigerian National Committee is actively represented in various workbodies of the Commission.

