

DESERTIFICATION IN THE DRYLANDS OF NIGERIA AND ITS CONSEQUENCES

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ABSTRACT

Desertification constitutes one of the international environmental problems whose global importance has been recognized by the international community. This importance is clearly visible in the massive endorsement that states have given to the United Nations Convention to Combat Desertification in those countries experiencing serious drought and/or desertification, particularly in Africa adopted in 1994. Desertification in Nigeria arises from the demands of increased populations that settle on the land in order to grow crops and graze animals. However, desertification is presently affecting the eleven northern states and is also considered the most pressing environmental problem and accounts for about 73% out of the estimated total cost of about US\$5.110 billion per annum the country is losing arising from environmental degradation (UNCCD, 1999). This paper discusses the menace of desertification, the extent and the impact and having identified the causes of the problem, the paper recommends measures to combat desertification and mitigate the effect of drought in Nigeria.

Keywords: Climatic Variation, Desertification, Drought, Human Activities, Nigeria.

Introduction

United Nations defines desertification as land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities. Desertification affects about one sixth of the world's population, 70 per cent of all drylands, amounting to 3.6 billion hectares, and one quarter of the total land area of the world. The most obvious impact of desertification, in addition to widespread poverty, is the degradation of 3.3 billion hectares of the total area of rangeland, constituting 73 per cent of the rangeland with a low potential for human and animal carrying capacity; decline in soil fertility and soil structure on about 47 per cent of the drylands areas constituting marginal rain fed cropland; and the degradation of irrigated cropland, amounting to 30 per cent of the drylands areas with a high population density and agricultural potential (UNCCD 1992).

Nigeria is a large country with a substantial part of its area extending into the Sudano-sahelian belt, which, together with the neighboring northern Guinea savanna, constitutes the dry lands of the country. With an estimated population of 140 million, human pressure on the land particularly in the marginal areas has continued to take its toll on the environment, resulting in desertification. Desertification is made very severe in the dry lands of the country by increasing human attempts to exploit the resources of the ecological zone in the face of persistent drought. Before now, Nigeria has been tackling the problem of desertification the best way it could, but with little success. It is now

obvious that the menace should be addressed in a holistic manner in order to ensure that the dry lands of the country continue to support human and natural resources.

The Location and Extent of Nigeria

Nigeria is located approximately between Latitudes 4° and 14° north of the Equator and between Longitudes 2° 2' and 14° 30' east of the Greenwich Meridian. To the north, it is bordered by the Republics of Niger and Chad, to the east by the Republic of Cameroon, to the south by the Atlantic Ocean and to the West by the Republic of Benin (Figure 1).

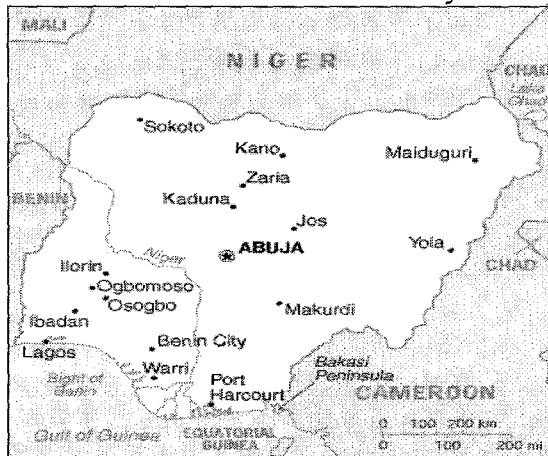


Figure 1: Map of Nigeria

The surface area of the country is approximately 923,770 m². About 35% of this land mass is believed to be arable while 15% is said to be used as pastures, 10% as forest reserve, 10% for settlements and the remaining 30% is considered uncultivable, for one reason or the other. However, another estimate puts the surface area as 91.07 million hectares, 57% of which is believed to be either under crops, or pastures while the remaining 43% is divided among forest, water bodies and other uses (Cleaver and Shreiber, 1994).

Climate

By virtue of its location, Nigeria enjoys a warm tropical climatic condition with relatively high temperatures throughout the year and two seasons; the dry and wet seasons. The climate of the country is influenced by the interaction of two air masses: the relatively warm and moist tropical maritime air mass (mT) which originates from the Atlantic Ocean and is associated with Southwest winds in Nigeria; and the relatively cool, dry and relatively stable tropical continental air mass (cTs) that originates from the Sahara Desert and is associated with the dry, cool and dusty North-East Trades (Harmattan). The boundary surface area between the two air masses is known as the Inter-tropical Discontinuity (ITD) or the Inter-tropical Convergence Zone (ITCZ). The ITD migrates north and south of the country bringing rainfall or dryness to different areas of the country at different times of the year. Similarly, annual rainfall totals range from over 2,500mm in the south to less than 400mm in parts of the extreme north (Nasiru, 2007).

Geology, Landform, and Soils

The geology of Nigeria is dominated by igneous structures that form most of the highlands and hills. The rocks of the Basement Complex, mainly of igneous origin, are encountered in over 60% of the surface area. Younger Granites are intruded into these rocks in Jos Plateau and environs. Volcanic rocks are also extruded on to the surface in places such as Jos Plateau and Adamawa Highlands. Areas of sedimentary formations are restricted to the coastal belt; the Niger-Benue Trough, including the southeastern scarps land and the Sokoto-Rima basin; and the Chad Basin. The landforms can simply be classified into highlands, plateaus, hills, plains and river valley systems. Suffice it to state that the landforms are more deeply dissected in the southern parts than in the northern parts. Indeed, except for the Eastern Highlands in Adamawa area and the Jos Plateau, basins characterized by broad gently sloping plains dominate the northern half of Nigeria. An extensive section of this area is identified as the High Plains of Hausa land (Udo, 1970).

Drainage and Hydrology

There are three major drainage systems in the country. These are: the River Niger drainage system; the coastal drainage system and the Lake Chad inland drainage system. The total area of inland water ways is estimated to be slightly over 12 million hectares (Nap, 2000).

Vegetation

There is hardly any vegetation that has not been affected by human activities in the country. Farming, logging, grazing, hunting, urbanization, road construction and other development activities by the rapidly expanding population have together reduced the nation's natural plant cover to isolated remnants. Based on the climatic conditions, the following vegetation types are recognized in the country: the mangrove and fresh water swamps, the rain forest, the Guinea Savanna, the Sudan Savanna and the Sahel in a south-north transect. Between the rain forest and the Guinea Savanna is a modified vegetation transition consisting of light deciduous forest and derived savanna. The southern forest that is, both the swamps and the rain forest constitutes the country's main source of wood. The derived savanna zone, about 250km wide, was once the northern part of the forest zone, but transformed by such activities into a vegetation type consisting largely of deciduous trees and grasses. The vegetation still supplies some wood. Most of the remaining part of the country is the Sudan Savanna accounting for more than 25% of the surface area, and expanding at the expense of the Guinea Savanna. At the northeastern and northwestern corners of the country is the Sahel that ordinarily does not account for more than 5 - 10% of the surface area, but is now growing larger at the expense of the Sudan zone. Indeed, it is now more meaningful to take the two driest zones together as the Sudano-sahelian zone.

Agriculture

Agriculture in Nigeria involves four broad systems of land use: crop production, animal husbandry, fishery and forestry. Crop production involves three types of farming in the country: rotational fallow; semi permanent or permanent cultivation; and mixed farming. However, as the population of a place increases, the fallow period becomes shortened

until a permanent cultivation is entrenched. It is an irony of fate that the drylands of Nigeria is where permanent cultivation, as a result of pressure of people on the land, is practiced more than in other areas. Animal husbandry in Nigeria is mainly the pastoral type. The system has international dimensions as herders from the neighboring countries infiltrate into Nigeria during the dry season. Mixed farming is also practiced on a permanent basis. This system combines semi-permanent crop farming with grass fallow for grazing. Where livestock dominates, crop production will be a minor activity, and the rangeland type of agriculture is practiced.

Physical Characteristics of the Drylands of Nigeria

The drylands of Nigeria forms an undulating plain at a general elevation from about 450m to 700m. More than half of the region is covered by ferruginous tropical soils which are highly weathered and markedly laterised. A large proportion of the region is also characterized by sandy-fixed undulating topography. The sandy soil is usually low in organic matter, nitrogen and phosphorus and may degrade rapidly under conditions of intensive rainfall (Mortimore, 1989). When over-use occurs in this generally sandy environment, denuded patches may appear when the wind-blown sand becomes mobile. Average annual rainfall in drylands of Nigeria varies from 500mm in the northeastern part to 1000mm in the southern sub-area, but it is unreliable in many parts. Unpredictability and unreliability characterize the pattern of rainfall. As in other arid and semi-arid areas of the world, it is not just the total amount of rainfall that is important, but the timing and distribution. In this respect, the pattern of rainfall in the region is highly variable in spatial and temporal dimensions with an inter-annual variability of between 15 and 20 percent. The nature of the rainfall in the region supports mostly savanna vegetation.

Desertification in Nigeria

The extent and severity of desertification in Nigeria has not been fully established neither the rate of progression properly documented. Nevertheless, there is a general consensus that desertification is by far the most pressing environmental problem in the drylands parts of the country. The visible sign of this phenomenon is the gradual shift in vegetation from grasses, bushes and occasional trees, to grass and bushes; and in the final stages, expansive areas of desert-like sand. It has been estimated that between 50% and 75% of Adamawa, Bauchi, Borno, Gombe, Jigawa, Kano, Katsina, Kebbi, Sokoto, Yobe, and Zamfara States in Nigeria are being affected by desertification. These states, with a population of about 50 million people account for about 43% of the country's total land area (Nasiru, 2007). In these areas, population pressure resulting in over grazing and over exploitation of marginal lands has aggravated desertification and drought. Entire villages and major access roads have been buried under sand dunes in the extreme northern parts of Katsina, Sokoto, Jigawa, Borno, and Yobe States. The pressure of the migrating human and livestock populations from these areas are absorbed by pressure point buffer states such as the Federal Capital Territory, Plateau, Taraba, Niger, Kwara and Kaduna states. It is reported that these buffer states have about 10-15% of their land area threatened by desertification (UNCCD, 1999). This action leads to an intensified use of fragile and marginal ecosystems resulting into progressive degradation even in years of normal rainfall.

The Causes of Desertification in the Nigerian Environment

Natural Causes

The natural causes of desertification include the poor physical conditions of soils, vegetation, topography as well as the inherent extreme climatic variability as evidenced in periodic droughts. Climate variation is perhaps the most important natural cause of desertification and drought in the dry lands of Nigeria. The history of the Sudano-sahelian zone of Nigeria is replete with severe and prolonged drought events, some lasting several years. The zone started the 20th century with a prolonged drought of 1903 culminating in that of 1911-1914. Other droughts included those of 1919; 1924; 1935 and 1951-1954. Rainfall was relatively abundant in the late 1950s and the early 1960s. Since then average rainfall has fallen below the 1930-1960 mean for almost three decades with lows in both 1972-1973 and 1984-1985. In terms of rainfall deficiency, river discharges and Lake Chad level, the period 1983-1985 was the driest period in this century in this zone as the lake fell to its lowest level and shrank to its smallest area (Nasiru, 2007).

Human Activities

The anthropogenic factor is mainly the disruption of the ecological system caused by poor land use and ever-increasing pressure put upon the available resources by the expanding population. More specifically there are four primary causes, notably over-exploitation, over-grazing, deforestation and poor irrigation practices, and these are influenced by factors such as changes in population, climate and socio-economic conditions. It is obviously a complex inter-relationship, which includes: poor physical conditions in terms of soils, vegetation, topography and inherent extreme variability of climate as manifested in frequent drought; disruption in ecological balance caused by poor land use and ever increasing demand being made on the available resources by the expanding population and socio-economic systems of the affected areas; and improper land-use practices and poor land management. Thus desertification is a result of complex inter-relationships between social and natural systems. Figure 2 shows the interplay among them. In addition to the causes mentioned above according to Marguba (1991) and NAP (2000) the following are the main causes of desertification in Nigeria through anthropogenic factor.

1. Wood Extraction for fuel and Construction

Without alternative sources of energy in the Sudano-sahelian zone, the demand for fuel wood has been on steady increase by the increasing population and rapid urbanization despite the existing Felling of Trees (Control) Edict in the various States. In addition, wood is also exploited for building, arts and crafts in this environment. The United Nations Sudano-Sahelian Office (UNSO) has identified forest depletion as the major agent of desertification in Nigeria. As a result of the demand for wood for construction, building, fuel, fishing industry and other uses, the removal of trees, shrubs, herbaceous plants and grass cover from the fragile land of the Sahel will continue to accelerate the degradation of the soil to desert-like conditions.

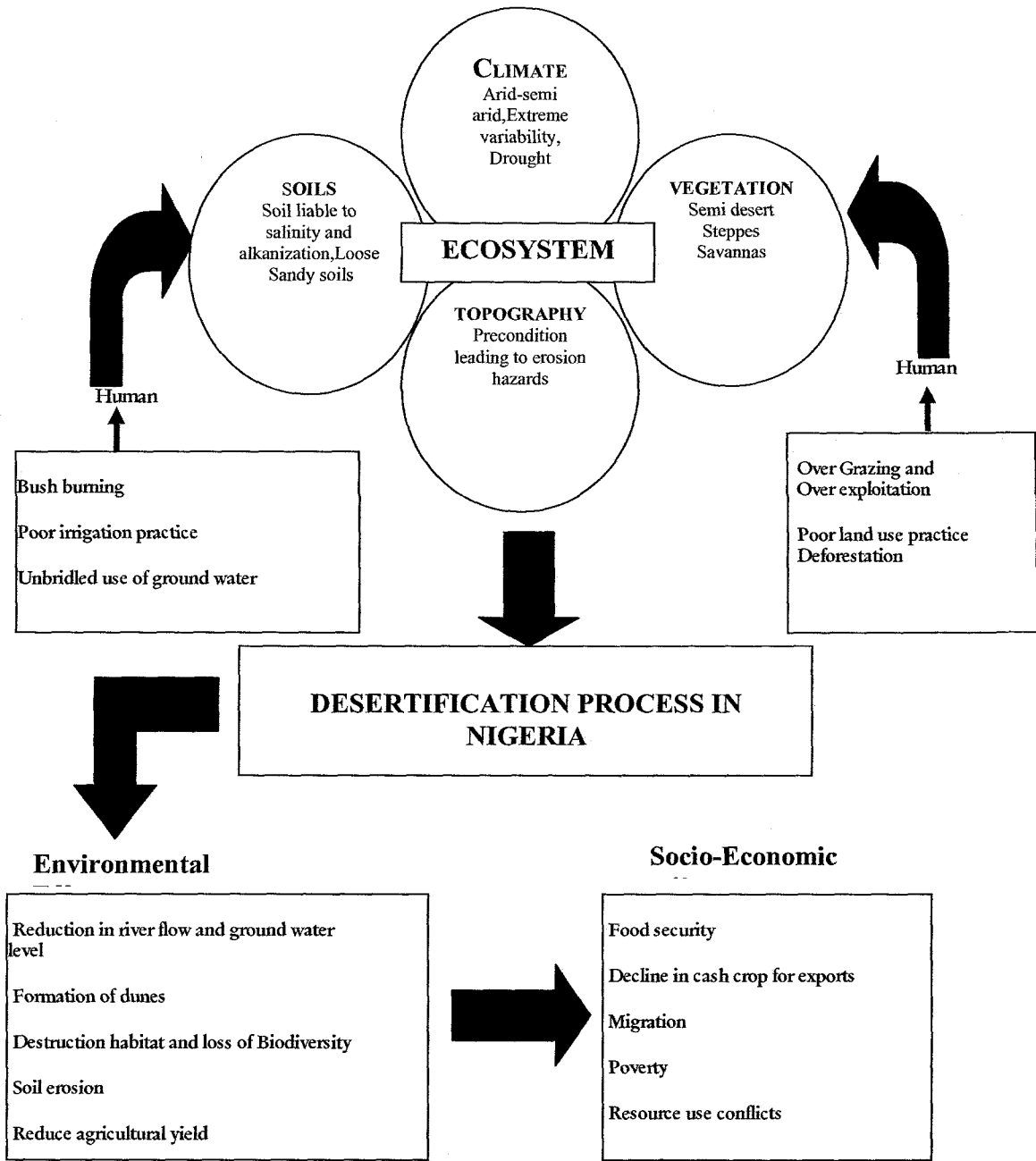


Figure 2: Model of desertification process in Nigeria (Adapted from Oladipo 1993)

2. Bush Burning

Bush burning is an agent in the process of deforestation. Owing to the low relative humidity of the semi-arid zone coupled with very dry harmattan wind, there is always a high incidence of bush fires every dry season. The occurrence of fire within the zone can be attributed to bush burning by villagers during land clearing for agriculture, hunters who in search of game, set fire onto the vegetation, and cattle herdsmen who set fire to dry grass to stimulate growth of dormant grass buds.

3. Grazing

Livestock population in Nigeria has been estimated to consist of 16 million cattle, about 13.5 million sheep, some 26 million goats, approximately 2.2 and 150 million pigs and poultry respectively (Gadzama, 1995). The dry lands of Nigeria is said to support much of the country's livestock economy, hosting about 90% of the cattle population. In the Sudan and Sahel zones, which carry most of the livestock population, nomadic herdsmen graze their livestock throughout the area and are constantly in search of suitable pastures. Additional pressure is also put on pasture resources by livestock from neighboring countries, notably Cameroon, Chad and Niger respectively.

4. Cultivation of Marginal Land

Cultivation of marginal areas is one of the causes of desertification. In periods of higher than normal rainfall, people tend to extend farming activities into the marginal areas. When the years of plenty are followed by dry years, exposed land with very little vegetal cover is at the mercy of the winds. The fine clays and silts are carried away as dust, and the sand drifts into dunes. The effect of this could be irreversible except through carefully planned rehabilitation programme.

5. Faulty Irrigation Management

Irrigated cropping can turn land into desert if not properly designed and managed as a result of waterlogging, salinized or alkalinization. This scenario is already a reality on a number of irrigation projects in Nigeria today, such as the Bakolori Irrigation, South Chad Irrigation and the Hadejia – Jamaare Irrigation Projects.

6. Poverty

Perhaps the most subtle and often neglected cause of desertification is poverty. Although statistical data are hard to come-by, evidence seems to suggest that the vast majority of the inhabitants of the drylands of Nigeria live below the Poverty level. To a large extent therefore, they depend heavily on the natural resources of the area. Thus, the well known interrelationship between Poverty and Environmental degradation obtains whereby poverty generates environmental degradation (desertification) which in turn accentuates poverty.

Impact of Desertification and Drought

Socio-economic Impact

Desertification and drought have severe impact on food security, livelihood, socio-economic and cultural activities of the affected people. This has aggravated the food

situation in the area resulting in low food security index. Drought causes a lot of economic disruption, for example, it was held responsible for the drastic fall in the GDP of 18.4 percent in 1971-72 and of 7.3 percent in 1972-73 (at constant 1974-75 prices). It was also seen as causing the rapid rise in price index for foodstuff and relative decline in non-oil exports.

Land and Water Resources

In addition to the socio-economic impacts, drought and desertification do have serious consequences on available water resources. Long term drought could adversely affect the level of upper ground water and stream flows, as well as the underground water. They also affect the level of large lakes, thereby affecting riparian access as in Lake Chad, which has receded beyond the borders on Nigeria.

Resource Use Conflicts

Desertification and land degradation encourage economic and social strife as shown in wars of the Sahel and the Horn of Africa in the last two decades. This is often accentuated by lack of proper natural resource planning and management as well as rapid population increase in the arid zone, and the diminishing environmental resource base. In the drylands of Nigeria, conflicts over land resources are focused on areas of high productivity, especially those that provide seasonally critical resource such as the wetlands. The most of which have competitive uses amongst the various rural land users, notably farmers, herders, fishermen and hunters.

Destruction of Habitat and Loss of Bio-Diversity

The flora and fauna of the Sudano-sahelian zone have been badly depleted as a result of climatic variation and human mismanagement and/or over-exploitation of the environment. Some fauna species such as the sitodunga antelope, cheetah, lion, giraffe and elephants are endangered. Other endangered species are the crowned crane, the bustard, palearctic migrants, ostriches, fulvov tree ducks.

GOVERNMENT EFFORTS AT COMBATING DESERTIFICATION IN NIGERIA

The Nigeria Government, within the overall framework of protecting the Nigerian environment, has given prominence to the twin environmental problems of drought and desertification. The efforts are on National Policies, Institutional and Legislative Framework, Sectoral Programmes and Partnership Building that have been put in place to address the problem of drought and desertification. The current government policies are;

-National Policy on Environment - The policy clearly indicates synergies with other sub-sectors relating to population, culture, housing and human settlements, biological diversity, conservation of natural resources, land-use and soil conservation, agriculture, water resources, forestry, wildlife and protected areas, mining and mineral resources, energy, education, science and technology, flood and erosion control and the cross-sectoral issues of public participation.

-National Agricultural Policy - Within the National Agricultural Policy, there are sub-sectoral policies covering livestock, forestry, food production, and land and water resources.

-National Energy Policy - The objectives of this policy is for the promotion of the use of renewable energy resources (wind, water) and improving efficiency of domestic energy utilization as well as minimizing and mitigating harmful practice of extracting energy from woods (plants).

-National Forestry Policy and Action Plan - It is a framework for halting deforestation and associated destructive impacts. Among its objectives are: protection of forest resources, achieving 25% forest coverage in Nigeria and sustainable utilization of forest products.

-National Environmental Action Plan and State Environmental Action Plans - The policies, plans and programs include: overall protection of the Nigerian environment, promotion of renewable energy technologies, conservation of threatened flora and fauna species, environmental education and awareness creation and reduction of resource use conflict among land users.

-National Conservation Strategy - The aim is to manage the ecosystems in such a way that they yield greatest sustainable benefit to present generations while maintaining the potential to meet the needs and aspirations of future generations in such a way that essential ecological processes and life support systems are maintained.

-Natural Resources Conservation Action Plan - This plan aims at collating and evaluating data and knowledge on natural resources with a view to developing programs of action for management and sustainable use.

-National Water Resources Master Plan (1995-2020) - The Master Plan aims at sustainable utilization of water resources, particularly in the semi-arid zone of the country.

-National Biodiversity Strategy and Action Plan - The goals and objectives are to conserve and enhance the sustainable use of the nation's biodiversity resources and to integrate biodiversity-planning considerations into national policy and decision making and the Green Agenda of the Vision 2010.

-National Agenda 21 - This is essentially designed to integrate environment and development, which seeks to attain sustainable development. Its main focus is on how to redress the major existing environmental problems.

-National Action Program to Combat Desertification - This National Action Program (NAP) is a report that spells out critical activities to be taken in a holistic manner to tackle the menace of desertification of the country.

-National Economic Empowerment and Development Strategy (NEEDS) - NEEDS focuses on four key strategies: reorienting values, reducing poverty, creating wealth, and generating employment.

Institutional and Legislative Framework

The establishment of FEPA by Decree 58 of 1988 was probably the most far-reaching initiative undertaken by the Federal Government of Nigeria for the purpose of addressing the multifarious environmental problems (drought and desertification inclusive) and protecting the Nigerian Environment. The Federal Environmental Protection Agency also facilitated the establishment of State Environmental Protection Agencies (SEPAs) in the 36 states of the Federation and the Federal Capital Territory (FCT). Nigeria signed the Desertification Convention on the 31st October, 1994 and ratified same on the 8th July, 1997 thereby qualifying the country as a Party to the convention with effect from 6th October, 1997. The creation of the Department of Drought and Desertification Amelioration in the Federal Ministry of Environment 1999 strengthens the existing institutional arrangement for more effective coordination of activities by Government towards the implementation of the CCD in the country.

Sectoral Programmes

In Nigeria, several sectoral and multi-sectoral programmes have been put in place over the years to tackle the twin problem of drought and desertification. A brief review of some of these programmes is given below:

1. Management of Water Resources

Towards promoting sustainable utilisation of water resources in the drylands, Nigeria established River Basin Development Authorities (RBRDAs) under the supervision of the Federal Ministry of Water Resources. These are actively involved in development of water resources particularly for irrigation. These efforts include damming and diversion of rivers, and in some areas exploiting underground water. The RBDAs are also involved in improvement of community water supplies and provision of watering points in rangelands. The RBDAs that operate in the semi-arid region of Nigeria include the Sokoto-Rima, Hadejia- Jama'are, Upper Benue, Niger River and Chad Basin Development Authorities. The Federal Government of Nigeria, with World Bank assistance, has also implemented a programme tagged National Fadama Development Project for the purpose of optimally utilizing the water resources of the wetlands of Nigeria for small scale irrigation. The project was under the guidance and supervision of the Agricultural Development Programmes (ADPs) of the various states. The project provided gainful employment for the rural populace during the dry season thereby cutting down on the number of peasants that engage in off-season trade in firewood.

2. Forestry Programmes

An Arid Zone Afforestation Project (AZAP) was instituted by the Federal Government in 1976 to tackle the problems of desertification through the establishment of woodlots, shelterbelts and windbreaks. Over 10 million seedlings were raised annually between 1978 and 1984. About 150 kilometers of shelterbelts, 3,680 hectares of woodlots, 24 boreholes, 70 tree nurseries, and Forestry Vocational Schools were established. The European Economic Community supported a pilot project in Katsina State covering a

total area of 1.6 million hectares involving the establishment of shelterbelts, windbreaks, woodlots and trees on farmlands. In addition, the World Bank also financed a similar project in the five arid zone states. The emphasis is on farmer participation and extension. Areas of focus of the Forestry Programme include the following; land use policy, fuel energy, mass tree planting campaign, prevention of bush fire, silvo-pastoral system and sand dune fixation.

3. Agricultural Development Programme

The Federal Government of Nigeria with World Bank Assistance has expended enormous resources to establish Agricultural Development Programmes (ADPs) in all the 36 states of the Federation and the Federal Capital Territory. The ADPs operate the Training and Visit (T & V) system of unified extension system covering the areas of Crop Production and Protection, Livestock Production and Animal Health, Fisheries, Agro-forestry and Gender related issues in Agriculture popularly referred to as Women In Agriculture. This unified extension system is employed for the dissemination of proven agricultural technologies (aimed at ensuring sustainable development) to the small-scale, resource poor farmers who are responsible for well over 90 percent of the national food production.

4. Energy Resources

Although Nigeria is blessed with abundant renewable energy resources, there is currently a heavy reliance on fuel wood and fossil fuels. Sourcing of fuel wood for domestic and commercial uses is a major cause of desertification in the arid zone states of Nigeria. Currently, fuel wood is the dominant source of energy in the domestic sector. According to a report by the ECN Nigeria consumes well over 50 million metric tonnes of fuel wood annually; a rate that far exceeds the replenishment rate through various afforestation programmes. The Federal Government, through the Energy Commission of Nigeria (ECN), has put in place the following programmes for the purpose of promoting optimal utilization of renewable energy resources with a view to reducing deforestation associated with fuel wood sourcing; training programmes on renewable energy technology, biogas and biomass utilization projects and solar photovoltaic electrification projects for remote rural areas. All energy-related environmental projects that are being implemented in Nigeria are guided by the National Policy Guidelines on Energy.

5. Integrated Programmes Targeted at Poverty Alleviation

The Federal Government of Nigeria realises that poverty alleviation is a major weapon for combating desertification. Consequently, a number of poverty alleviation programmes have been put in place. Notable amongst these are the Northeast Arid Zone Development Programme (NEAZDP), the FMENV/UNIMAID Linkage model village project, the Katsina State Agricultural and Community Development Project (KSACDP), and the Sokoto Environmental Protection Programme (SEPP). The major components of this programme include water resources development and management (including irrigated agriculture), provision of micro-credit for off season economic activities, cottage industries, livestock fattening, rural banking and popularisation of animal traction for land preparation for agricultural activities.

Building Partnerships

Government has recognised that the hydra-headed problem of desertification cannot be tackled by itself alone. To this end, it has facilitated the involvement of other actors including the Private Sector, Non- Governmental Organizations (NGOs) Community based Organizations (CBOs) and Donors. At present, a number of NGOs are actively involved in the implementation of CCD in Nigeria. Some of them participated very actively in the negotiation process. The Regional Annexes of the Convention and the Resolution on Urgent Action for Africa spell out the expected roles for NGOs as follows:

1. Action Programmes, Co-ordination Mechanisms and Partnerships.
2. Capacity Building, Education and Public Awareness
3. Financial Resources and Mechanisms.

Ongoing Projects Initiated by the Government

The following projects have been approved for implementation by the Federal Government of Nigeria as part of her effort in combating desertification and mitigating the effect of drought:

-The Greenbelt Project - The Greenbelt Project is an integrated and participatory scheme with the following components: nursery development, poverty reduction, promotion of livelihood, watershed management, rural water supply, micro-credit facility, eco-tourism, rural energy, biodiversity conservation, environmental education and awareness creation, capacity building and research.

-Model Village Development (Integrated, Community-based Approach) - Fourteen communities spread over the eleven desertification frontline states have been selected for this project, which is now being implemented. This project which is estimated to cost about five hundred and fifty million naira (equivalent to US \$4.0m)

-Pilot Project on Sand-dune Fixation - This pilot project is being implemented to raise awareness level and demonstrate the appropriate technologies for sand-dune fixation for adoption by the communities.

-Pilot Project on Rangelands - This project is designed to demonstrate to communities in the dry-land of Nigeria technologies for establishing rangelands in order to improve the carrying capacity of the land for livestock, particularly cattle, goats and sheep that have been implicated in land degradation.

-Development of National Drought Forecasting and Early Warning System - The capacity to predict the occurrence of drought will no doubt facilitate timely development of early warning systems for effective adoption of appropriate mitigation measures.

-Assessment and Preparation of Desertification Map for Nigeria - A major output of the project will be the production of National Desertification Map using satellite imagery and GIS. This is of course in addition to yielding credible data on the extent, severity and rate of desertification in Nigeria.

-Nigeria-Niger Trans-boundary Ecosystem Management Project - Integrated Ecosystem Management of Trans-boundary Areas between Nigeria and Niger is a global environment facility (GEF) funded project aimed at creating conditions for sustainable integrated ecosystem management and thereby improve livelihoods in areas covered by the Maiduguri Agreement between the two countries.

-Nigeria-Japan (JICA) Master Plan for Utilization of Solar Energy in Nigeria - A master plan study for utilization of solar energy in Nigeria currently ongoing by the Japan International Cooperation Agency from June of 2005 in collaboration with the Energy Commission of Nigeria, Federal Ministry of Power and Steel, and the National Planning Commission

-UNIDO-Energy Commission of Nigeria Small Hydro Power (SHP) Program - Energy commission of Nigeria (ECN), with the assistance of the United Nations Industrial Development Organization (UNIDO), is carrying out activities in the area of small hydropower.

Conclusion and Recommendations

Despite the various national efforts/programs discussed above, desertification continues to be a serious problem in the dry-land of Nigeria. This paper identifies the point to various weaknesses in the formulation as well as the implementation of some of these programs. These include adoption of the top-down approach that limits consultation between and among the various stakeholders, inconsistency of government policies, neglect of indigenous knowledge, use of inappropriate technology, sectoral approach, inadequate funding, inadequate awareness and rural poverty which compels the people to rely heavily and unsustainably on the environment. Desertification is a reversible process, but action must be taken immediately to reverse the process in areas where the threat is greatest before the process reaches its conclusion and there is no longer the chance of recovery. In the drylands of Nigeria and in particular the north western and north eastern part has the highest priority because it is here that removal of natural vegetation and inappropriate cultivation methods are degrading and depleting valuable and limited biological, soil, and water resources at the fastest rate. In addition, the priority in combating desertification should be the implementation of preventive measures for lands that are not yet degraded, or which are only slightly degraded. However, the severely degraded areas should not be neglected. In combating desertification and drought, the participation of local communities, rural organizations, national Governments, non-governmental organizations and international and regional organizations is essential.

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