

# Encroachment in the north east region of nigeria



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DESERTIFICATION OR DESERT ENCROACHMENT can result from a change in climate or from human action, and it is often difficult to distinguish between the two. This has commonly led to confusion and misconceptions. A temporary or long-continued deterioration of climate may accentuate the harmful consequences of human occupation of the land and vice versa. It has often been suggested that man's activities have resulted in climatic deterioration, but this is difficult to substantiate. In any case it is important to attempt to assess the relative contribution of climate and man in the process of desertification in order to decide on the ameliorative measures that can best be taken and to estimate the likelihood of their success.

Deserts are not expanding everywhere in Africa. Irrigation has converted what had been desert into highly productive cropland; afforestation has at least locally reclaimed the waste. However it is widely thought that the Sahara, the Kalahari and other desert and semi-desert regions are expanding. Why should this assumption be made? It has not always been based, I would suggest, on sound evidence. Students of classical writings in the eighteenth and nineteenth centuries were led to conclude that North Africa had been much more highly productive in Roman times. Many of them were inclined to explain the deterioration in terms of desiccation, though as early as 1828 the Copenhagen botanist Schow showed that it was unlikely that the temperature and rainfall of the region were very different in classical times from his own.

Colonial administrators in the early twentieth century, comparing conditions at the tropical desert margins with those described by late nineteenth century explorers and seeing the ruins of ancient imperial capitals in the

Western Sudan, also convinced themselves that the rainfall was diminishing. Foresters and agriculturalists dismayed by the destructive land use practices of cultivators and graziers, so different from those they knew in north-west Europe, warned the governments of the African colonies of the dangers that threatened.

As a result the idea of desert expansion, of an advancing Sahara, became firmly rooted in the minds of the public at large. At the present day we find popular works on environmental deterioration conveying the same messages. Thus the Ehrlichs write ' the vast Sahara desert itself is largely man-made, the result of overgrazing, faulty irrigation, deforestation, perhaps combined with a shift in the course of a jet stream. Today the Sahara is advancing southward on a broad front at a rate of several miles per year. The recent dry years and their consequences may seem to substantiate such crude assessments of the situation.

The African deserts are not man-made dustbowls; they are to be ascribed primarily to the continent's geographical position. Africa lies almost entirely within 30° of the equator and a large part of its total area is occupied by dry descending air and receives little rain. Furthermore, the temperatures at low altitudes are generally high throughout most of the year so that water losses from land and water surfaces are high, especially in the tropical regions of low rainfall and relative humidity. The Sahara and the Kalahari are to be explained primarily in these terms. The Namib desert is associated with the cold Benguela current offshore, and in East Africa locally dry and semi-desert areas lie in the lee of highlands which have already drained the moist air masses from the oceans. Nevertheless, there are very extensive marginal

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areas where land use practices determine whether they shall be productive or unproductive in the long term.

A great deal has been learned about African deserts in the last few decades. Aerial and space photography and the work of scientists in a number of fields have greatly extended our ability to appreciate the nature of the desert lands and the processes at work on their margins. We have the long series of publications of UNESCO's Arid Zone Research Symposia; there have been WMO and FAO studies of semi-arid regions; the University of Arizona has published *Deserts of the World*, an appraisal of research into their physical and biological environments (1968) and *Arid Lands in Perspective* (1969). The publications of the Pan-African Congresses on Prehistory and the Quaternary, of ASEQUA (Association Senegalaise pour l'Etude du Quaternaire de l'Ouest Africain), and of Dr van Zinderen Bakker in his series on the Palaeoecology of Africa have brought together the results of the investigations of a host of geologists, geographers, archaeologists, botanists and other specialists, all of whose work has a bearing on the subject we are considering. Soil scientists and hydrologists, foresters and agriculturalists, anthropologists and historians have all made their contributions to our pool of information and we should now be in a much better position to view the whole question of desertification in its true perspective than were our predecessors a generation ago. Let us try to do this, by examining first the question of changing climates, then the nature of human interference, and finally the ways of measuring desert encroachment and the possible means of taking action against it.

It has not been found possible to distinguish clearly any simple long term trends or regular periodicities in the climate, though many attempts have been made to do so, and it is necessary to adopt an empirical historical approach to the subject. In tracing what is known of the history of Africa's climate it is useful to gain perspective by looking at the changes over the last century against the background of the last several thousand years. As pointed out by R. O. Whyte, we should distinguish major changes in climate, in or out of pluvial lasting thousands of years, from minor changes lasting hundreds of years, and from variations or trends which are experienced for 10 to 50 years. 1 Each time-scale has its own biological significance. The shorter period variations are superimposed on the longer period fluctuations, and we must recognize that as we attempt to penetrate further into the past, so our ability to distinguish minor oscillations diminishes and only the major changes can be detected.

### **The role of man:-**

Man's role in desert encroachment is a very ancient one. He has known how to make fire since late Acheulian times; for almost 10, 000 years he has herded his animals at the desert margins and grown his crops in the more favoured areas. He has established large settlements and cut wood for fuel and buildings over a similar period. Burning of the vegetation is possibly not a very important agency in the process of desertification; grass and trees in vulnerable areas are generally too sparse to burn readily. An exception to this general rule might be woodland alongside watercourses which has probably been largely eliminated in many semi-arid regions of Africa, possibly by fire. Gallery forest is a prominent feature of the savanna lands,

and the concentration of what vegetation there is in deserts like the Sahara alongside watercourses is very striking. In the intermediate zones, streamside vegetation is sometimes less evident than one might expect it to be. Burning might possibly be the explanation. A careful study of ERTS imagery would throw much light on the timing and areal incidence of burning.

Heavy grazing by wild animals cannot be entirely ruled out as a cause of desert encroachment in the past. Certainly the eighteenth and early nineteenth century accounts of the enormous herds of antelope at the margins of the Kalahari and in the arid parts of Kenya, for example, suggest that their effect on the vegetation must have been very great. Animal populations increase and decrease in waves and the peak populations may not coincide with the maximum availability of food. However, the balance between available food and the bio-mass is probably better kept by wild animal species with varied food preferences than by man and his livestock. It seems likely that browsing and grazing by wild animals may maintain grassland conditions and that with their replacement by domestic animals woodland made up of thorny species of shrubs and trees may replace the grass. This seems to have occurred notably in the Karoo of southern Africa in recent decades. Bush has moved east and north replacing sweet grass veld, while extensive areas in the west are said to have become virtual desert.

The nomads and their herds of cattle, roaming the margins of the Sahara, resemble game animals on Serengeti in adjusting their movements to the availability of water and pasture. However their movements have been increasingly restricted by political frontiers, taxation arrangements, and the <https://assignbuster.com/encroachment-in-the-north-east-region-of-nigeria/>

occupation of grazing land by agriculturalists. Particularly important in this respect are the dry seasons grazing lands that have been taken over for irrigation. At the margins of the Kalahari, the pastoralists of eastern Botswana live in large villages and take their herds out over the extensive grazing land to the west in the dry season. This seems to be a sensible response to the natural conditions. However, there is always a tendency for the herds to build up in

good years and then the numbers are kept high in dry years so that the pastures are eaten out.

In recent years the risks of desertification as a result of overgrazing has increased as a result of three factors:

1. The increase in numbers of livestock in many areas, e. g., north-east Nigeria. It would be useful to have more information about this. Doubling of numbers in a decade seems to have occurred in some areas, although livestock numbers are notoriously inaccurate.
2. The increasing proportion of cattle in small herds often belonging to sedentary cultivators and herded by small boys, who cannot wander far, resulting in local overgrazing while other areas with pasture “-main ungrazed.
3. The provision of water in certain areas, such as parts of the artesian basin near Lake Chad, resulting in cattle remaining near wells and eating out the grazing round about instead of moving off to the rivers and other areas with dry season water and grass.

The risks of serious deterioration are greatest when a succession of good years is followed by a period of long-continued drought.

Woodcutting is a serious matter in many areas. Pastoralists are partly to blame. In places like Tibesti they cut foliage to feed their camels and use branches to build enclosures for their goats. However it might be noted that a considerable part of the woody growth in some areas springs from posts that were used for the enclosures and have taken root. Another threat comes from the demand for fuel in towns. The people in the surrounding countryside find the sale of wood to the townpeople a useful supplement to their meager cash incomes. K. J. Mortimore and J. Wilson have estimated that nearly three-quarters of Kano city's firewood consumption of some 75, 000 tons per year for its population of 300, 000, is brought in by donkeys mainly from within a radius of about 20 km. Although there is a return cargo of manure (over 10 per cent of the total applied to the intensely cultivated fields around the city), this trade represents the felling of thousands of trees every year. As Kano and similar towns grow at rates of 5-10 per cent annually, one can expect the woodland around to become very sparse. Alongside roads, at a distance from the larger settlements, wide areas are also being cleared by people who add to their income by making charcoal which is then carried into town by passing lorries. When the woodland has disappeared from such areas only animal dung remains for fuel for local consumption, and all the sylvan produce, honey, fruits and beans, medicaments and so on, are lost.

Woodland in agricultural areas, as in the Sudan zone and the Sahel, is particularly important. It provides foodstuff for animals and man; it brings up



nutrients from below that are released to the base-poor sandy soils from the decaying leaves and from the substances washed off the leaves; it brakes the speed of the wind, reduces the rate of evaporation at the end of the rains and the risk of soil blowing away towards the end of the dry season, and it provides shade for man and beast. Not least, it has an aesthetic value in improving the appearance of the landscape. Particularly important is the Winterthorn, *Acacia albida*, which is in leaf during the dry season and yields 'beans' from great woody pods before the rains come. Multiplication of this tree should be encouraged throughout the Sudan and Sahel.

Cultivation in marginal areas during periods of higher than normal rainfall is especially dangerous, and is perhaps the main cause of desertification against which it may be necessary to take preventive action. When dry years follow years of relative plenty, ploughed soil-or soil from which the sparse cover of natural plants has been eliminated by cultivation-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 is likely to be irreversible except at great cost.

Measuring the rate of desert encroachment ' In 1882 land classified as either desert or wasteland amounted to 9.4 percent of the total land on Earth. In 1952 it had risen to 23.3 percent'. I give this quotation not because it is true but because it is meaningless. No definitions are given and it is not dear whether the difference between the figures is the result of the spread of desert conditions or, much more likely, whether definitions of desert and availability of knowledge were different on the two occasions. However, it does bring out the point that it is extremely difficult to measure and state in

numerical terms the rate of desert encroachment-though less difficult now than it was in the past.

In the past there has been a good deal of reliance on such indicators as the movement of towns and tribes, and on the chance observations of travelers and the tales they were told. Writing in 1921, F. Migeod noted that the capital of Kanem was shifted to positions successively further south; Bovill brought together additional historical evidence of the encroachment of the Sahara on the Sudan. Both were writing soon after the dry period of the early twentieth century. In 1935 E. T. Stebbing produced a map of West Africa showing the ' present advance of sand' and attempted to estimate its rate of progress. The basis for all such calculations was very flimsy, but figures of 200 km. in 200 years were commonly given. The rainfall gradient from south to north in West Africa is remarkably regular and mean values diminish northwards by about 100 mm. per 100 km. in the Sahelian zone, so that the kinds of changes in the precipitation that are likely to have taken place cannot alone explain such a shift. All the writers pointed to the depredations of nomads, firing of forest lands and so on. Similar alarm bells were rung in East and South Africa and in all these areas government commissions were appointed to investigate. They confirmed that rainfall was not progressively decreasing, but agreed that the vegetation cover was deteriorating and in some areas water-tables were falling and rivers drying up.

There is an interesting exception to the usual story of Hearing of the vegetation being followed by a fall in the water-table. It was found in northern Nigeria in the 1950s that in spite of the spread of cultivation and <https://assignbuster.com/encroachment-in-the-north-east-region-of-nigeria/>

the destruction of woodland in western Bornu, in the preceding 25 years the water-table had risen phenomenally, levels rising in some wells by more than 100 feet and perennial springs breaking out to feed small lakes. 84 It was postulated that the destruction of woodland, by reducing the loss by transpiration of water brought up from depth by the tree roots, had increased the volume left to percolate deeply into the pervious sedimentary rocks. Similar reports come from West Australia and East Africa, and it seems that we may not be able to use the height of the water table by itself as a sound indicator of desertification.

On the whole we are concerned with the vegetation cover, its completeness or otherwise, its composition and its productivity. In assessing the rate of change in any or all of these we are faced with the difficulties of very great variability over short distances according to soil, slope, availability of water and, above all, intensity and manner of land use. Quantitative assessments of the plant cover at a particular place and at a particular time can now be made by using suitable sampling and statistical procedures, and extrapolating from the sample areas by using aerial photographs and other methods of remote sensing. It may be possible to monitor changes in the situation from season to season by satellite observations. Changes over a long period of time can now be assessed by comparing air photographs taken at intervals of 25 years in many of the desert marginal areas. The Trimetrigon photography taken by the US Air Force of much of Africa during the Second World War could be particularly useful in this respect (consisting of strips of vertical photos with obliques on either side). In some areas, such as Morocco and parts of southern Africa, photographic cover is available

spanning an even longer interval of time. Opportunities for comparative studies of this kind do not seem to have been widely exploited and might be encouraged. One of the more interesting attempts to use air photographs to trace the shifting of the edge of the desert is that of M. Clos-Arceuduc who, from a study of the nature of the vegetation patterns in the Sahelian zone known as 'brousse tigree' has come to the conclusion that they indicate a shift south of the vegetation zones through 150 km. in the Niamey region over 2 centuries or less.

## **Combating Desert Encroachment**

Except for arid areas that yield oil, and the limited irrigated areas near the Nile, Niger, Senegal and Lake Chad, the lands at the margins of African deserts are poor and not likely to be highly productive. There is little to be said in favour of great schemes for climatic amelioration involving, for example, the diversion of great rivers such as the Zambesi and the creation (or reconstitution) of great lakes like those that existed in the humid periods of the Pleistocene. Such lakes would be extremely expensive to make, they would flood land which is now productive, and it is unlikely that they would lead to an increase of rainfall that would yield returns in any way commensurate with the costs involved. It is conceivable that the destruction of rain forest in the Congo basin, for example, may have reduced the rainfall of areas further from the equator; by how much it is impossible to say. There is no question of afforestation in such a region on a scale sufficient to restore the situation. In special circumstances cloud-seeding may be found to be rewarding, and it is possible that in the future ways will be found of

modifying the general circulation advantageously. I would not regard any of these as being of much concern to us at present.

At present, populations in the semi-arid lands of the continent are increasing at rates of about 3 per cent annually, as they are elsewhere in Africa. In the near future, however, it is possible that the rural population, especially the pastoral population, may decline. This has already happened in parts of the Sahara and Libya affected by oil production. There are three trends that are more generally effective. Firstly, young people going to school are becoming literate and have greater expectations than their parents had; secondly, people are consuming more and have the desire to consume more than they did; thirdly, people are congregating more near roads and in large towns. It is just as important to keep track of these changes in the human geography of the desert margins as it is to monitor changes in the vegetation cover and to calculate trends in precipitation.

If effective measures are to be taken against desertification, the people involved must be persuaded of the advantages to themselves. Wherever possible measures should be of a positive rather than of a restrictive character. Thus, if it is inevitable that people are going to concentrate in large settlements in sensitive areas, then as well as attempting to regulate the felling of trees for fuel and timber, authorities may be able to cheapen alternative supplies of fuel and construction materials, provide young fruit trees at low cost, and so on.

Perhaps the main problems are presented by pastoralists, whose traditional systems do not fit neatly into the framework of a modern state.

Nomadic flexibility is an advantage to people living in fluctuating, marginal environmental conditions, and nomadic mobility allows good use to be made of variable grazing. Settlement of pastoralists is expedient politically and has some economic advantages, but the greater rigidity seems to involve considerable risks of disaster when the drought years come again, as they will. In UNESCO's Use and Conservation of the Biosphere, it is noted that 'nomadism as a careful pastoral continuum is the least traumatic of human influences and as a form of husbandry utilizes areas which could not be utilized by man in any other way. I think we have yet to find a better alternative.'