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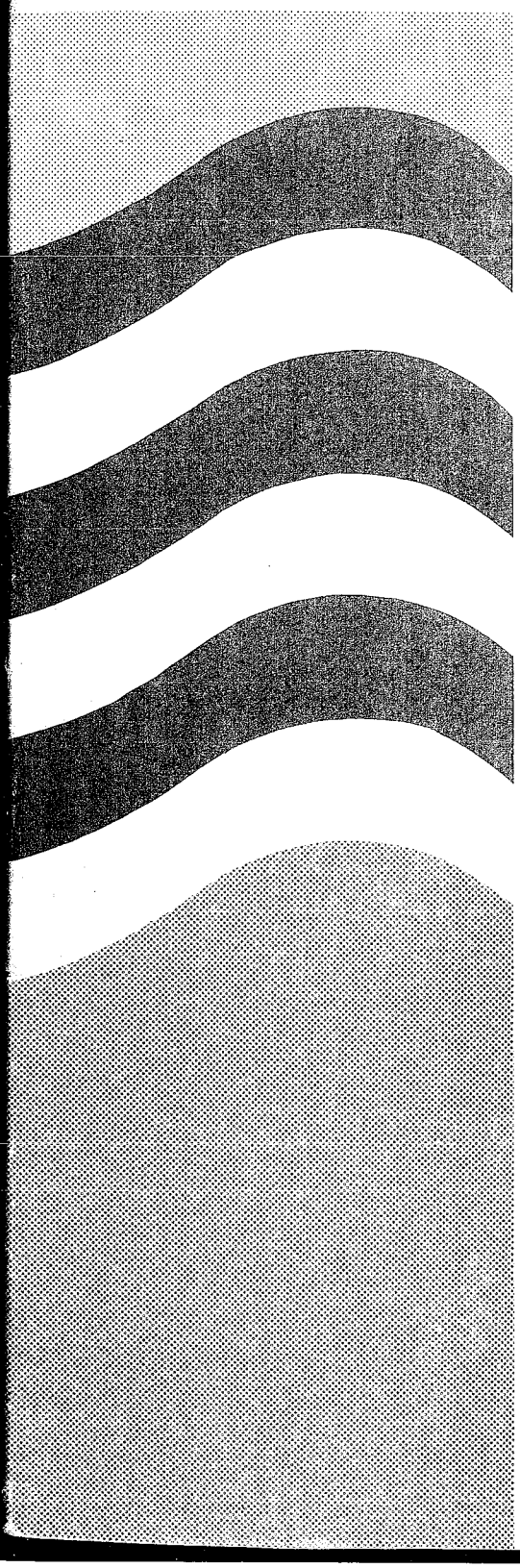

African Drought - A Review

Philip O'Keefe, B.A. (Hons)

January 1975

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PREFACE

The Disaster Research Unit was formed in December 1973 and is a research group within the Project Planning Centre for Developing Countries at the University of Bradford. Unit members are:

James Lewis ARIBA, Senior Research Fellow and Unit Leader,

Philip O'Keefe, B.A.(Hons.), Research Fellow,

Kenneth Westgate, B.Sc.(Hons.), is attached to the Unit as a Research Student.

This series of Occasional Papers will contain the results of the Unit's work. An Index of the Occasional Papers is included on the inside back cover.

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FOREWORD

The Disaster Research Unit, established at the University of Bradford, has compiled and collected material on drought over the last year. It is on the basis of this material that the Disaster Research Unit wishes to present an overview of the current situation in Africa. To attempt incisive generalisation encourages ambiguity and inaccuracy, but the current plethora of publications begs an overview. I apologise for any ideographic inconsistency but do so tongue in cheek.

Drought is simply a period in which moisture availability falls below the current requirements of some or all the living communities in an area and below their ability to sustain the deficit without damage, disruption or excessive costs (Hewitt, 1971). The damage from drought can be listed as:

1. Withering of vegetation including crops.
2. Dehydration or death of animals, including man.
3. Excessive overdraft on 'controlled' human water supplies.
4. Insufficient natural running water for public utilities (Hewitt, 1971).

The drought in Africa, a drought that has occurred primarily in a sequence of years alternating with sets of years of adequate moisture, is technically known as secular drought (Saarinen, 1966). Because drought affects many parts of Africa that do not require spectacular famine relief, it should not be assumed that the study of the causes, prediction and amelioration of drought conditions are topics of concern only to the focus of this study, the Sahel (Richards, 1974).

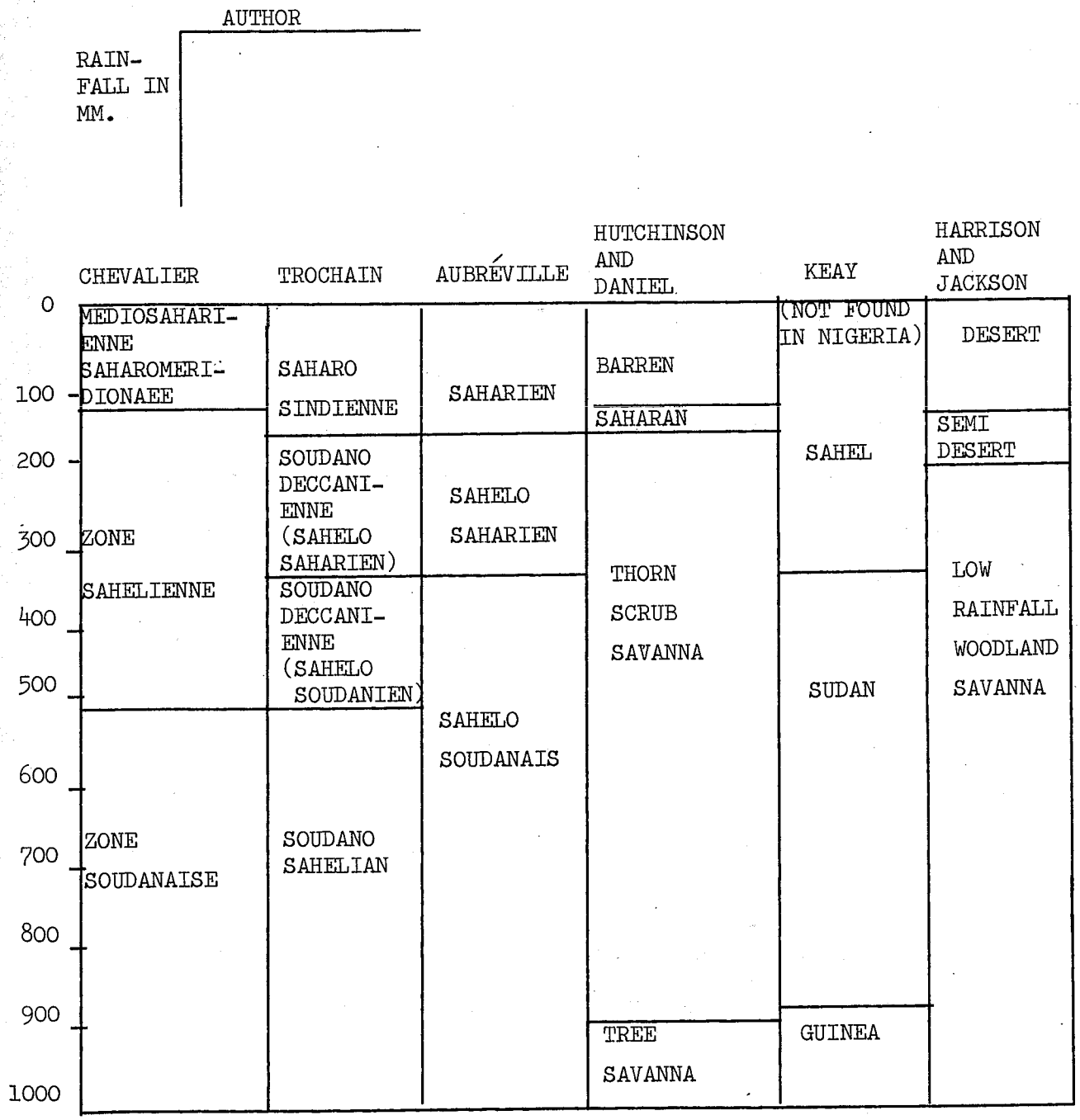
The delimitation of the Sahel as a distinct geographic unit would seem at first sight to be relatively simple, but even the briefest acquaintance with the literature indicates that the area varies according to the criteria utilised in regionalisation. A simple dictionary definition would describe the Sahel as the Western Sahara (Harrap, 1962). Such a general definition is worthless, but geographic descriptions of the area are equally vague; the best outline is given in Geographie Universelle, Larousse, 1964.

'The Northern borders of West Africa lie in an area of total interminable flatness, without rocks, covered with minute pebbles over

which shimmer pools of hot air. Vegetation appears only on the higher ground towards Tagant and among the Iforas - a few blades of yellow grass, a group of date palms where there are human beings. THEN COMES THE HOSTILE SAHEL, an area of twisted stems, thorny branches, grey leaves. A baobab tree here and there heralds the South. The landscape is relieved occasionally by long green sheets of aquatic plants stretched over the blue surface of one of the two great Sahelian rivers. Towards the South of the Sahel the size and density of the thorny scrub increases; the tufts of grass grow close together, their great yellow patches variegate a reddening soil, but the Sudanese bush only really begins with the appearance of trees and green leaves. The trunks remain twisted, but there are fewer thorns; the ubiquitous kartie, the shea butter tree with its plum-like fruit is characteristic of the Sudanese belt and in every landscape the absurd outline of the baobab occurs, an enormous barrel with a crest of stumpy branches from which hang great bellshaped fruits on strings if endless peduncles. The steppe turns into a parkland savanna then into a savanna of more and more trees as one goes further South'.

Despite poetic tendencies this paragraph does contain the basis of a regional definition; the Sahel is a unit of steppe defined by the nature of its vegetation. Unfortunately, there seems to be no standard definition of the vegetation which allows the delimitation of the region in terms of accordant spatial relationships, although it is accepted that the sub-desert steppe and wooded steppe, forming the Sahel, are the most impoverished of West Africa savanna (Bradley, 1971). Figure 1, diagrammatically expresses the confusion that appears in the literature and reveals that the Sahel region has been described as a unit receiving between 0 - 1000mm of rain per annum.

FIGURE 1



AFTER HARRISON AND JACKSON, 1958

Figure 2 indicates that if one accepts a vegetation as the classification criteria for delimiting the Sahel, then one accepts a region extending from West to East Africa. The areas delimited as sub-desert steppe, grass steppe and woodland savanna mosaic (dry) are units that could be considered as Sahelian. This region from West to East Africa suffers from drought and it would seem probable that one could isolate similar courses and policy action for the total area. This argument is strengthened when one considers the work of Rattray (1960) and Rosetti (1965).

Despite the difficulties of delimiting the actual area of the Sahel, one can accept the Sahel as being a transition zone between desert and savannah, located between latitudes 14N and 18N stretching from the Atlantic Coast of Senegal and Mauritania into the Sudan Republic. If one accepts the biogeographical definition one accepts that this is the driest and most northerly of the three savanna zones. The other two are the Guinea (humid) and the Sudan (intermediate) savannas. The Guinea savanna may be described as savanna woodland because of the mix of tree-grass areas. In the Sudan savanna, trees are less common, grasses being the predominant vegetation form. The Sahel is characterised by acacia or thorn woodland with short seasonal grasses.

It is difficult to generalise about arid-zone soils for azonal soils are common but the general characteristics should be noted; these can be summarised as:

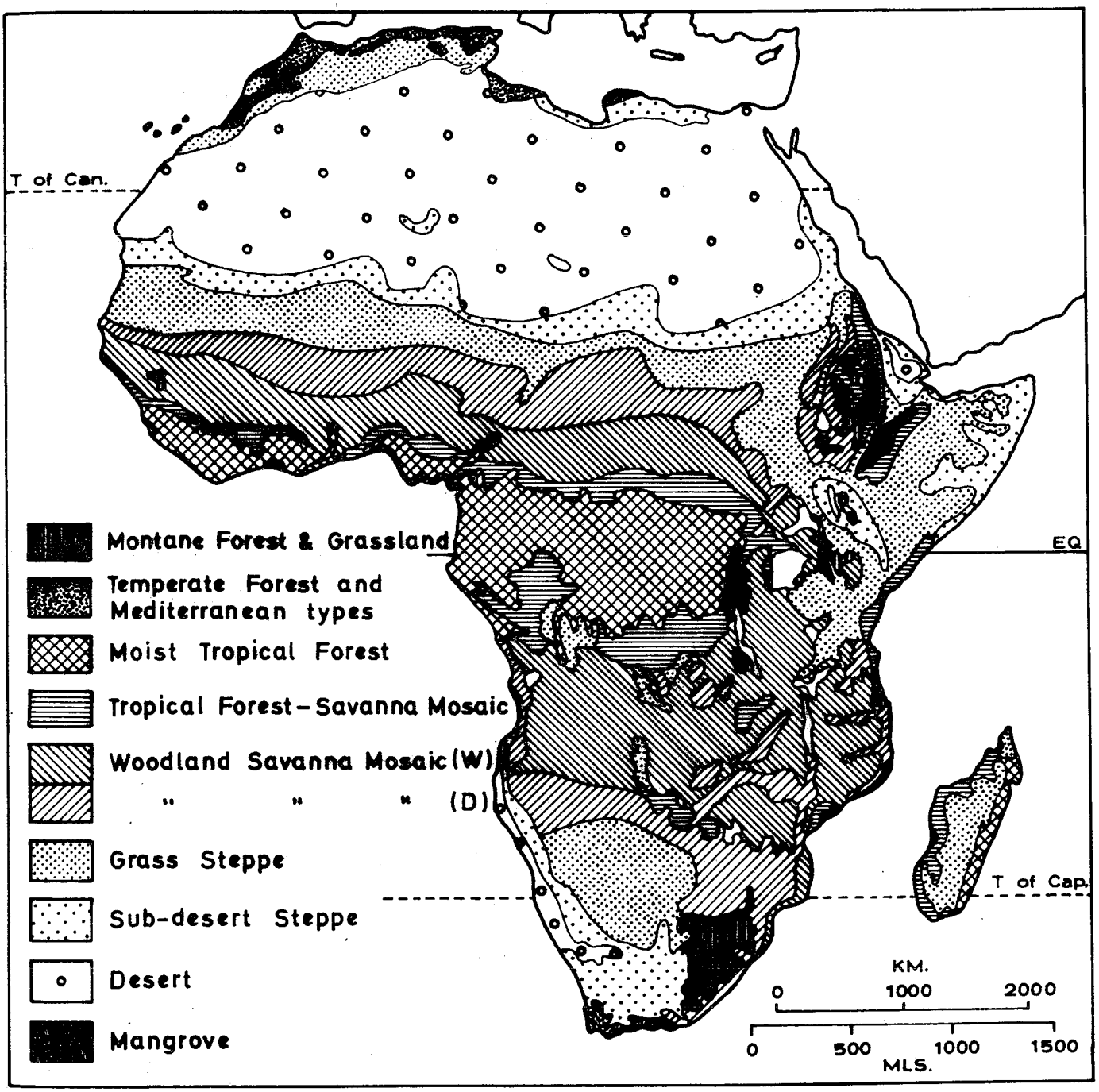
a. Shallowness;

b. Lack of vegetation which means that the organic content of the soil is low, rarely exceeding 3 percent;

c. Lack of natural nitrogen and the difficulties of applying nitrogen in any farming areas;

d. Soils tend to be sandy in texture and the clay fraction is small;

FIGURE 2



Source: Harrison Church and Others. (After Keay)

e. Low rainfall means that there is little leaching and so salts released by chemical weathering remain in the surface layers forming saline crusts that are toxic to plants.

f. Soils are alkaline in reaction, having a Ph value between 7 and 8. High alkalinity depresses plant growth and makes it difficult to obtain a good tilth.

g. Arid soils accumulate a calcium carbonate layer in profile.

h. Because the soils are skeletal and immature, wind erosion removes the soil cover.

As one moves from the steppe to the savanna, many Econtonic features occur. Although there are marked variations within savanna soil types most of them fall within Kellog's latosol type. The major characteristics of savanna soils are detailed below:

a. They suffer from leaching and usually exhibit phosphorous deficiencies.

b. There is severe laterisation in these ferruginous soils; silica has been removed from the upper horizon and sesquioxides accumulate in the lower layers.

c. The accumulation may take the form of mottled clays, nodules of iron oxide or a hardpan.

d. Structurally they become compacted if heavy machinery is used on them; porosity is reduced, infiltration declines and run-off increases.

e. They are susceptible to soil erosion because of the lack of vegetative cover and because of their sandy nature (Grigg,1970).

This climate of the Sahel is tropical semi-arid. Tropical implies high temperatures throughout the year while the semi-arid describes those areas where rainfall is sufficient to support forms of vegetation but too small for the rain-fed cultivation of crops. The high temperatures produce

a potential evapotranspiration that is considerably greater than the rainfall. Mean annual rainfall in the Sahel varies from 100mm to 700mm.

Even a cursory glance at an atlas will indicate the inter-relationships between geology, climate, soils and vegetation in the Sahel. The impossibility of drawing an exact boundary to delimit the area does not prevent one from isolating the general characteristics of the area. To provide a rule-of-thumb delimitation would seem unnecessary but, if one is needed, it should be based upon rainfall rather than vegetation. Several reasons support this argument, namely that

1. Although rainfall data are of varying quality they are more readily available than botanical data.
2. There is insufficient taxonometric classification to allow for the regionalisation of the Sahel on biogeographical grounds.
3. Most importantly, concentration on rainfall data allows one to study the drought and to assess the relationship between the natural hazard drought and the famine experienced in the Sahel.

If one accepts a regional delimitation based on precipitation, then the suggested breakpoint would be the 700mm isohyet. With Gambia now officially included among the drought stricken countries, this would seem a viable proposition; it would also include areas of dry farming which have been partly eclipsed by the emphasis on the nomadic areas, (West Africa, 29th July, 1974).

The Sahel is lightly populated and contains no large city West of Khartoum. Population concentrations are found along rivers, the Senegal and Niger, where some irrigation is possible. Away from the rivers the economy is one of pastoral migration. Major groups include the Fulani, Tuareg and Arab pastoralists. Settled agriculture other than the two

main rivers is restricted to small areas around oases and seasonal streams, e.g. Kiffa region in Mauretania and the Massif de L'Air.

It should be stressed that while the Sahel experiences such variability of rainfall that cultivation of crops is precarious, the Sudan savanna is the region that suffers most from drought because of the greater concentration of population and agriculture in this region. Thus a definition of the area hit by drought would seem to be more logically expressed in climatic rather than vegetative criteria.

On a global scale, the most serious difficulties caused by climatic variation are the recurrent failures of crops and pasture in the zone immediately South of the Sahara. These droughts have been associated with a longer and more persistent flow of dry anticyclonic air over land from regions in the middle latitudes. In parts of the zone between 10^{o} and 20^{o} lat N, there have been five years of successive drought and rainfall has generally been decreasing since around 1930; five-year average rainfalls have fallen by 30 to 50 percent since the 1950s. Current research on anomalies of the global rainfall distribution since 1960 and especially 1970, together with analysis of the rainfall trends and the configuration of the world's wind circulation suggest that the long-term prospect is towards increasing drought in the Sahel zone of Africa. Any such long-term trend is, however, likely to be overlaid by shorter-term fluctuations - runs of four or five years bringing more rainfall (Lamb, 1974).

The most notable analysis of these climatic variations is that of Winstanley (1973a, 1973b). He has shown that, since 1960, the summer monsoon rainfall of the Sahel zone has been highly negatively correlated with the winter-spring rainfall of the North of the Sahara. During the 1960s, the circumpolar vortex expanded and the meridional circulation in the tropics contracted giving heavy winter-spring rainfall over the Medi-

terranean and the Middle East, and low monsoon rainfall in the Sahel zone. The change since 1960 is interpreted as a continuation of trends first apparent in the 1920s. Winstanley argues that the monsoon rainfall is at a low point on an irregular fluctuation, superimposed on a longer downward trend; the present drought extending from Mauritania to India is a result of the cumulative effects of a decade of below average rainfall, with less and less rain each year.

Winstanley attempts to measure the Southward shift of these monsoonal rains. He emphasises that, in the zonal arrangement of isohyets to the South of the Sahara, the mean distance between the 100 and 300mm isohyets is about 280km, i.e. a gradient of 1mm per 1.4km. From 1960-1970, there was an average decrease of 65mm in the mean seasonal rainfall of the Sahel. It can be estimated that since 1960 there has been a Southward shift of the isohyets of 65 x 1.4m, which is approximately 9km per annum. This situation, coupled with the continuous decrease in rainfall which is not representative of longer-term trends, has led to the Southward shift of the Sahara Desert. The strength of the general circulation of the atmosphere and monsoonal rainfall have been decreasing for almost 50 years. Because of the low, mean annual rainfall and the strong North-South gradient in the Sahel, a Southward shift of the climatic zones through 1^{o} of latitude over 100 years means a decrease in rainfall of 40-50%.

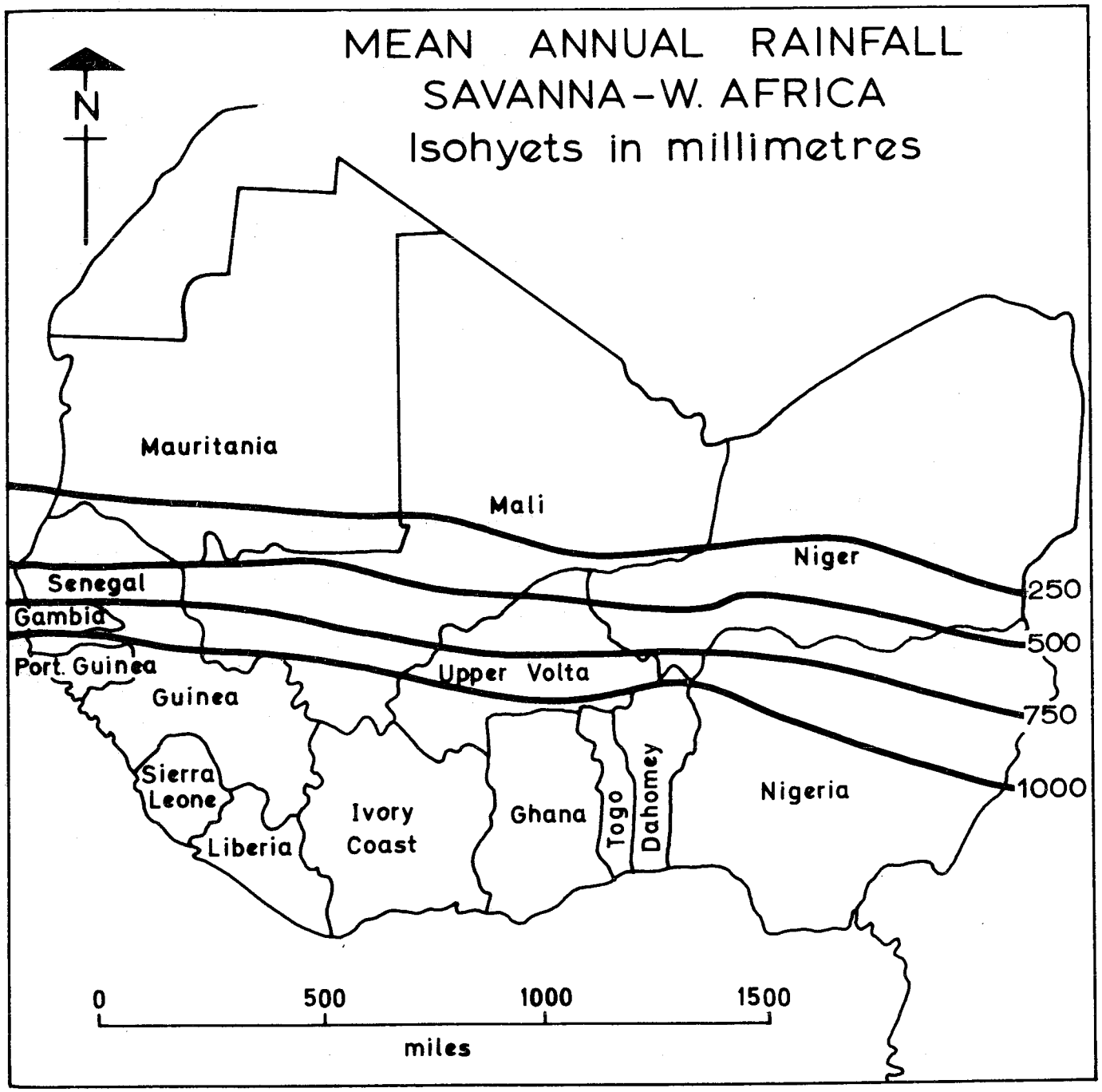
Work done in the Sudan has indicated that the major factors influencing rainfall are the Inter-tropical Convergence Zone (ITCZ), the monsoons, the line squalls and the relief (El-Tom, 1973). The reason for the decline in rainfall amounts and the decline of the rainy season Northwards is the movement of the ITCZ. The ITCZ is situated near the South coast of West Africa from December to February. It moves to 20^{o}N in August, then retreats Southwards. The length of the rainy season and the amount of rainfall received depends on how far a place is situated to the South

of the ITCZ. Thus, Agadez (17°N) normally has one rainy month, Zinder (14°N) has 2-3 rainy months, and Kano (12°N) has four rainy months. A late start of the rains indicates a late arrival of the ITCZ from the South; on the basis of existing evidence, a late appearance of the ITCZ does not result in an early retreat. It is interesting to note that most authors argue that the opportunities fro the artificial modification of the rainfall regime are remote (El-Tom, 1972).

Mean annual rainfall totals in the savanna of West Africa increase from North to South (figure 3). The length of the rainy season has a similar pattern to total rainfall. Months with more than 100mm, the amount needed for crop cultivation, decrease from four months in the North Guinea savanna, to one month in mid-Sahel, (figure 4). Areas with less than 250mm mean annual rainfall do not generally obtain sufficient rainfall in any one month for the cultivation of crops. Reliability of rainfall also increases from North to South. Thus areas in the Southern Sudan zone normally have rainfall within 20% of their mean annual totals while areas in the Sahel often experience a 30% variation around their mean annual totals. In addition to this general trend, there is another feature of rainfall variability; areas in the West, Senegal and Mauritania, and the East, Niger and Chad, have greater variability than the central region, Mali. The explanation of the phenomenon is that the central region is less affected by high pressure masses and, therefore, rainfall is more reliable, (figure 5).

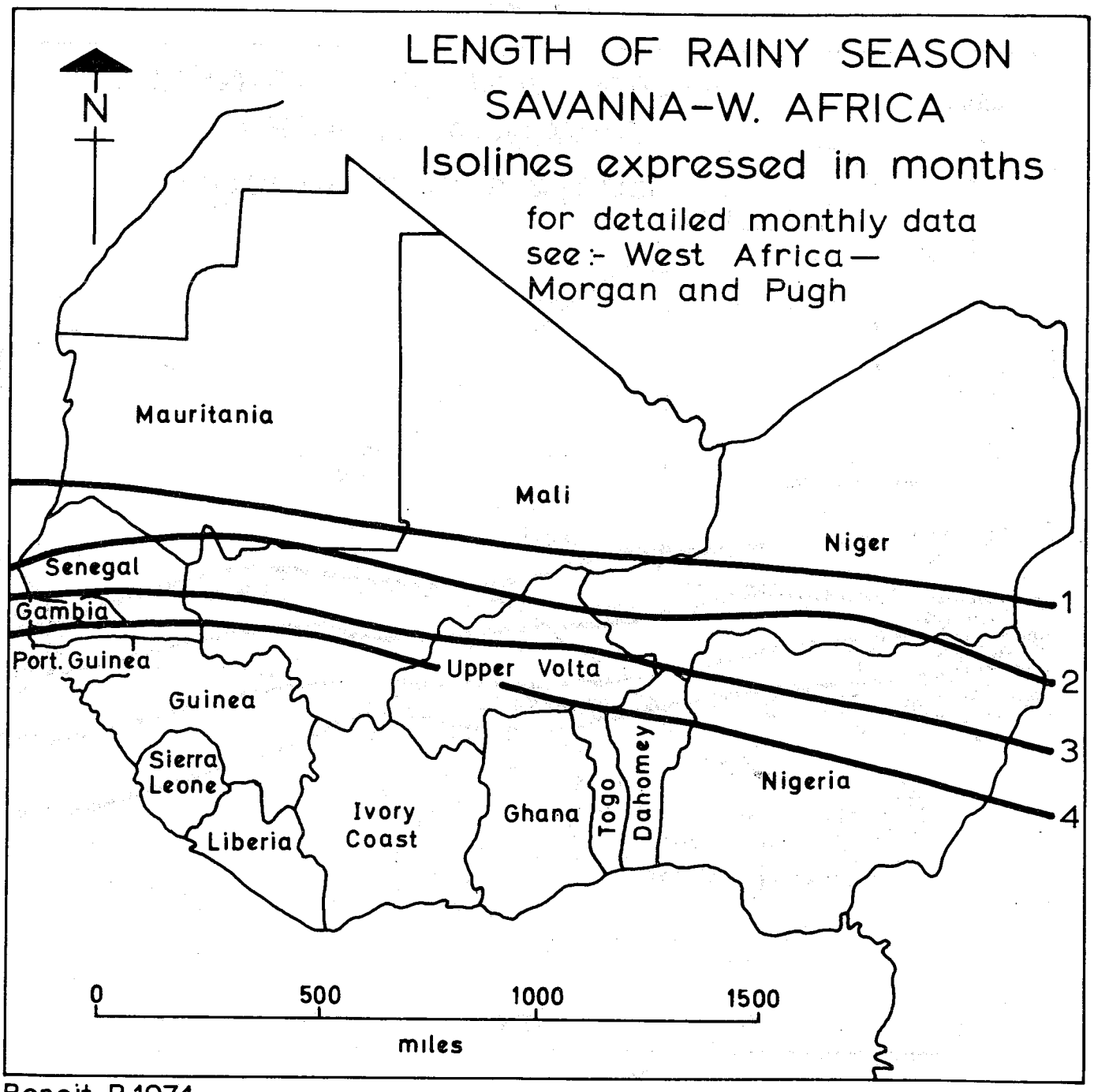
Bradley (1973) examined the implications of the 1973 rains at Samaru, Nigeria. He argued that low early season rainfall would be expected to have a detrimental effect on the annual total. Figure 6 shows a significant correlation between annual rainfall and cumulative totals. From the regression lines and comparison of the predicted value derived from the cumulative total to 30th June, Bradley indicated that the 1973 rainfall

FIGURE 3



After Benoit. P. 1974

FIGURE 4

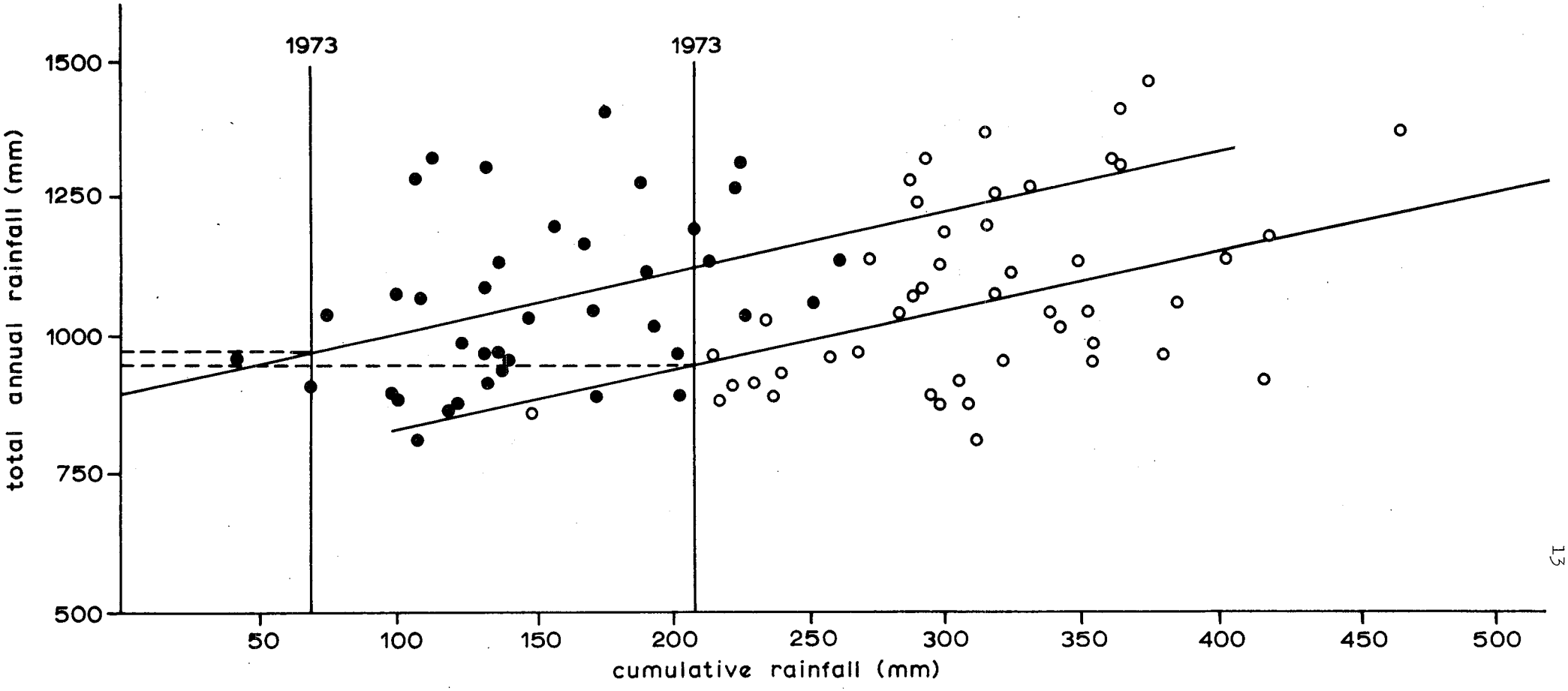


Benoit. P. 1974

FIGURE 5

CUMULATIVE RAINFALL TO MAY 31st.(•) AND JUNE 30th.(○)

(3 observations missing)



source: Bradley. P. 1973

would show a deficit of 75mm. Even if the total rainfall for 1973 had approached or surpassed the mean, the early season deficit would certainly produce a poor harvest because, for most crops, good growth is essential during the first month after germination.

The period favourable for crop growth is when effective precipitation is greater than or equal to evaporation or less than the evaporation by an amount of water available in the soil within the root range of plants, (Bunting, 1961). The favourable period can be determined by comparing the rainfall with the potential evapotranspiration (PE). In the Sahel, PE is more than 2000mm per annum. The Sudan savanna has values between 1500 and 2000mm per annum. The monthly totals vary from 200mm in the hot months (March, April, May) to less than 150mm in August and September. The rainfall regime of the Sahel-Sudan zone is characterised by a rainy season from June through to September. Mean rainfall exceeds PE in the Southern Sahel only in August and in the Sudan savanna during July, August and September.

In the Southern Sahel, crop production is based on dry farming and, therefore, the species are of a fast growing drought resistant variety. Millet, for example, can be harvested two or three months after planting and may yield a crop with less than 200mm of rain. Sorghum requires a slightly longer growing season and a minimum of 350-400mm of rain. Although these crops are able to survive periods of water shortage during early growth with minimal effects, yields and production are influenced by water shortage during heading. Groundnuts require a longer growing season than millet or sorghum, 3-5 months, and yields decline with moisture stress any time during growth. The worst results occur when drought coincides with the floral period, before kernel formation in the middle of the growing period. All crops suffer most when the August rains fail.

At this juncture, it is worth stressing that because of the shortage

of climatic data, no watertight case can be presented to indicate the significance or severity of the drought. Lamb (1974) and Winstanley (1973) argue that increasing dryness is the Sahel's long-term prospect. Others (Benoit, 1974) argue that there is no significant trend in the mean annual rainfall of the Sahel or Sudan savanna. Past dry periods have always been followed by periods enjoying sufficient rainfall and thus, the mean annual total has been maintained. Previous to the current drought, dry years tended to occur randomly; rarely did two or more years follow in succession. Similarly wetter years occur together and it is significant to note that much of the economic development and population expansion in the French Colonies took place during a period of abnormally good rainfall; in 27 of the 39 years, from 1920-1958, rainfall throughout this semi-arid zone was above the long period average.

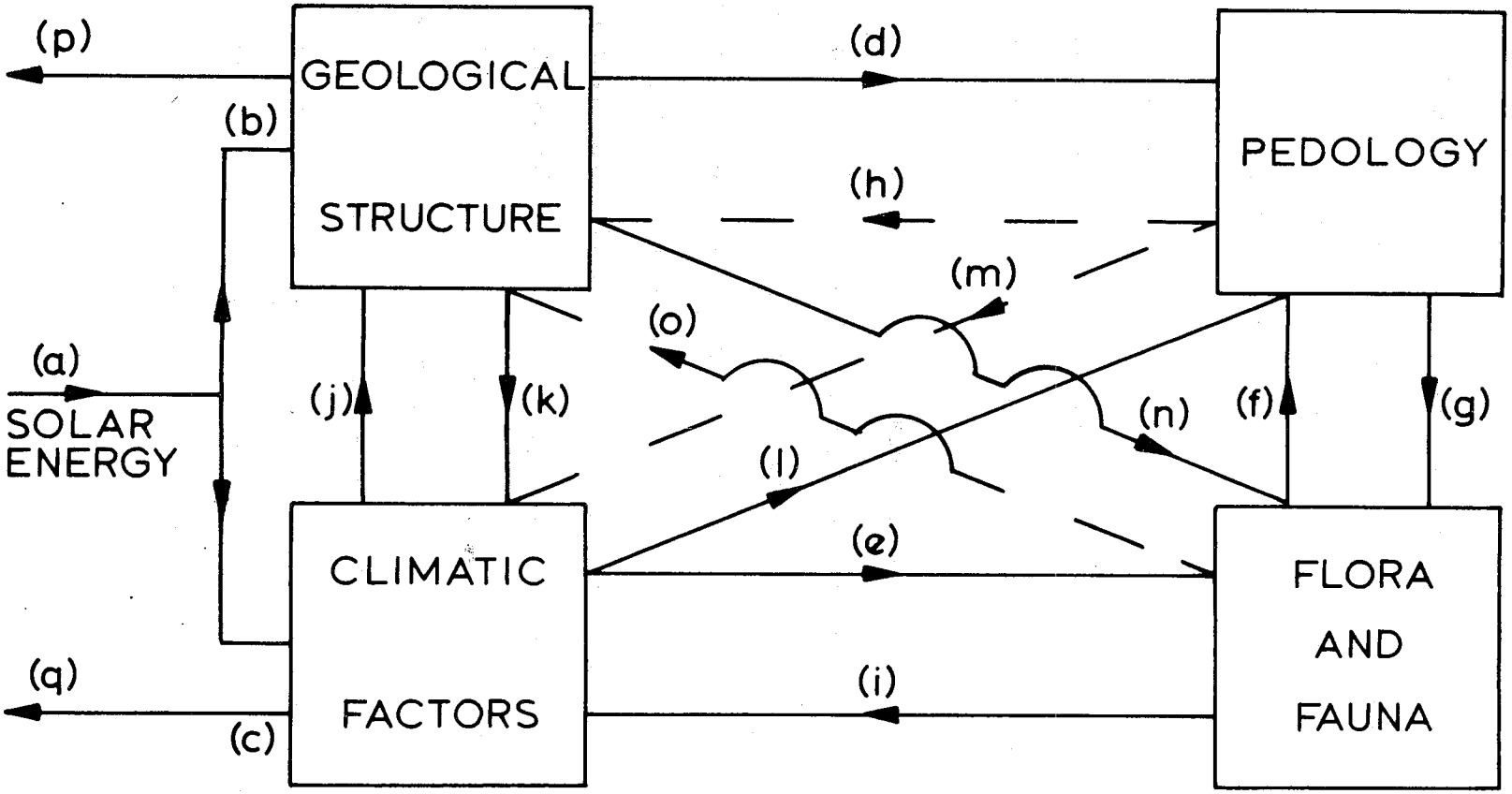
It is possible to argue for 30 year cycles (Benoit, 1974) or cycles for longer periods. The important point to grasp is that, in the Sahel, the human response to low and highly variable rainfall has been nomadic pastoralism and dry farming, a functionally adapted way of life. That the population has been unable to cope with the present shortage of rainfall indicates the severity of the drought and the lack of alternative sources of income.

Benoit (1974b) has recently reconsidered Roche's statement 'Note sur la sécheresse actuelle du Afrique de l'Ouest', and argues that desertification as a long-term Sahel prospect is false and that the periodic cycles of rainfall can be detected. It is becoming more apparent that the little rainfall data that exist for West Africa can be used to show either long or short-term fluctuations.

A simple description of the environment would be that it is an open functional system with associated energy transfer. The consequent equilibrium of the system is expressed in figure 6. The initial input is

FIGURE 6

EQUALIBRIUM IN THE PHYSICAL ENVIRONMENT



one of solar energy 'a', which controls the geological and climatic factors 'b' and 'c'. In turn, these determine the pedology and the flora-fauna complex 'd' and 'e'. The pedology and the flora-fauna complex show a strong relationship 'f' and 'g', but there is a weak relationship between pedology and geology while there is a stronger one, transpiration, between the flora-fauna complex and climate 'h' and 'i' respectively. Strong relationships exist between geology and the flora-fauna complex and between the climatic factors and the pedology, 'l' and 'n', but weak relationships exist between pedology and climate 'm', and the flora-fauna complex and geology, 'o'. Energy flows 'p' and 'q' complete the system. The destruction of the system's equilibrium can occur through two main energy flows, climatic change and human intervention. A major change in the climatic factors, such as the Sahelian Drought, changes other relationships in the system. Rarely is climatic change as destructive as environmental mismanagement which, allowing for the removal of the vegetation cover, encourages soil erosion, the destruction of the soil catena and the consequent reduction of the environmental potential; this is ecological devolution. This process of ecological devolution has two major consequences in terms of the Sahel-Sudan savanna, namely desertification and deafforestation.

1. Desertification

The myth of the advance of the Sahara often described in terminology, which leads the non-specialist to imagine a southerly shift of the frontier between vegetated area and bare sand, should be dispelled. Ecologists would agree that the area of downgrading, or ecological devolution, is the limit between the areas where the grasses are predominantly annuals and those where they are mainly perennials. This zone lies between the 500-700mm isohyet. The perennial grasses which are being destroyed are more

useful to man as food for livestock and stabilisers of soil than the annuals that replace them. Damage to grasslands further North seems limited to areas of permanent water and in Mali is not extensive because of the lack of water except on the Niger flood plain. The major reason for the lack of damage to the more northerly pastures is that when it rains there is a great temporary superabundance of fodder and, providing that a reasonable proportion of the grasses are able to mature and set seed, any amount of subsequent grassing will do little harm. Once an annual grass has set seed, its vegetative parts are of little further importance except to bind and insulate the soil. Since there is normally bare sand between the plants, it is doubtful if the latter function is of great importance. Many of these annual grass areas could support perennials if they were suitably managed. At the moment, these pastures are stable whereas the perennial grasslands of the Sahel-Sudan savanna are more susceptible to fire risk and dry season overgrazing.

2. Deafforestation

Like the myth of the advancing Sahara, deafforestation is another emotive word to mislead planners. What is generally not understood is that the first result of overgrazing is often bush encroachment and that this increase in bush cover leads to a drop in ground water levels. The idea of trees helping to raise the water table still seems widely accepted, although this technique could be successfully applied only in particular circumstances. The suggestion of utilising treelines to stop the spread of desert to create 'Green Barriers', which would humidify the atmosphere and encourage rain, seem remarkably outdated except that aid planners still consider their feasibility. If there is a need for wood or browze, it might be necessary to plant trees but by and large, bush encroachment, the consequent suppression of grass growth and the increased spread of the

insect vectors of cattle diseases is a far more serious problem than deafforestation. In this connection, it seems incongruous that in many countries, it is illegal to lop branches from trees to feed goats; good species of Sahelian trees withstand lopping and can be shaped to give a good browze profile.

If the concepts of desertification and deafforestation are seen to blur rather than clarify the discussion, then a clearer insight into the environmental process will have been gained.

It is self-evident that the form of peasant resource management in dry areas is functionally adapted to the environment. Any functional adaptation requires ongoing change as the range of the experience-response system expands; change implies the necessary political power to enforce further adaptation but it is the absence of executive power that has made the peasant farmers so vulnerable during the current drought. If one assumes that these peasant landuse systems were initially successful and efficient, then one needs to reconsider their recent history to understand why they should be so vulnerable in the current crisis.

The adaptation is best viewed within a game theoretical framework. It is accepted that the limitations of the environmental potential and social organisation allow for an optimum strategy to be followed at a specific time. Strategy, however, is quite distinct from the player and both strategy and the player are distinct from the rules within which strategy is evolved by generations of players. If one reviews the current crisis against this theoretical framework, the following points come to light.

a. In 27 of the 39 years, from 1920 to 1958, rainfall in the semi-arid area of Africa was above the long period average; this change would necessarily encourage the evolvement of a different

environmental strategy by the peasant farmer.

b. No alternative environmental strategy was evolved because of the impress of colonialism. Colonialism had far-reaching effects but these may be summarised in game theoretical terms as follows:

i. The composition of the players changed as death and desease control were introduced without concomitant birth control.

ii. The strategy, initially a functional adaptation was fossilised by colonial legislation which in part emphasised statutory and individual land tenure against traditional patterns. Alternative pastures and virgin land were reduced; the land frontier was closed.

iii. the rules changed as the economy was assimilated into an era of market force manipulation. Consequently, the resource base itself was eroded.

Despite the impact of colonialisation the peasant soldiered on; the composition of players changed, the rules changed but the strategy remained the same. It was not until the environment itself changed that acute disaster occurred. Unable to adopt alternative strategies to counteract the drought, unwilling to forfeit their traditional life and unfavourably regarded by their urban compatriots, the peasants suffered famine, not only as victims of drought but victims of generations of colonialism.

One hardly needs to emphasise the lack and inaccuracy of demographic data in this particular situation. It is sufficient to state that if one accepts a catastrophe as a situation in which more than 100 people die and/or 1000 are injured and/or £1,000,000 worth of damage is sustained, then this disaster is parallel to recent disasters in Bangladesh in terms of magnitude of death, disability and destruction. The present crisis in

Honduras pales to significance besides the situation in Africa.

Six years of drought have brought the sub Sahara area of the Sahel, parts of Ethiopia, Kenya and Tanzania to nothing short of catastrophe. More than 25 million have been affected and initial estimates for West Africa suggest that more than 100,000 people have died (Sheets, 1974; Bowden, 1974). Although these figures have been queried it seems the most realistic estimate, particularly as more countries declare themselves disaster zones. Estimates of cattle losses are also high; it is thought that Mauretania has lost 1.6 million cattle from a total of 2.1 million in the last two years. Cattle losses are placed around 50 per cent in Senegal, 50-80 per cent in Mali, 50-100 per cent in Upper Volta, 80 per cent in Niger and 90 per cent in Chad; FAO estimate the 1973 cattle loss at 3.5 billion head valued at $400 million: this suggests a loss of 25 per cent in the Sahel herds (Oxfam, 1974). Crop losses have varied between 50-70 per cent (± 20 per cent).

General statistics tend to be misleading so other data sources are necessary. The best indications of the populations status can be gathered from the nutritional surveys completed during the last two years. Several pessimistic conclusions emerge from these surveys. First, that although the anthrometric and clinical evidence presented indicates that the population is on a low nutritional plane the general situation is not unusual for rural Africans in similar environments. Secondly, the poor harvests of 1972 and 1973 and the probable poor one of 1974 have produced a serious economic situation in which migratory pastoralists have been more severely affected than sedentary cultivators; long-term drought prospects would prove disastrous. Thirdly, it is not possible to state whether or not the people who have received free distributions of cereals have actually depended upon them. Fourthly, it is accepted that death seldom results from malnutrition *per se*, but because a malnourished population is sus-

ceptible to endemic and epidemic diseases. In this context it is worth noting a major increase in the occurrence of measles in West Africa. Fifthly, and most importantly, the continued erosion of food stores and stock, compiled with the prospect of long-term drought, indicates that a more permanent solution than relief aid must be established. With current estimates of malnutrition suggesting 10% of the sedentary and 52% of the nomadic population is undernourished, there is an immediate necessity for long-term planning. Such a stress situation encourages wholesale migration and to some extent increases the difficulties of relief distribution and rehabilitation. Traditionally two migratory patterns were discernible:

1. A rural-urban movement for wage labour.
2. A seasonal movement of semi-nomadic population utilising traditional routes in search of water and pasturage for their animals.

None of the traditional alternatives, which are spatially finite in a primary community experiencing stress, are available. It is useless to increase the labour input, useless to search for fertile unoccupied land, difficult to establish external linkages to provide secondary sources of income, pointless to emigrate to equally barren areas and futile to implement population control programmes which do not have immediate benefit. As a result of the stress situation and the absence of alternative strategies major migratory variations have occurred, namely,

1. Persons deviating from traditional itineraries in that nomads are arriving at urban areas and other migrants have been seen in areas further south of their normal patterns causing political friction.
2. Additional numbers of people are migrating. Entire families have been seen on routes usually followed only by male herders and their animals.

3. Persons are migrating for different reasons. No longer are they searching for pasturage but rather for government distributed food.

4. The normal seasonal migration is not being balanced by the usual predictable return; many nomads will remain with the urban area.

Such a situation indicates that the drought has turned to famine even if, at the moment, it is impossible to quantify the exact extent of social and economic dislocation.

Reaction to the drought and growing famine was extremely slow. Only in the last 18 months has the plight of the people in the Sahara become news-worthy, so news-worthy that three colour magazines have devoted space to the topic. Many articles have emphasised that modern techniques have been insufficiently mobilised to give warning of the approaching famine. The FAO/WFP Early Warning System gave the first intimation of critical crop failure and exceptionally poor harvests only in September 1972; it was only at the end of February 1973, after the ECA Conference of Ministers that an FAO/WFP Inter-Departmental Working Group on the Problems of the Sahelian Zone was established. If they were tardy in their appreciation and reporting of the drought, the response of the International Organisations was equally slow despite possessing the necessary structure to ameliorate the effects of drought.

The inadequacy of multilateral and bilateral aid to the drought zone has been well illustrated. It would be more beneficial in terms of this Conference to consider British Aid to the Sahel. A very important distinction exists between famine relief and development. British famine relief has been meagre but given the political decisions that surround such resource allocation this is not unusual. Since the Sahel is Francophone it is not surprising that most British relief aid is channelled

through the FAO Sahel Trust Fund, EEC Food Aid Programme and the WFP Emergency Food Aid Programme; contributions to these bodies were £800,000, £4 million and £1.2 million respectively. Contributions to the last two funds are not necessarily directed only to the Sahel. Bilateral agreements seem to have been focused on Mali, Mauretania, Niger and Chad. It seems, however, further relief aid will be needed in the drought zone. One only hopes that the planning organisation and distribution of famine relief are somewhat more efficient than recent experience would indicate.

Such a situation of apparent aid dependence raises obvious questions of rehabilitation and future development. With an apparent lack of mineral resources the drought zone will have to rely on agricultural development, particularly the development of ranching. By definition, development is not growth or modernisation; it must be orientated to minimum displacement of the indigenous population respecting societal norms; technology must be within a framework that the peasantry comprehends and returns must be seen to be accruing to that population. Only when such considerations are forecast will a lasting solution be found to the problem of drought.

POSTSCRIPT

Since this paper was written a Seminar held jointly by SOAS and the International African Institute at School of Oriental and African Studies in London to consider drought, came forward with the following resume of the situation.

The first session involved a discussion on whether the evidence shows the current drought as a short or long-term phenomenon. All three papers took issue with the theories of Winstanley and Lamb that the drought was part of a long cycle of shifting climatic belts throughout the world. The speakers found that, although one must admit such a possibility, the available records from West Africa do not stretch far enough back or show a clear enough trend to hypothesize any type of cycle. Six years of drought could happen even by chance. The pattern of distribution of rainfall throughout the year is in any case far more important than the annual total, and it is now possible to make some limited predictions within a particular year. There are still gaps in the speedy publication of climatic data, for some countries, and it was suggested that a region-wide monitoring service for West Africa would be of great value.

The next question considered was how far the apparent effects of drought should be attributed to natural or social causes. Papers dealt with specific examples of the distribution of relief and plans of development as well as discussion of the natural and human causes of the degradation of the ecosystem and institutional factors affecting the measures taken to deal with the problem. In discussion, various speakers drew attention to the problems that can be caused by the alteration of one factor in an ecosystem, e.g. by digging wells, or eradicating animal diseases, and they stressed the need for integrated development projects.

Relief agencies are, however, faced on the one hand by ecologists all holding different theories and on the other by the problem of having to act through government channels in recipient countries. No conclusion was drawn on the relative 'causation' of the famine and hardship stemming from the drought, although it was agreed that the recent concern with shortfall of rain has sometimes obscured the importance of other natural and social factors. Although the resume states that little consensus existed about the causes of the drought, it was obvious that few political factors entered into the discussion of the drought.

Thirdly, the question of development was discussed, in particular whether in certain areas the choice had to be faced of either investment for development or strategic withdrawal. General discussion concerned the problems of introducing more scientific ranching in the Sahel, of the sedentarisation of pastoral nomads, of the symbiosis of pastoralist and agriculturalist, and the lessons, e.g. in water storage, that might be learnt from semi-arid and arid regions elsewhere, notably in the Middle East. Withdrawal was not generally regarded as practicable for those countries largely consisting of Sahel regions. The need was stressed for a long-term strategy both by governments, acting if possible in unison, and by the various outside agencies.

Finally the question of exaggeration or under-estimation in reports about the drought was discussed. Although early reports may have exaggerated the problem, the question was not seen as very important - of much greater importance was the organisation of multi-agency relief in such situations. In any case, without sufficient baseline data, e.g. on 'normal' nutrition in the area, it is hard to say what is an 'exaggeration' of hunger or need. The meeting was reminded, finally, that drought - in the sense of a reduction in rainfall drastically affecting normal patterns of agriculture - affects not only the Sahel, under discussion most of the

day, but large, more densely populated areas of Africa. Drought is therefore a recurrent theme which has to be taken into account in the consideration of development almost anywhere in Africa.

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