12 - The Environment in West African History

West Africa has been in contact with the outside world longer than any other part of Africa south of the Sahara and west of the boundary between Nigeria and Cameroon, a boundary that is one of Africa's major physical and human divides. Africa and West-Africa in particular involuntarily supplied a significant amount of resources in slaves, minerals, as well as farm and forest produce. Again, in Africa, environmental issues have been a perennial concern for historical and physical geographers, anthropologists, archaeologists and medical scientists. Historians have discussed ways the physical environment and conditions have shaped the history and development of the people of Africa

In this chapter, we shall look at the Historical antecedent of the physical environment, trace the origin of some major crops grown in the region, then lastly, soil and land management.

THE HISTORICAL ANTECEDENT OF THE PHYSICAL ENVIRONMENT IN WEST AFRICA

The land of West Africa consists of contrasting kinds of physical environment. The forest environment differs from the savanna environment, a mountainous area from a flat lowland area, riverine area from one away from a river, an area with predominantly sandy soils from one with predominantly loamy soils. Each kind of physical environment presents a peculiar set of problems or challenges which must be solved if people are to survive on the land. A farmer, for example, should take the physical characteristics of the land into serious consideration and devise suitable methods to ensure that he gets good results. He would probably perish or live a very simple and miserable life if he were unable to find ways of solving the problems of the physical environment.

GEOLOGY

West Africa, like most parts of Africa, is largely composed of Pre-Cambrian rocks, which have been folded and are often aligned from north- east to south-west, as is reflected in much of the relief. They are exposed over about one-third of west Africa or over two-thirds of the area south of 12^{o} N and are part of the vast continental platform of Africa which in West Africa has an average elevation of about 400m (1,300ft). The oldest rocks may be about 4000 million years old. Some are metamorphosed sedimentary rocks, others are ancient volcanic and intrusive.

Pre-Cambrian rocks have been variously subdivided, but their ages are uncertain as radioactive dating methods are not reliable with metamorphic rock. This oldest or lower Pre-Cambrian, comprises the Archaean or Dahomeyan and probably the Birmian system.

The Archaean consists of highly metamorphosed rocks. Prevalent acidic types are mica schists, gneisses and quartzites, most are the product of the granitisation and metamorphism of original sediments. Basic rocks are garnrtiferous geneisse and amphiboite. Gneisses of similar composition are found in the Kasila series of Sierra Leone and others are known in Mauritania and Nigeria.

The Birimian system occurs in southern Ghana and the Ivory Coast. The lower Birimian has folded and steeply dipping alternating grey-wacks and argillaceous beds, as well as some tuffs and lavas. The upper Birimian (Greenstones) consist mainly of volcanic rocks. The Kambui and Marampa schists of Sierra Leone may also be Birimian.

RELIEF

West Africa lies generally about 200m and 500m (600 to 600ft) and consists mainly of the worn monotonous and fairly level surfaces of the platform of Pre-Cambrian rocks. Higher relief may occur where trends in the ancient rocks can still be traced from the north-south hills of the Sierra Leone interior. Residual granite domes are common and the 'Younger Granites' are responsible for some bold relief, an example is the Jos Plateau in Nigeria. Certain series of the Pre-Cambrian give higher relief. An example is the several Birimian, Tarkwaian and Akwapim-Togo –Atacora ridges.

DRAINAGE

The drainage characteristics of West Africa may be summarized as follows:

1. Rapid run off on crystalline rocks, especially on the south or south-western Pre-Cambrian shield, where the rainfall is particularly heavy.
2. Behind the south western and Guinea coasts, rivers are cutting down to new base levels, probably because of Miocene and later uplifts and inward tilting. Thus the Volta River is gaining at the expense of others. The Guinea Coast Rivers are frequently interrupted by rapids and deposit relatively little alluvium, except close to the shoreline.
3. Greater maturity and indeterminate courses of the rivers of the sandy central lowland zone compared with the immaturity and vigor of the Guinea Coast Rivers. The Senegal, middle Niger and the upper reach of the Volta rivers have devious courses from the central zone.
4. Great seasonal variations in river flow a seasonal rain causes extensive flooding eg. along the Central Niger.

AGRICULTURE

Agricultural pursuits are the basis of almost all West African life. As in any part of the world, important determinants of crop distribution are climate and soils.

In the forest, crops have to be raised from small plots by periodic cutting and burning. Soil becomes exhausted and, as there is very little animal manure and artificial fertilisers are expensive and difficult to use satisfactorily in the tropics, there is no simple alternative to a long fallow period. Thus the forest farmer generally expends much energy per acre. Yet he is more than compensated by growth of permanent tree crops such as the cocoa, the oil palm, kola and coffee.

By contrast, savanna farms are generally large and less varied in their crops, as the shorter growing periods restrict the farmer to one main crop unreliability of rainfall and lack of bumper harvest are challenges that may encourage more careful cropping. Population presence may also induce better farming, for example, the Kabrai of Togo, the Hausa around Kano and others.

Inter cropping or double cropping is very common in West Africa. Although this method may seem inefficient and looks a muddle, it saves labour and land and limits soil erosion by keeping the ground covered. Moreover, some plants may benefit from inter-cropping. On the other hand mixed cropping may necessitate the use of crop varieties tolerant of this system.

THE DISCOVERY OF COCOA

The cocoa tree (Theobroma cacao) originated in South America and its bean consumed as a drink by Mayans and Aztecs. Historians believe the Olmecs (first major civilization in Guatemala and Mexico) first discovered that the cocoa fruit was edible by observing rats eating it with gluttonous vigor. They soon realized the tree produced a fruit with a thousand flavors and nearly as many uses.

Theobroma cacao. Wikipedia. CC BY 3.0.

The Olmces (1500-400BC) were almost certainty the first humans to consume chocolate, originally in the form of a drink. They crushed the cocoa beans, mixed them with water and added spices, chillies and herbs (Coe's Theory). They began cultivating cocoa in equatorial Mexico. Over time, the Mayans (6000 BC) and Aztecs (400 AD) developed successfully methods for cultivating cocoa as well.

For these civilizations, cocoa was a symbol of abundance. It was used in religious ritual dedicated to Quetzalcoatl, the Aztec god responsible for bringing the cocoa tree to man to Chak ek Chuah, the Mayan patron saint of the cocoa and as an offering at the funerals of noblemen. Cocoa beans were also used as a form of currency in pre-Columbian Mexico.

Cocoa production advanced as people migrated throughout Meso-America but consumption of the drink remained a privilege for the upper classes and for soldiers during battle. By this time, the re-invigorating and fortifying virtues of cocoa were becoming widely recognized and embraced.

COMMERCIALIZATION OF COCOA (16TH CENTURY)

In 1502, Columbus got his first glimpse of cocoa beans on a native canoe during a stop-over in Nicaragua, but he did not appreciate its awesome potential value. The true importance of this 'brown gold' was not recognized until Hernando Cortez drank it with the Aztec emperor Montezuma, and brought it back to the Spanish court in 1528 along with the equipment necessary for brewing the drink. Even then, it is unlikely anyone envisaged it ultimate importance as a world commodity.

Following a victorious war against the Aztec empire and the downfall of the Aztec civilization, Cortez intensified cultivation efforts in New Spain, with the intention of developing a lucrative trade with Europe.

The Spanish court soon fell under the spell of this exotic elixir and adapted it to their taste, adding cane sugar, vanilla, cinnamon and pepper. Initially Spain reserved cocoa for its exclusive use, carefully guarding its existence from the rest of the world. They were so successful keeping cocoa secret that when a group of English pirates captured a Spanish gallons, not recognizing the value of the weighty cargo of beans, they burned them!

In 1585, the first cargo of cocoa beans arrived on the Iberian Peninsula from New Spain (the Spanish name for Mexico. This launched the trade in cocoa, and resulted in the establishment of the first chocolate shops, thus ushering in a new era of rapidly growing demand for this mysterious nectar from the new world.

THE EARLY INTRODUCTION OF COCOA TO WEST AFRICA

The date of the first introduction of the Cacao tree to the British West African possessions is somewhat uncertain. The credit of having first brought the cacao tree from the New World to the African tropics undoubtedly goes to the Portuguese. They are reputed to have planted cacao on the island of Sao Tome (off the coast of Gabon) as far back as 1822. It was not until about 1870, however, that cultivation was undertaken seriously there. By 1895, the export of cocoa beans from this island had reached a million kilograms, which was a considerable quantity for those days.

ORIGIN OF COCOA IN GHANA

With regard to the Gold Coast, which has been for many years the leading cocoa producer of West Africa, it is stated that in 1868 the Basel Mission at Akropong (in Akwapim, Eastern Province) had a few cacao trees growing in their grounds and that these were flourishing. It is also stated that in 1879 a native of Mampong (also in Akwapim) brought back pods from Fernando Po (an island off the Cameroons) where he had been working, and raised a few trees which he planted on his farm near that village. These trees are believed to have been the parent trees of the Gold Coast industry. Cultivation on the Gold Coast was greatly encouraged by Sir William Griffith, who was Governor from 1880 to 1895, and who established the botanic garden and experiment.

ORIGIN OF COCOA IN NIGERIA

In Nigeria, the position is very similar to that of the Gold Coast. For cocoa is alleged to have been first introduced there by a native chief called "Squiss Banego" in 1874—also from Fernando Po. He established a cocoa farm in the Bonny district and cultivation spread. By

1887-9 a few plantations had been established by European companies, those of the Royal Niger Company at Abutshi and Onitsha being taken over by the Government of South Nigeria in 1900.

It is thus apparent that the cacao of both the Gold Coast and Nigeria was derived from a common source—Fernando Po. From which part of the American tropics the Portuguese obtained their seed or plants in the early part of last century there appears to be no record, but it is probable that they would have come from Pará in the Amazon region, or from other parts of Brazil.

ORIGIN OF COCOA IN SIERRA LEONE

In Sierra Leone the cacao in cultivation is conceded to be of a different type from that in general cultivation in the Gold Coast and Nigeria. This raises the question of the origin of Sierra Leone cacao. In this connection it may be of interest to note that among old records at Kew is one of young cacao plants being sent to Glasgow Botanic Garden for shipment to West Africa on the 30th August, 1864. Unfortunately, there are no details as to the ultimate destination of the plants and how they fared. However, it is probable that at this early period they would have been consigned to Freetown and not to any other part of West Africa. As the voyage is a comparatively short one it is quite probable the plants survived and ultimately became established in Sierra Leone. At about this time, economically productive plants of various kinds, including cacao, were constantly sent from Kew to such far off places as the botanic gardens at Brisbane and at Durban and usually survived the long voyage. There was free intercourse and exchange of plants between Kew and the West Indies at this period and the probability is that the cacao plants dispatched from Kew in 1864 were raised from West Indian seed and were not of Brazilian origin as is believed to be the case with the early introductions to the Gold Coast and Nigeria.

There is thus the interesting probability that the present day cocoa of West Africa (apart from recent introductions at experiment stations) is of dual origin, that of the Gold Coast and Nigeria having originated from Brazil and that of Sierra Leone from the West Indies.

DISCOVERY OF KOLA NUT IN WEST AFRICA

Kola nut is the seed kernel of a large African tree grown commercially around the world, particularly in Nigeria, Sri Lanka, Indonesia, Brazil and other parts of South America. It is extremely popular amongst the inhabitants as a caffeine-containing stimulant. The nuts are eaten whole or powdered and mixed with liquid for a drink.

The kola nut is primarily derived from three species from the cocoa tree family, Cola acuminta, Cola nitida and Cola vera, which originate in tropical West Africa but can also be found in pockets of Brazil and the West Indies, where they were taken by captives on the trans-Atlantic slave trade. The trees typically reach a height of 25 meters or 60 feet, and its waxy oval leaves frame cheerful star-shaped flowers that are white or yellow with purple

accents. Its fruit is pod-shaped, each of which is nestled about a dozen roundish shaped seeds or kola nuts. The kola nuts may be red, white or pinkish of hue. The nut's aroma is sweet and rose-like; and the first taste is bitter, but sweetens upon chewing. The nut can be boiled to extract the cola.

Cola acuminata. Franz Eugen Köhler, Köhler's Medizinal-Pflanzen. Wikipedia. Public domain.

The Many Roles of the Kola Nut

Its versatility as a symbol, medicine, food and flavoring has been long been utilized around the world since ancient times and continues to be so applied. Science has isolated certain compounds within it, which can be credited with its medicinal benefits.

Symbolic Uses

As a symbol it is used in West Africa by the Igbos of Nigeria, Senegambia, Ghana among other countries to grace social rituals of hospitality as welcome offerings to guests; as sacred offering in religious rites and prayers; in ancestor veneration; and in important life events such as weddings, naming ceremonies, funerals and memorials. As a mark of respect the kola nut is broken with knife. Prayer follows the presentation of kola nut immediately, which in traditional pattern is with libations. In the prayer our forefathers are beckoned to come and participate in the eating of the kola nut and to guide and protect in the mission that brings the people together. After the prayer, the kola nut is broken, shared, everybody eats and the ceremony begins.

Medicinal Uses

The kola nut is high in caffeine as well as a number of other phyto-chemical compounds including betaine (a natural red pigment), kola red, phenolics, tannins, theobromine and theophylline. Its bitter astringent flavor is used as digestive aid prior to meals to stimulate gastric juice and bile production; while its caffeine and theobromine content make it a potent neuro-stimulant that is used to combat fatigue. The nut and its extracts have been also successfully used in treating respiratory conditions such as asthma and whooping cough as its caffeine, theobromine and theophylline content act as vasodilators that dilate the blood vessels, allowing for greater circulation of oxygen. Other medicinal uses include the treatment of toothache, diarrhea, exhaustion, headaches, hunger (the caffeine content means it is an effective appetite suppressant), malaria, nausea, poison antidote, sedative, and as a stimulant and tonic.

As Food and Flavoring For Drinks

You will find often West African manual workers, laborers and farm workers chewing kola as they go about their daily work as a pep-me-up in between meals, although the practice is said to be dwindling amongst the younger generation. Nonetheless, the kola nut is still used as a type of aperitif prior to meals to enhance the taste of the food to follow, as its astringency cleanses the palate and stimulates saliva production. Nutritionally, it is a source of some B-vitamins (thiamine, riboflavin, niacin), as well as proteins, starch and sugar. Muslims in Africa often substitute it for alcohol as their religion forbids them to drink and, although it contains 1-3.5% caffeine, it is not addictive. It is the distinctive source of flavor for colas, and certain soft drinks and tonics.

Coca Cola Drink

In May of 1886, Dr. John Styth Pemberton, a pharmacist from Georgia, USA took extracts of the kolanut and coca, mixed them with sugar, carbonated water and caramel coloring to create the first Coca-Cola recipe. Since then it has been used as flavoring in many other soft drinks - although Coca-Cola purportedly does not used kola nut anymore, but uses instead synthetic derivatives that mimic its flavors.

Negative Effects Of Kola Nut

Regular daily chewing of the kola nut can stain the teeth giving a telling rusty color. According to medical science, kola nut does have a high level of nicotine, which can affect body chemistry negatively. It can lead to insomnia, high blood pressure, high heartbeat, high-level toxicity, over stimulations and locomotive effects. However, despite some of these negative medical reports, the kolanut is a cherished commodity that has blossomed into a huge economic prospect with kolanut exportation to China, North America and India, where it is largely required for the production of cola drinks and pharmaceutical products.

SOIL AND LAND MANAGEMENT

The African cultivator in particular and the tropical cultivator in general have frequently been portrayed as wasteful, even destructive, exploiters of biological resources, especially in

relation to tropical forests. This view, if not completely unjustified, is certainly a gross oversimplification of the actual situation. Indigenous systems based on the cultivation of small areas for short periods, and the subsequent development of a natural fallow, are conservative of biological resources, for the following major reasons:

1. Only small patches are cultivated. This is probably a consequence of the labour involved in clearing forest, but has the effect of introducing only minimal disturbance of the plant-soil system, of reducing the effect of increased run-off by constricting the distance over which movement of material is possible, and of limiting disturbance microclimatic effects.
2. Cultivation lasts only for a short period, which may be two or three years, or a little longer, after which the plot is allowed to revert to natural fallow. The reason for this reversion has commonly been supposed to be ''loss of fertility' but there is considerable doubt that this is so, at least, in itself. Nutrient supply by the soil does not, in many areas at least, decrease as rapidly in successive years as had once been assumed. The measurable amounts of nutrients in the soil, though low by standard in higher latitudes. (if the more fertile areas are used for the comparison), may not truly indicate the availability if those nutrients to plants. The activity of the soil water regime characteristic of forest areas for much of the year, and for the wet season in much of the rest of tropical West Africa, probably ensures maximum solution and dissociation of nutrient ions during the growing season of the crop plant. It is likely that weed problem play a significant role in the decision to abandon a cultivation plot.
3. Many large trees are not cleared, the stools of smaller trees are left in the ground, and the roots are rarely disturbed significantly, particularly in their lower extensions. This means that considerable quantities of organic matter continue to be supplied to the soil while cultivation proceeds, and that as soon as the regeneration of stools and roots ceases to be prevented by the abscission of the aerial shoots in the process of weeding, vigorous growth of these plants takes place. Furthermore, under the woody fallow, restoration of the nutrient and organic matter equilibria in the soil is rapidly achieved. Related to this is the fact the seven or eight years is usually a sufficient length of time for the woody fallow to accumulate nutrients in amounts adequate for renewed cultivation.
4. In the process of cultivation, the indigenous cultivator leaves a considerable number of adventitious plants growing with his crops. These are rarely weeds, which are by definition useless to the cultivator, but self-sown plants which have a technological, medicinal or food use to the indigenous community. They have the effect of providing a cover of ground which conserves moisture, intercepts heavy rainfall, and supplies some organic matter to the soil.
5. Finally, a significant proportion of forest clearing for food crop cultivation is undertaken with the intention of establishing more permanent managed ecosystems, which include cocoa, oil palm, rubber and other tree crops. These, despite their much greater simplicity compared to developed forest, are analogous to it in respect of a number of basic ecological relationships, and represent an essentially conservative form of land use in the tropical forests.

SOIL EROSION AND WATER CONTROL

Soil erosion is not a general problem in West Africa under indigenous husbandry systems. It is, however, locally a chronic problem, and in many areas a potential hazard under changing cultivation practices. Soil erosion is intimately associated with problems of water control and desertification, and it is thus convenient to consider both together.

Arid Land - Cape Verde, Boa Vista (2013). Photograph by Espen Faugstad. Flickr. CC BY 2.0. https://flic.kr/p/dMfcwG

Over much of tropical Africa the annual water supply from precipitation is less than the amount of water most crop plants would transpire if adequately supplied with moisture. Furthermore, over much of this area the rainfall is unreliable in amount and occurrence, both seasonally and annually. Also it is commonly very intense. Thus conservation measures must involve efficient use of the available moisture, and the prevention of the adverse effect of intense rainfall, such as flash floods. A special section has been created in this chapter to discuss the drought at the Sahel region.

Maintaining a plant cover and mulching, separately or together, constitute one approach to the problem, but the preservation of useless plants simply as a conservation measure involves the waste of moisture which might otherwise go the crop plant, and is feasible only in areas where the water supply is more or less adequate to the being grown. Mulching with dead plant matter is also not usually practicable, since there are other more pressing uses for such materials as straw, plant stems and leaves, which might be used for conservation of this type. Artificial mulches, such as bitumen-in-water, though practicable, are not usually economically or technically possible in the present socio-economic situation in areas where such measures are most needed.

Contour and tie-ridging effectively achieve conservation of water supplies, and a diminution of runoff velocities. The combination of the two has proved their worth. These measures offer simple and satisfactory ways of controlling water use and preventing soil erosion, but soil differences still need to be taken into account. The importance of such measures cannot be overemphasized, and always involve major schemes of rehabilitation, embracing

engineering works, afforestation, considerable modifications of traditional agricultural practices, even of settlement patterns and land apportionment. These imply considerable expense of money and of expertise which could otherwise be used for agricultural improvement, rather than for arresting the effects of past malpractices. Rainfall variability, and prolonged drought have been major environmental issues disturbing the African continent. On the more western part, while the Sahel region has had a long reputation of extreme drought conditions, most West-African countries have historically suffered from environmental challenges. For the past thirty years, inconsistencies in rainfall and high levels of variability have negatively affected agriculture. Rainfall provides the moist nature of soil and aids in its aeration encouraging massive agriculture production. Concerning rice production, it has had the tendency of causing fluctuations in production in countries like Sierra Leone and Gambia. The major climatic condition that has negatively impacted the agricultural activities of the West African regions is drought. This environmental phenomenon has persisted since the 1960s with the early 1980s and 70s witnessing the worst conditions of it. This drought had systematically altered the kind of food crops cultivated in the regions whiles drastically reducing the production of other crops. Examples include sorghum, millet and rice.In Gambia, farmers had claimed that, the droughts had altered the rains negatively. Rainfall in this country and other Sahelian states has being the main source of irrigational water for their crops. Considerably, Agricultural produce had increased in the 1950s and 60s due to the favourable rains in this period, however the late 1960s and early 70s saw the decline of the rains. In the southern part of the country, farmers claimed rains in the month June of the 70s were low comparing it to that of the 1950s. The rains in the latter had only last for a month. The major crop which has been affected by these droughts is rice. Rice has been the major staple of countries like Sierra Leone, Gambia and most Sahelian States. In Gambia about 20-30% of lands are converted to upland rice cultivation. Primarily, its production has been dominated by women serving as major source of income. Since the inception of this environmental phenomenon, rice production has declined approximately half of what use to be produced. This has led to most indigenes relying on exported ones. The major setback here is the reduced rains which has also in turn reduced run-off to the main lands of rice plantations. Generally, rivers have also dried due to this same issue.

Other major staples which have been affected by the drought are millet, sorghum and groundnuts. The cultivation patterns of these crops have increasingly been determined by natural rains. With the advent of the drought, Men have opted for Lands which are rich and moisture which can sustain the cultivation of the crops. This action has led to increasing degrading activities in regions like Burkina Faso, Mali and Gambia. The desire to farm in areas closer to water bodies has also led to water pollution. Statistically, poor and erratic rainfall in many years
since 1968 has brought about reduced yields of these crops in the countries and has reduced the potential germination of seeds. Particularly the seeds of millet and sorghum have suffered a great deal from this instance.

Ghana just like many other tropical countries is very much vulnerable to climate change and variability. An estimated 35 percent of the total land mass is desert and since the 1980s the has been increasing desertification of the northern part of the country. Desertification in Ghana is currently estimated to be proceeding at a rate of 20,000 hectares per annum

thereby compromising water resource. n northern Ghana, these farmers are usually involved in the cultivation of staple grains including maize, rice, millet, sorghum, soybean, cowpea and groundnut, and also engage in the rearing of small ruminants such as sheep and goat**.**

CONCLUSION

The soils of Africa vary widely in their characteristics and behavior in relation to plant growth, and in their response to various agricultural practices. Nevertheless, discernible spatial pattern may be clearly seen on different scales, and thus afford the basis upon which subsequent rational development of the resources may be built. Increasing production from already productive areas and developing as yet unused areas of land is possible, given adequate local knowledge of soil character, and its satisfactory representation on an understandable map, as well as the technical knowledge which is available as a tool for the development of agriculture from the essentially conservative indigenous systems to more ambitious uses. This involves, as Sir Joseph Hutchinson has pointed out 'the domestication of the soil as [man] has domesticated plants and animals'. This is already in progress, and much current soils in the tropics have been developed in Western Europe. Concerning this development, an understanding of the basic characteristics and distribution of the soil would make a major contribution.

DROUGHT IN THE SAHEL

Africa has been affected by series of challenges which ranges from high rate of poverty to conflicts and war among others. Environmental hazards have been one of the challenges confronting the African continent. Droughts continue to feature greatly in these environmental hazards. It is defined as a long period of little or no rain. Though all regions have enjoyed a considerable amount of drought, the Sahel region continues to top the chart so far as this environmental hazard is concern. The Sahel is a strip of Land that stretches across 12 countries including Chad, Mauritania, Niger, Mali, Senegal, Cameroon, Gambia, Somalia and Ethiopia. It is geographically situated at the South of the Sahara Desert. The region witnessed its extreme drought in periods prior to 1820 and 1840. This had remerged again in the 1980s with effects greater as compared to the period stated above. Climatologists and Scientists have predicted that these drought conditions can last for several decades. Tied to the issue of drought in West Africa is the variation of rainfall patterns or the dry spells. The dry spell is defined as the Sequence occurrence of consecutive days with precipitation lower than 1mm. considerably, the uniformity of rainfall in the Sahel Regions have fluctuated over time. Rains in the month of August which peaks rainfall in the region, has been falling considerably according to the Meteorologist Mike Dennet. What are the possible causes of this?

A Sahelian landscape. Nigeria-Niger border in the Lake Chad area (2010). Photograph by Vincent Hiribarren. CC-BY-SA 4.0.

Causes of the Increasing Rate of Drought and Minimum Rainfall in West Africa

Changes in Sea Surface Temperature

The West African Monsoon westerly (WAM) has been the main source of rainfall in the Sahel. The reduction of the WAM have caused the onset of the droughts experienced in the 1960s. Between 1930 and 2000, the region has encountered the weak WAM which has resulted in the southward shift in the Inter-Tropical Convergence Zone (ITCZ). This in turn has decreased moisture input which acts as an agent of vegetation growth. The long lasting effect has been less vegetation and high albedo.

Moreover, the repercussions of the El Nino weather pattern which is of the warm waters in the Pacific Ocean have also played a part in the Sahel's dry spell. This has also caused the northward shift of the mean sea level pressure along the coast of West Africa hence creating dry conditions over the Sahel.

The Declining Vegetation Cover

The declining vegetation cover has been caused by overgrazing and the conversion of woodland into agricultural lands, and has caused increase in the albedo of the landscape. This has reduced the amount of moisture in the atmosphere resulting in a lower probability

of rainfall in the region. The overreliance on wood as the sole means of fuel in the region has also largely contributed to devegetation.

Human Induced Climate Change

Human-induced climate is mainly concerned with human activities such as deforestation and land degradation through various unsustainable methods of cultivation and the sweeping Green Houses Gases such as Carbon Dioxide. Sahel's CO_2 rate has increased at a rate of 2.2% between 1960 and 2006. According to Epule and Peng this is associated with the 28% increase in population. Hence people are encroaching the areas that were initially uninhabited. This has contributed to ripping the region of the little vegetation it is left with.

Effects of Sahel's Drought

The major impact of the drought in the Sahel is the drastic decline of tree species in the region. The major tree species in the region is the Acacia tree. Other species include Commiphora africana, Balanites aegyptiaca, Faidherbia albida, and Boscia senegalensis. These trees are the major reducing agent of CO_2 in the atmosphere. In Senegal, the average number of trees present reduced from 64 ± 2 in 1945 to 43 ± 2 in 2005. Their decline inversely has increased the rate of CO_2 in the atmosphere. Other effects have to do with the surge of famine in the region. Poor nutrient nature of the soil has resulted in poor yield of major staples of the region. The food sufficiency had dropped from 98% to 25 % between 1960 and 1985. In Sudan, famine had affected close to about 20-25 million people with 3% month death rate. Staple food crops such as millet and sorghum yields have also dropped to about 20% from the normal.

The inconsistencies in rainfall statistics and little attention being paid to other atmospheric data and conditions responsible for drought in the Sahel region have made drought predictability difficult. There is a need for more studies on these atmospheric behaviors concerning the drought. Keen attention can be paid to what time span constitute the drought and what should drought's threshold hold; this will aid in proffering a better solution to the seeming unending phenomenon.

Moreover some positive changes are now taking place which show how concerted action by West African governments can make a difference. The government of Senegal instituted a major tree-planting initiative along the River Senegal (at the border with Mauritania). This has led to increased vegetation and crop production or the first time for many decades.

Thus history shows the relation of West African history to environmental patterns, but also the potential to change the trend for the better with concerted social action and historical awareness of these factors.

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