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Electromagnetic Effect of 5g Spectrums on Africa Vegetation

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Abstract:- Despite the advantages associated with evolving communication technologies, there exist some disadvantages that have become life threatening as well. The consequences of deploying 5G spectrum of electromagnetic wave on vegetation in Africa are presented in this work. According to different frequencies and wavelength, the 5G electromagnetic spectrum is divided into eight spectral band, including audio wave, radio wave, infrared, visible light, ultraviolet, X-ray and gamma rays. This work, focused on the impact of 5G spectrum deployments in the mangrove rain forest, woodlands, semi-desert and vegetation. In addition, the impact of this deployment on climate change and pollution in the environment was discussed in this work. Ultraviolet light from the deployment of 5G electromagnetic spectrumwas associated with the deterioration and alteration of canopy area, dry mass, some biochemical and morphological properties of leaves (chlorophyll, carotenoid and flavonoid concentrations) however, those of shrubland, woodland, thicket, savanna and dry forest were unaffected.

Keyword:- *Spectrum, Vegetation, Ecosystem, Africa, Radiation, Plant, Effect of 5G.*

I. INTRODUCTION

African vegetation is capable of embracing the huge potential of this technology as the rest of the world, even with the limitations of existing infrastructure and complex connectivity challenges. The effect of 5G technologies on African vegetation are far less studied [1]. It is argued that the addition of this added high frequency 5G radiation to an already complex mix of lower frequencies, 5G spectrum will impact negatively on deciduous forest of the vegetation and forest trees , grassland will experience the climate change in the vegetation for public health outcome both from physical and mental health perspectives[2].The deployment of 5G mobile network in African vegetation, might impact the regions negatively [3]. In this work, the harmful effect of 5G radiation on vegetation in Africa is discussed.

II. ELECTROMAGNETIC SPECTRUM OF 5G

5G can be implemented in low –band, mid-band or high-band millimeter- wave 24 GHz up to 54 GHz low band. 5G uses a similar frequency range to 4G cell phones, 600-900 MHZ, giving download speeds a little higher than 4G: 30-250 Mbps [4].

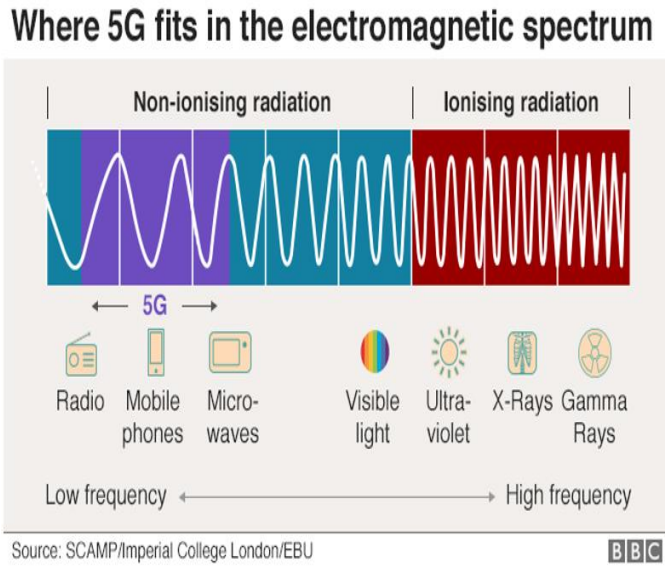

Fig 1.0 electromagnetic spectrum of 5G

III. 5G TECHNOLOGY ANALYSIS IN RELATION TO ELECTROMAGNETIC WAVES

Electromagnetic waves are present in most of the main devices used by humans. The advancement of 5G mobile network technology has been gaining ground in the telecommunications market and with it both positive and potentially negative consequences as it is used. Fundamental research has been conducted to gain knowledge and familiarity with 5G technology, how it works, its waves and range of the electromagnetic spectrum [5]. The Surveys showed that the use of 5G for mobile network frequency presents no risks compared to other equipment that are currently in use.

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IV. THE EFFECT OF ELECTROMAGNETIC RADIATION ON AFRICAN VEGETATION

Electromagnetic radiation was cited as a core indicator, together with solid waste disposal and perception of environmental quality. Electromagnetic radiation not only has a potential long-term effect and threat to public health but may also impact the ecological environment[6]. In recent decades, researchers have carried out numerous experiments to evaluate the biological and health effect of in vitro and in vivo exposure to non-ionizing radio frequency fields in animals, humans and their isolated cells. Plants were also used in studying the effects of EMF on living organisms, and electromagnetic radiation induced different alteration in enzyme activities[7].

V. ELECTROMAGNETIC SPECTRUM

The electromagnetic spectrum has frequencies (the spectrum) of electromagnetic radiation with respective wavelengths and photon energies. The electromagnetic spectrum covers the electromagnetic wave with frequencies ranging from below one Hertz to above 10^{25} Hertz, corresponding to wavelengths from thousands of kilometers down to a fraction of the size of an atomic nucleus. This frequency range is divided into separate bands, and the electromagnetic waves within each frequency band are called by different names; beginning at the low frequency (long wavelength) end of the spectrum viz: radio wave, microwave, infrared, visible light, ultraviolet, X-rays and gamma rays at the high frequency(short wavelength) end.

Electromagnetic radiation can be described by its amplitude (brightness), wavelength, frequency, and period by the equation E=HVE=H/NU E=HV, we have seen how the frequency of a light wave is proportional to energy.

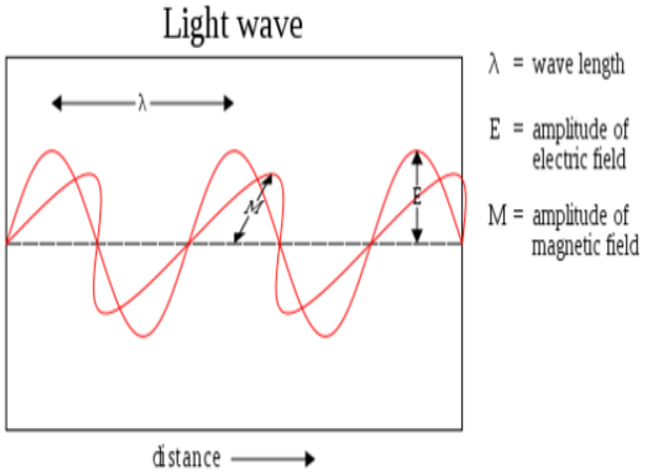

Fig 1.1: Electromagnetic spectrum

VI. THE INFLUENCE OF ELECTROMAGNETIC RADIATION POLLUTION ON LIVING ORGANISM AND HUMAN HEALTH

Electromagnetic fields and or electromagnetic radiation, as electromagnetic pollution, affect various elements of the environment. Among the elements of that environment all living organisms should be placed at the first position. Therefore it becomes very important to appropriately determine the nature and related side effect of electromagnetic pollution and its impact on living types of electromagnetic pollution.

VII. AFRICAN VEGETATION

The term African Vegetation is used in this paper here to mean plant community in a general sense. This comprises both trees (woody plants) and grasses (non-woody plants). Gasses may be tall and rich, as in the wetter tropical grasslands, or short, rough, and spear-shaped, as in the drier parts.

The vegetation of a place is controlled by a number of factors. These include the climate, especially the rainfall or more strictly, the effective precipitation; the length of dry season; the temperature; the occurrence of frost and the relative humidity of the driest month: soil; and height and slope of land (especially in mountain districts).

Comparison of the African Vegetation, Rainfall, and Soil maps of Africa reveals the following relationships:

- Forests may be found in regions where the annual rainfall is heavy (usually over 45 inches), or where the relative humidity of the driest month is not below about 65 percent. These humid areas have been heavily leached and have lateritic and related soils.
- Grass vegetation usually occupies areas with moderate to light annual rainfall (about 15 inches to 45 inches), concentrated in one season of the relative humidity of the driest month is normally over 20 per cent. Grasslands are, on the whole, areas of slightly leached chernozem and related soils.
- Scrub and desert areas are characterized by aridity, the annual rainfall is generally below 15 inches, and there is low humidity, at times under 10 per cent. These areas, like the grasslands have chernozem and related soils.

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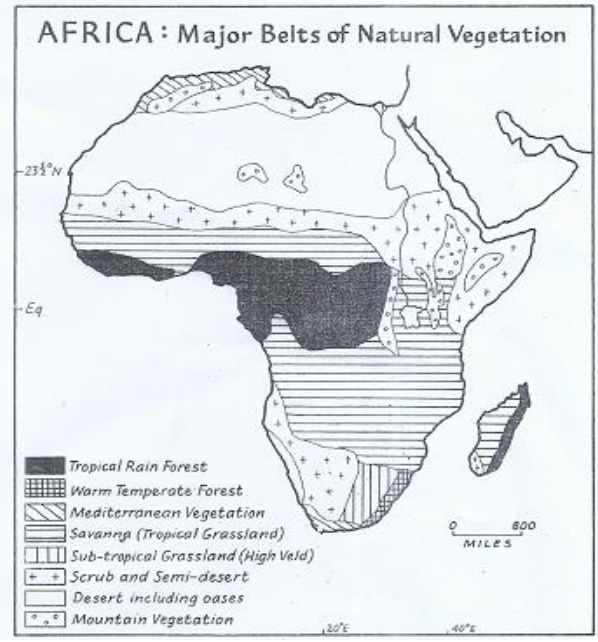

Fig 1.2: African Vegetation

VIII. AFRICAN VEGETATION ZONES

According to Figure 1.2, it shows generalized types of vegetation belts of Africa. These include:

(1) Tropical Rain Forest Zone

The forests are found in the Congo (where they occupy the largest area), Gabon, Rio Muni, Togo, Dahomey, and part of Western Nigeria), and eastern Madagascar. This zone has high temperatures and high humidity all the year and heavy rainfall all or most of the year.

Naturally, a typical rainforest shows a general "top layer" of very tall trees (usually, well over 100 feet), distinguishable amid two or more lower layers. The latter "stones" (as the layers are called) with the climbing wood plants, creepers, and tangle of lianas are apparently impenetrable. Some useful trees of the rain forests are Iroko, Mahogany and Ebonyi.

The chief products include palm oil and kernels, rubber, cocoa, coffee, bananas, kola, and tropical hardwoods. Monkeys, gorillas, hippopotami, snakes, birds and numerous insects occur in this belt.

(2) Warm Temperate Forest Belt

This forest occurs in South-eastern African, especially in Natal. The South-east trade winds bring rainfall all the year round but with a summer maximum. The winters are mild and the summers warm (Durban has a mid-winter temperature of 60^0F, a mid-summer temperature of 74F, and an annual rainfall of 40 inches. These conditions favour the existence luxuriant forests, which characterize this vegetation zone, but many of the trees shed their leaves in winter (deciduous).The belt contains different types of trees, but it is more open than the tropical rain forest. Pines and palms are among the trees which grow outside the swamps, while mangrove trees abound in coastal areas. Animals include foxes, rabbits and dear. The chief products are sugar, maize, tobacco, cotton, tea and fruits.

(3) Mediterranean Vegetation

This is found in North-west African near the Mediterranean and in South-west Cape province. Also warm-temperate, but on the Western side of the Continent. This is the area of warm, dry summers and mild wet winters (Cape Town-January 70^0F-55^0F; annual rainfall 25 inches). Trees and shrubs are evergreen, and are adapted to withstand summer drought. They do this in a number of ways such as the possession of small leaves with few stomata, cells which are store water, thickened cuticles, waxy leaves, and long tap roots which can read the deeper supplies of water.

Typical trees are olive, cork-oak, cedars, and laurel. The animals include goats and donkeys. The Mediterranean region is healthier and more developed than most of the other zones. Its products are fruits, wines, tobacco and cereals. The region in South African exports fresh fruits (oranges, peaches and apricots) during the Southern summer but northern winter.

(4) Grasslands Savanna

This vegetation belt occupies vast expanses north, east and south of the Rain forest region – in the Sudan, the east African plateau, south-central African plateau, and western Madagascar.

Savanna areas have temperatures which are continuously high (over 70^0F), with a maximum before the rains, and the evaporation rate is high all the year. Rainfall is concentrated into one period, the other being a distinctly long dry season (often up to eight months; see the Temperature and rainfall for Kayes).

Attention has already been drawn to the fact that the Savanna areas vary in their vegetation and length of dry season. Their unifying characteristic is the occurrence of grass, which has entered those former woodlands as the result of bush burning by man.

Rich savannas near the Rainforest, have only a short dry season. They have many trees and tall grasses which often attain a height of twelve feet or more and look thick, especially in the rainy season. It is much more open than rain forest. In the dry season the grasses become seaved and the trees leadless (later the trees become coated with ash after the annual grass fires).

The poorest types of savanna is found in the pole-ward sides, has short feathery spear-grass, xerophytes plants, thorn-bush and baobab.

(5) Sub-Tropical Grassland High Leveled

The physical characteristics of this belt on the whole resemble those of the Savanna; but because of the height (generally over 4000 feet above sea-level), and greater distance from the equator, temperatures are lower than those of the tropical grasslands. Rain is brought by summer winds and is not very heavy (15 to 30 inches), as this belt is in the rain shadow of the Drakensberg mountains (Kimberley, January temperature 76^0F; July 51^0F, annual rainfall 18 inches).

The vegetation consists of grasslands some 3 feet high. Trees are rare but the monotony of the grass is varied by occasional flat-topped hills called "kopjes". Animals include springbok and sheep, goats and cattle are much kept.

(6) Scrub and Desert Land (Sahara and Kalahari)

These occupy large areas. The scrub is a transition between the grassland and the desert proper. The dry season in this semi-desert is very long, the length increasing desert-ward until in the desert proper there may be complete painlessness for many years.

Scrub vegetation consists of extremely poor grass in separate clumps, with sparsely scattered and necessarily xerophilous plants. These plants are able to endure persistent drought. They may possess peculiar structures such as long tap roots, thorns instead of leaves or branches, rolled leaves and thickened cuticles.

(7) Montane Vegetation (Ethiopia, mountains of East Africa and Mt. Cameroon)

This is not uniform but vanes with altitude. The variation is controlled by a number of factors, of which the amount of precipitation and evaporation, cloudiness, the lowest temperature at a particular height and relative exposure to wind and rain are the most important.

Mountain vegetation shows a horizontal distribution which vanes according to both the position and the altitude of the mountain. The normal order of the vegetation in East Africa, from the base of the mountain to the summit, is Rain Forest up to about 3000 feet; most forests to 6000 feet; semi-temperate forest or wood land to 8000 feet; montane tall or short Grassland to about 14,000 feet; and snow above 14,000 feet [14].

IX. UNHEALTHY EFFECTS OF 5G RADIATION

The attributed of the emission of effect of 5G radiation in African vegetation which will impact negatively in vegetations based on weather and climate change and exposure. The increase in the implementation of 5G that will alter surface properties and mediates moisture, energy between the atmospheres of the global region.

Secondly, the stronger the impact of decision about 5G radiation, the effect on growth of different kinds of vegetation in Africa like mountains, forest, grass land, planes and deserts because of the variety growth of the soil that will be affected. Mangrove forest growth on wet and marshy deltaic soil, cactus and thorn bushes will be dry because of the increase in temperature affecting humidity. The increase in precipitation and the types of soil growth of conical shaped trees photoperiod will be affected because of the high sunlight in the vanes places at different latitudes and longitude in Africa vegetation.

Radiation exists all around us, from both natural and manmade sources, and is in two forms: *ionizing* and *non-ionizing* radiation.

Ionizing radiation is a form of energy that acts by removing electrons from atoms and molecules of materials that include air, water, and living tissue. Ionizing radiation can travel unseen and pass through these materials.

What is non-ionizing radiation?

Non-ionizing radiation exists all around us from many sources.

Examples include:

- Radiofrequency (RF) radiation used in many broadcast and communications applications
- Microwaves used in the home kitchen
- Infrared radiation used in heat lamps
- Ultraviolet (UV) radiation from the sun and tanning beds

The dividing line between ionizing and non-ionizing radiation occurs in the ultraviolet part of the electromagnetic spectrum [shown in the illustration of the electromagnetic spectrum above]. Radiation in the ultraviolet band and at lower energies (to the left of ultraviolet) is called non-ionizing radiation, while at the higher energies to the right of the ultraviolet band is called ionizing radiation.

Unlike x-rays and other forms of ionizing radiation, non-ionizing radiation does not have enough energy to remove electrons from atoms and molecules. Non-ionizing radiation can heat substances. For example, the microwave radiation inside a microwave oven heats water and food rapidly.

What is the risk from exposure to non-ionizing radiation? We are exposed to low levels of non-ionizing radiation every day. Exposure to intense, direct amounts of non-ionizing radiation may result in damage to tissue due to heat. This is not common and mainly of concern in the workplace for those who work on large sources of non-ionizing radiation devices and instruments.

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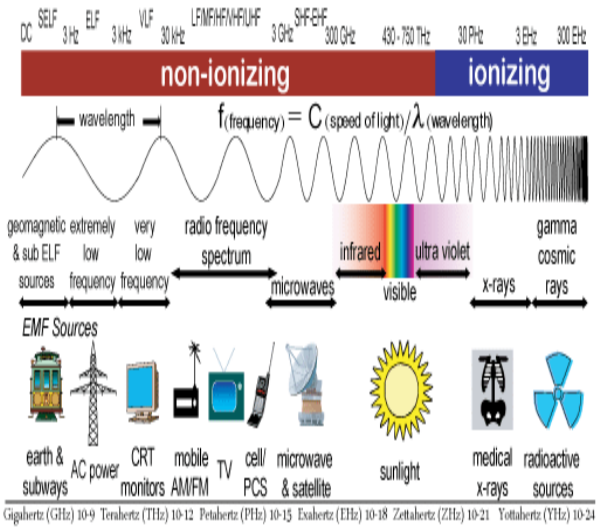

Fig 1.4: Electromagnetic Radiation between the ionizing and non ionizing radiation

The higher frequencies of EM radiation, consisting of x-ray and gamma rays, and types of ionizing radiation. Lower frequency radiation consisting of ultraviolet (UV), infrared (TR), microwave (MW) Radio frequency (RF) and extremely low frequency (ELF) are types of non-ionizing radiations.

Furthermore, the non-ionizing is potentially less harmful than the following because radiation of this type has less energy than ionizing and can cause molecules to move in an atom but it cannot remove electrons.

X. RESULT AND DISCUSSION

Electromagnetic (EMF) frequency has been found to alter the growth and development of African vegetations. Electromagnetic exposure results in biochemical changes, research shows that the African vegetation perceive and respond to the electromagnetic effect of 5G and are a good model to study the biological effect of exposure of the vegetations from the 5G spectrum and other wireless telecommunication that can affect African vegetation growth were noticed. As we expected, mangrove vegetation reflected more light in the green spectrum than surrounding marsh vegetation or shadows.

In addition, the electromagnetic effect of 5G cause a climate change and pollution in vegetations, however, there will be threats to the vegetations which can result to these including overharvesting of wood for fuel and construction, dams and irrigation that reduce the flow of water that can cause flooding at the coastal land and reaching the forests and mosaic forest/savanna.

The arm were to assess how ultraviolet light of electromagnetic of effect 5G affect canopy area, dry mass and some biochemical and morphological properties of leaves had altered chlorophyll, carotenoid and flavonoid, savanna and dry forest did not non- structural carbohydrates were unaffected. However, changes in leaf shape did correlate with canopy area and dry mass which will affect deciduous species performance.

Fig 1.5 picture of African vegetation

XI. CONCLUSION

Electromagnetic (EMF) frequency has been found to alter the growth and development of African vegetation. Electromagnetic exposure results in biochemical changes in the vegetation which shows that the vegetation perceives and responded to the electromagnetic effect of 5G and this will impact the regions negatively.

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