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IMPACT OF CLIMATE CHANGE ON FOOD SECURITY IN NIGERIA

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Abstract

Climate change is brought about by natural as well as man-made factors. Climate change or global warming has negative impact on the global environment. Some of these devastating effects include

volcano, landslide, erosion, flooding, drought, pests and diseases. These factors in turn impact on agriculture and consequently threaten food security. This paper therefore is aimed at examining, through literature search, the impact of climate change on food security in Nigeria with a view to making suggestions on strategies to mitigate the impact of climate change on the environment generally and food security in particular. Some of the suggested strategies include: reducing the emission of green house gases by stopping deforestation; use of high yield and disease-tolerant crops and crops adaptable to extreme weather conditions; farmers to cultivate their crops when rains are expected rather than during 'planting seasons'. The paper concludes that the menace of environmental degradation occasioned by climate change has affected agricultural production in sub-Saharan Africa in general and Nigeria in particular and must be tackled with all seriousness it deserves.

Key words: Climate change, greenhouse gases, food security.

Introduction

The number of people under malnutrition and undernourishment in the world keeps on increasing with each year passing. FAD 2009 (as cited in Essien, 2013) reported that between 2003 and 2005, 848 million people in the world were undernourished. By 2007, the number of undernourished worldwide had increased precipitously to 923 million, a difference of 75 million. Of the additional 75 million people flung into the pool of world undernourished between 2005 and 2007, 41 million people were from Asia and the Pacific while 24 million were from sub-Saharan Africa.

Malnutrition and undernourishment are consequences of food insecurity which is threatening the world. One major factor that impacts negatively on food security is climate change or global warming. The effects of climate change on the environment, some of which are landslide, erosion, flooding, drought, pests and diseases in

turn have devastating effect on agriculture and consequently threaten food security.

Concept of Climate Change

Oxford Dictionary of Science (2005) defines climate change as a long term change in the elements of climate, such as temperature, precipitation, wind and pressure measured over a long period of time of at least several decades. Climate change according to Nzewi (2009) refers to the measurable increases in the average temperature of earth's atmosphere, oceans and landmasses. Onyimonyi (2012) sees climate change as a process whereby the average weather conditions of a particular region over a long period become different from what it used to be.

The term climate change is also used synonymously with global warming which is defined by Oxford Dictionary of Science (2005) as an increase over time of the average air temperature on the earth. The dictionary further stated that throughout the geological history of the earth, there have been periodic fluctuations between warmer and cooler periods on a wide range of time scales. The causes of climate change are complex. Factors include the external processes of variations of solar emissions, variations of the earth's orbit, volcanic eruptions, mountain building and tectonic movements; anthropogenic (human-induced) processes. Thus, according to Okebukola and Akpan (2009), the causes of climate change can be divided into two categories – those that are due to natural causes and those that are created by humans. Prominent among the natural causes are continental drift, volcanoes, ocean currents, the earth's tilt, comets and meteorites.

Agbo (2012) maintained that the major contributory factors of climate change are man-made. This is line with Nzewi (2009) who stated earlier that current knowledge will suggest that about 60% of the climate change is attributed to such human activities as altered land use, deforestation, agricultural and industrial activities, wars and

increasing energy consumption. Others include use of fertilizers, burning of fossil fuels, refuse dumps, automobiles and through domesticated animals (Agbo, 2012). All these result to the emission of greenhouse gases, some of which include carbon dioxide, methane, nitrous oxide and ozone (O₃). Because greenhouse gases absorb and emit heat, increase in their concentration in the atmosphere tend to have a warming effect leading to climate change (global warming) which is now causing more heat waves, drought and flooding as well as threatening food and water supplies.

Uzoечи (2009) affirmed that as the concentration of greenhouse gases increases, the temperature on Earth will also increase. Other causes of changes in the average temperature of the Earth include ocean currents which move vast amounts of heat across the planet and volcanoes which introduce sulphur dioxide, water vapour, ash and dust into the atmosphere. Increasing temperatures tend to increase evaporation which leads to more precipitation. As average global temperatures have risen, average global precipitation has also increased. As a result, there has been an increase in the number of heavy precipitation events over many years during the past century as well as an increase since the 1970s in the prevalence of droughts especially in the tropics and sub-tropics (Okebukola & Akpan, 2009). Increase in the Earth's temperature might lead to the melting of the ice caps resulting to a release of more water into the oceans so that sea levels will rise and consequently many low-lying areas of the land will be flooded. Thus, the melting of glaciers and ice sheets in some areas swells the seas and as the sea invades the mouths of rivers, flooding from runoff will also increase upstream (Nzewi, 2009; Uzoечи, 2009).

In Nigeria, Eze, Ikeogu, Iwu and Nwakama (2012) affirmed that environmental devastation arising from climate change is becoming rampant in many parts of the country. For instance, they noted that current environmental problem in the Niger Delta is flooding which comes from rainfall and runoff from rivers and urban chains, tidal

movement and wind. The situation in Nigeria was vividly captured when they stated thus:

Climate change or global warming has become a new reality with deleterious effects: seasonal cycles are disrupted as are ecosystems; and agriculture, water needs and supply, and food production are adversely affected. Global warming (climate change) also leads to sea-level rise with its attendant consequences, and includes fiercer weather, increased frequency and intensity of storms, floods, hurricanes, droughts, increased frequency of fires, poverty, malnutrition and series of health and socioeconomic consequences (p. 69).

Climate Change and Food Security

Food security is a condition where all people at all times have physical and economic access to safe, sufficient, culturally acceptable and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO in Essien, 2013). Condition of food security can be said to have been achieved when household can reliably obtain food of adequate quantity and quality to support a healthy and active life for all members (Lipton in Essien, 2013). Thus to be food secured, a household must have access to sufficient food that meets its nutritional requirements either by directly producing such food or purchasing it (Charles & Bassey in Essien, 2013).

According to Essien (2013), food security intrinsically entails three fundamental aspects namely, availability, sufficiency and accessibility, which must occur simultaneously. Absence of any of these fundamental aspects at any time will result to food insecurity – a condition in which households experience a lack/inadequate food stock. In other words, when food security is threatened for sometime without adequate rescue measures, it results in food insecurity, a phenomenon which seems to characterise the present world food

situation. The problem of food insecurity has become so pronounced at both national and international levels in the last two decades. Though it is a global plague, it is more obvious in less developed countries and the sub-Saharan Africa are among the most hit (FAO, 2011 in Essien, 2013). A variety of food crops are produced in Nigeria and these are dependent on rainfall. Therefore where rain is abundant (from the coast up to the middle belt for example), crops dependent on rain are planted while in dry parts of the country, crops that do not require much rain are cultivated.

Essien (2013) stated that most countries in sub-Saharan Africa are agrarian and most of their population are rural dwellers depending on agriculture as their major source of livelihood. Small scale farming (rural farming) constitutes about 80% of African agriculture producing largely staple food (Berner & Resnick in Essien, 2013). Broad-based rural development that includes small holders (rural farmers) can have a huge impact on rural food production which accounts for not less than 70% of sub-Saharan Africa food basket. However, food production on the whole has not kept pace with Nigeria's population increase.

An important factor of climate change is acid rain. Sulphur dioxide and nitrogen oxides in the atmosphere dissolve in rain water to form acidic solutions. The acidic solutions return to the earth as wet deposits called acid rain. This according to Uzoechi (2009) damages plants in that, although it may not affect the plant leaves directly, it affects the soil in which the plants are growing. The acid rain water seeps into the soil and washes away ions such as calcium, magnesium and aluminium. Lack of these ions in the soil will not only affect the growth of the plants, but will also make it difficult for such plants to absorb other nutrients from the soil. Thus, the plants may die or have very poor yield. Besides, some of these ions washed away from the soil may end up in rivers and lakes. Aluminium for instance is very poisonous to fish and can kill young fishes as well as other aquatic organisms that can be beneficial to man.

The dependence of over 80% of crop production in Nigeria on rainfall has serious consequences on crop productivity with the advent of climate change (Agbo, 2012). Climate change leads to a distortion of seasonal patterns and consequently, changes in rainfall patterns. Iruma and Uzor in Agbo (2012) reported that in Nigeria, uncertainties in the onset of farming season due to changes in rainfall characteristics (delay in onset, rainfall sustenance, and weeks of dryness after initial rains) as well as long/short periods of rainfall in some areas and reduced harmattan were incidences of climate change phenomenon observed by farmers. According to Sowunmi and Akintola in Agbo (2012), reports of late start of rains and concentrated few rain days in most ecological zones has led to late start of crop production in the mangrove swamp, rain forest, parts of derived savanna, Sahel and Guinea Savanna zones. Also, variability in rainfall, changes in water levels/volume of ponds, lakes, rivers and streams; frequency of storms and drought and increased incidence of soil erosion caused by excessive flooding and sporadic storms are all brought about by climate change. All these weather change phenomena hinder crop production in Nigeria. The shift in rainfall pattern is very detrimental to rain-fed crops production that occupies more than 90% of crop farms in Nigeria. Uncertainties can lead to an unusual sequence of crop planting and replanting resulting to food shortages due to harvest failure. Harvest failure for example, would directly impact the fruit juice manufacturing and food processing industries (Eze et al., 2012).

Nigeria with a land area of 910.8 thousand sq. km. has 41.2% of it as arable land by 2008 (Essien, 2013). Climatic problems like high wind, heavy rainfall, heat and cold lead to advent of tropical storms, floods, landslides, droughts and sea level rise. Flood, erosion and droughts seem to be the most disasters which threaten the entire country, Nigeria with increasing severe consequences. For instance, Nwogwugwu and Nwogwugwu (2013) stated that the menace of erosion no doubt represents a major economic challenge facing most states in Nigeria. Undue human interference in the natural ecosystem

such as deforestation, soil excavation, construction activities and the stress of over population are some of the recognised factors that cause erosion. Increased occurrence of flood due to heavy rains is also likely to spark off incidences of water-borne diseases.

According to Eze et al. (2012), the low-lying nature of Nigeria's 800kms coast line from Lagos to Calabar makes the region vulnerable to climate change. It is prone to sea water intrusion into coastal fresh water resources and consequently inland fisheries and aquaculture are negatively affected. There is a high frequency of coastal erosion and flooding both, climate change-induced forms of land degradation and ground water, thereby increasing epidemics of water-borne diseases commonly experienced in the south such as cholera and typhoid fever.

Increasing incidences of heat waves could lead to more causes of cerebrospinal meningitis which today is found to correlate positively with the highest maximum temperature of the northern winter season. The polluted ground water increases epidemics of water-borne diseases such as cholera and typhoid fever, and other diseases like hepatitis and malaria commonly experienced in the southern part of the country (Eze et al., 2012). Pests attack the food crops leading to poor yield and high price of the scarce food crops and consequent malnutrition. New devastating disease symptoms have emerged in the rain forest in response to climate change. New and yet to be identified disease of cocoyam has been ravaging the cocoyam industry with devastating impact on cocoyam production in southern Nigeria since 2009 (Agbo, 2012). Cocoyam is one of the staple foods in South-east Nigeria and for now, it is very scarce and when seen in the market, is very expensive and out of reach of an average person in this part of the country.

Pests and diseases adversely affect animal husbandry. According to Eze et al. (2012), two drought incidences in Nigeria in the 1960s and 1970s led to the death of millions of cows, goats and sheep while the production of foodstuff such as cereals and other products were long affected. In an agrarian society or agriculture-based society, like in

Nigeria and other developing countries of the world, domestic animals are still an essential component of a domestic establishment. To millions of the poor, livestock provide a bare means of subsistence.

Strategies for Mitigating the Effects of Climate Change on Food Security

To combat the problems of climate change on food security, there is need for an integrated approach that will involve all stakeholders at different levels – government, individual farmers, NGOs and the private sector.

- Agriculture is a powerful tool for reducing both hunger and poverty especially in the poor countries where agricultural sector is the highest employer of labour. Agricultural sector needs to be given serious attention even in the face of climate change. Adoption of agricultural technologies and innovations which, according to Agbo (2012) include use of high yielding and disease-tolerant crop breeds, crops adaptable to extreme weather conditions (drought, high rainfall and heat stress), irrigation technologies and sustainable agricultural practices, would stem the effect of climate change in crop production in Nigeria.
- Human requirement for timber, fuel wood and space had laid bare large proportion of otherwise fertile land thereby leaving the soil unprotected for the action of strong wind and rapidly flowing water. The practice of cut one tree, plant two should be enforced.
- Efforts should be made to reduce the emission of the green house gases. Stopping deforestation and growing new forest, particularly in the tropics, are the easiest and fastest way for society to reduce carbon dioxide in the atmosphere and mitigate global warming. This is because conserved forest is a good means of carbon sink as the forest fauna and flora exchange and assimilate excess carbon from other sources.

- Crop production practices will have to adapt to climate changes to sustain production and stem hunger. Since planting seasons are now changing due to climate change, farmers should plan to cultivate their crops when rains are expected rather than during the “planting seasons”.
- Provision of necessary drainage structures and other erosion-control facilities by both road and building construction industries and individuals should be made compulsory in urban and rural areas in order to reduce flooding. Buildings should also not be constructed along water ways to prevent obstruction of water movement.
- There is an urgent need to prepare and implement appropriate and comprehensive national policy on soil and coastal erosion and flooding so as to combat land degradation, desertification, deforestation and loss of biodiversity and thereby improve food security, alleviate poverty and mitigate the effects of climate change on population (Ezeaku, 2012).
- Climate change and other environmental hazards should form key components of governments’ economic plan. There is need for full integration of environmental concerns in any developmental plan of the country at all levels of decision-making.
- Academic research institutions should direct and intensify their research efforts towards climate change issues.
- Climate change awareness is low in Nigeria particularly among the rural folk who also happen to be most vulnerable to the adverse impact of climate change because of their high dependence on climate-sensitive natural resources and also high poverty rates. This calls for enhanced environmental education and public awareness on the need for proper environmental management for sustainability. The media has important role to play in this wise.

Conclusion

Agricultural production in Sub-Saharan Africa countries is very low. This has engendered food insecurity in the region with resultant malnutrition, undernourishment, anaemia and sickness. Given the importance of food in human well being and the importance of agriculture in the functioning of national and regional economies, the menace of environmental degradation occasioned by climate change should be tackled with all seriousness it deserves. All stakeholders must be actively and purposefully involved.

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