Review

The Effects of Climate Change on Food Production

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Global concern on effects of climate change has all along been centered on the melting ice and its effects, such that the then Secretary General of the United Nations in 2009 paid a visit to Rumania to witness the melting ice in person. Other global concern has been that of ultra-violet radiation from the sun which could lead to sunburn and death, and could take place any moment. There has been less directed attention to the effects of climate change on forestry and agriculture productions, the very sector that falls on the three basic needs of man. The soil from where arable agriculture is practiced is directly influenced by climatic factors such as rainfall, temperature, humidity, etc. No reasonable agriculture production could be carried out in the absence of soil fertility. Climate change leads to land degradation resulting into erosion (nutrient loss), excessive rainfall leading to flooding of fertile arable lands, drought leading to water stress and crop loss just to mention but few. If the situation must be salvaged, the first step in the approach would be to identify the factors that bring about changes in climatic behaviour as that would go a long way in helping to devise adaptation strategies that could restore agriculture production in the face of climate change.

Key words: Global concern, forestry and agriculture production, climate change, land degradation, deforestation.

INTRODUCTION

The effects of climate change on food production contemporarily and in the near future have been stated and predicted (Unanaonwi, 2010c). Adedire (2010) stated that the adverse effects of climate change would be more felt in the sub-Saharan African environment where livelihood and economy are largely dependent on agricultural and forestry production. Climate is the average weather condition of an environment monitored over a long period of time. Such weather parameters include temperature, relative humidity, solar radiation and rainfall. Climate change therefore is a constant deviation from the average values of these parameters monitored over a long period of time, including a change in what is known to be the existing pattern (Nnodu, 2009).

CAUSES OF CLIMATE CHANGE

Addressing climate change and saving the world from the current global lamentation of its present and future effects on agriculture and forest productions would begin by first identifying the cause(s) of climate change. The major causes include deforestation, forest and land degradation, and pollution through gas emissions, among others. Tropical deforestation is responsible for about 20% of global greenhouse gas emissions- more than what all the cars, trucks, planes, boats and trains in the world jointly emits (UNFCCC, 2007). This devastating deforestation is not only a huge threat to our climate, but also deprives wildlife, indigenous peoples and local communities, as well. Many factors such as war, industrialization, colonization, etc; have been responsible for rapid rate of deforestation in many countries. With reference to population growth, more people means more acquisition of habitable lands which invariably means increased deforestation.

Civilization and culture dynamics have resulted in industrial revolution and global commerce in the modern world. This has led to the rise of heavy industries and factories, large cities and their accompanying pollution. Increase in areas occupied by cities forces the forest to recede. As the world turned to the forests to obtain the
Climate change has significant effect on the environment and indeed soil, which significantly affect agriculture, otherwise food production. It has been stated that productivity or yield is directly related to site quality (Unanaonwi, 2008) and soil fertility is one major site quality that directly portrays on yield. Oyerinde and Osanyande (2010) reported that rural farmers are becoming poorer because their farming systems are characterized by low and declining productivity due to climate change effect, while Adeyefa (1995) stated that there is a general decrease of water availability in many regions. This phenomenon has affected agriculture and caused reduction in potential crop yield in most tropical and sub-tropical regions. Changes in climate affect food production in the following areas include:

**Increased Incidence of Pests and Diseases**

Climate changes could increase the incidence of pests and diseases that attack and kill crops especially grains, animals and forest trees. This could result into species extinction which is negative in terms of productivity. Extreme heat is capable of causing high mortality in poultry as well as other farm animals. Most pests and diseases of crops, poultry and farm animals are prevalent and widespread when there is too much of rains or floods.

**Changes in Onset of Rain**

Unpredictable changes in the onset of rains in the last 20 to 30 years have led to situations where crops planted with the first or early rains are eventually smothered in the soil by unexpected dry spell that follows early planting. In the 1970’s and 1980’s, the sahelian zone suffered drought which resulted into massive harvest failure. Alao (2008) reported that close to one million livestock were lost, which affected meat and dairy supply throughout the country. Report by IFAD (2010) stated that climate change effect is directly evident in crop failures and livestock death causing higher economic losses. It noted that if nothing is done by way of mitigation, crop yield of predominantly rain-fed African agriculture would drop by 50% in 2020.

**Land Degradation**

Climate change leads to land degradation which reduces the quality and productivity of land, and manifests in various forms. In the Sahel and Northern Guinea Savanna, the predominant factors that bring about land degradation are wind erosion, sand dune formation, drought and desertification. Wind speed has become increasingly high and quite unpredictable. Sheet erosion could completely remove arable land and is the greatest hindrance to agricultural production, especially in the...
sandy soil regions of South-Eastern Nigeria (Anon, 2010b).

**Drought and High Temperature**

Agricultural production in the African region is mostly rainfed. The region, as stated, would be worst hit in the climate change impacts. The Lake Chad supplies over 10 million people in the northern states of Nigeria with water. The lake has presently shrunk to one-tenth of its original size, resulting to reduction in volume of water for irrigation (Bassey, 2010). In the midst of high temperature, the soil temperature will equally rise making the soil environment conducive to microorganisms that decompose biomass into organic matter, and since soil fertility is related with soil organic matter content, this phenomenon will results into infertility of soil. Where crops thrive at all in that condition, the yield would be very poor. Sometimes sown seeds or grains remain longer in the soil than expected before sprouting as a result of delay in germination. The soil-water is low, coupled with the soil high temperature, the sown crop would tend to remain dormant until it could overcome these stress. By the time it eventually sprout, it may not be able to produce the expected yield, especially crops that are pollinated by insects which comes around at set periods of the growing season.

Drought and high temperature with low humidity easily aggravate forest fires especially in the Savanna and Savanna woodlands. This happens during October through February, a period when most of grains are getting set for harvest in the northern region. Uncontrolled bus fire in that dry period spread to farmland, resulting to crop loss.

**Rainfall and Flood**

The current global warming induces the melting ice from the Polar Regions which brings liquid flow into seas and Oceans, thus increasing water levels. As this goes on, the low lying coastal regions which are generally fertile and highly productive, start experiencing flood. The rise in sea level could be attended with excessive evaporation and excess moisture in the atmosphere leading to excessive rainfall. Crop generally requires certain amount of rainfall during the growth period for maximum yield. When this becomes excessive it leads to poor harvest, if at all. While some areas experience excessive rains and flooding, in other areas it could be severe heat and reduced rainfall. Flooding make the soil waterlogged and could destroy standing crops especially as it is becoming unpredictable. Excessive rainfall will induce erosion thus washing away the soil nutrients as well as leaching down the top soil nutrients. Poor soil in terms of nutrients availability would results to poor yield.

It has been reported that the north eastern Nigeria (a Sudan Savanna) is gradually increasingly becoming an arid environment at the receding rate of 6 meters per year occasioned by fast depletion on the amount of surface water, flora and fauna resources on the land. In the same vein, in the Sudano-sahelian region, there has been a net shift toward aridity, especially towards hyper aridity, and a consequent net loss of semi-arid and dry sub-humid land that were once grains and grazing areas.

**Temperature and Precipitation- Early Senescence**

The duration of crop growth cycles are related to temperature and an increase temperature will speed up development. In the case of annual crops, the duration between sowing and harvesting will shorten (for example, the duration in order to harvest corn could shorten between one and four weeks). The shortening of such a cycle could have adverse effect on productivity because senescence would occur sooner (Oni et al., 2010). Changes in temperature and precipitation have changed forest formation, structure, composition, and productivity (Unanaonwi, 2014). Climate change could drive the migration in tree species, resulting in changed in the geographic distribution of forest types and new combinations of species within forests. In North America, many trees are shifting northward or to higher elevation (IPCC, 2007).

**CONCLUSION**

Climate change has many bad effects which directly affect man's existence on earth in as much as it affects agriculture production. No nation of the world could be said to have attained development if the citizens are unfed. In the present realities of climate change effect on agriculture production, it becomes imperative that all hands be on deck to pull together all efforts towards boosting food production. FAO (2007) had earlier called for mitigation efforts else there would be grave food shortage of about 50% by 2020. However, the present situation demands more than mitigation effort because the highest cause of climate change is from anthropogenic sources. Since climate change has come to stay, scientist and indeed the world community should be talking about adaptation. Scientists should therefore arise, work together and come up with adaptation options that farmers could use to sustain food production in spite of climate change.

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