

Impact of Climate Change on Agricultural Production in Nigeria

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Abstract

This study examines the impact of climate change on agricultural production in Nigeria. The country's economy is predominantly agrarian and agriculture and the exploitation of natural resources remain the driving force for the country's economic development. Fluctuations in national income are due not merely to the decline in oil price or to mistakes in economic policy making, but also to the vagaries of the weather. The main objective of the study is to assess the impact of climate change on agricultural production and the specific objectives are to assess the relationship between climate change and agricultural production; Identify the effect of climate change on agriculture; and Proffer solutions to the problem of climate change on agricultural production. The study reaffirms that agriculture in Nigeria is often limited by seasonality and the availability of moisture. Climate remains the dominant influence on the variety of crops cultivated and the types of agriculture practiced. It is recommended that if agricultural productivity was to be increased and sustained, environmentally and agricultural sensitive technologies and innovations that can prevent climate fluctuation should be encouraged.

Keywords: Climate Change and Agricultural Production

Introduction

Agriculture is arguably the most important sector of the economy that is highly dependent on climate. John M. Antle 2008. Climate change is perhaps the most serious environmental threat to the fight against hunger, malnutrition, disease and poverty in Africa, mainly through its impact on agricultural production. FAO, (2001)

Climate change and agriculture are interrelated processes, both of which take place on a global scale. Climate change affects agriculture in a number of ways, including through changes in average temperatures, rainfall, and climate extremes (e.g., heat waves); changes in pests and diseases; changes in atmospheric carbon dioxide and ground-level ozone

concentrations; changes in the nutritional quality of some foods; and changes in sea level. Specifically, it has been shown that the link between rainfall and animal numbers is approximately linear IPCC (2001).

Agriculture, including the forestry and fisheries sectors, must adapt to the impacts of climate change and improve the resilience of food production systems in order to feed a growing population. Agricultural practices themselves have often added to the water shortage problem in Africa more than anywhere else due to differences in property rights. More precisely, because farmers are often not owners of the land they work on, the preservation of natural resources is generally viewed as a secondary objective. In addition, pressures represented by increasing populations and changing technology add to the problem of land deterioration related to agricultural practices. Drechsel et al. (2001)

Climate change is one of the most serious environmental threats facing mankind worldwide. It affects agriculture in several ways, including its direct impact on food production. Climate change, which is attributable to the natural climate cycle and human activities, has adversely affected agricultural productivity in Africa (Ziervogel et al. 2006). In Nigeria, agriculture is the main source of food and employer of labour employing about 60-70 per cent of the population (Mayong et al. 2005). It is a significant sector of the economy and the source of raw materials used in the processing industries as well as a source of foreign exchange earnings for the country (Mohammed-Lawal and Atte 2006).

In Nigeria, agriculture is the main source of food and employer of labour employing about 60-70 per cent of the population (Mayong et al. 2005). Climate change affects food and water resources that are critical for livelihood in Africa where much of the population especially the poor, rely on local supply system that are sensitive to climate variation. Disruptions of existing food and water systems will have devastating implications for development and livelihood. These are expected to add to the challenges climate change already poses for poverty eradication (De Wit and Stankiewicz 2006).

Rainfall is by far the most important element of climate change in Nigeria and water resources potential in the country (Adejumo 2004). The northeast region of Nigeria is increasingly becoming an arid environment at a very fast rate per year occasioned by fast reduction in the amount of surface water, flora and fauna resources on land (Obioha 2008). It is a significant sector of the economy and the source of raw materials used in the processing

industries as well as a source of foreign exchange earnings for the country (Mohammed-Lawal and Atte 2006).

Statement of the problem

Climate change is a fundamental threat to global food security, sustainable development and poverty eradication. Rough estimates suggest that over the next 50 years or so, climate change may likely have a serious threat to meeting global food needs than other constraints on agricultural systems (IPCC, 2007; BNRCC, 2008).

Climate change and pressure on resources are major constraints to adequate agricultural production. Among the three, climate change is the most pressing challenges that the world faces today. Climate change is a defining phenomenon of the century. Climate change threatens to undermine the progress that has been achieved to date, especially in the agricultural sector. Enete (2014)

That is why climate change must be addressed as an integral part of the overall development agenda.

Objective of the Study

- I. Assess the relationship between climate change and agricultural production;
- II. Identify the effect of climate change on agriculture; and
- III. Proffer solutions to the problem of climate change on agricultural production.

Methodology

The study area is Nigeria. The study uses time series data from 2000 to 2016. The data were sourced from the National Bureau of Statistics (NBS), the Central Bank of Nigeria (CBN) bulletin, Food and Agricultural Organization Publication (FAO), Federal Ministry of Environment and the Federal Ministry of Agriculture and rural development. Descriptive statistics and Regression analysis were used to analyze the data.

RESULTS AND DISCUSSION

Effects of Climate Change on Agricultural Production

The study identifies some major effects of climate change such as Drought, excessive rainfall and high temperature or excessive heat on agricultural production as described below:

Effects of Drought on Agricultural Production

Livestock death and diseases: Livestock sales act as a buffer in times of hardship, farmers disinvesting in these assets to buy food. The first animals to be sold are usually those which make the least contribution to farm production, such as sheep and goats. However, as the period of drought-induced food deficit lengthens, farmers will have to start selling transport and draft animals, such as oxen and donkeys, as well as breeding stock, which constitute the basis of the household's wealth. In the Ethiopian highlands, stocks are usually disposed of in the following order: sheep and goats, then younger cattle, with horses, donkeys and work oxen being sold as a last resort (Wood, 1976),

Reduction of crop production: The most immediate consequence of drought is a fall in crop production, due to inadequate and poorly distributed rainfall. Farmers are faced with harvests that are too small to both feed their families and fulfil their other commitments. A lack of rainfall can cause entire crops to fail or result in a very small crop, even for farmers who irrigate their fields. In turn, low crop production leads to losses in other industries that rely on agricultural products in order to stay in business. The drought has led to increased prices for hay, feeds and even grocery produce. It has also effected ethanol production as the demand for corn has exceeded production levels. (FAO, 1984)

Reduction of feed quality and fodder shortage: Where crops have been badly affected by drought, pasture production is also likely to be reduced although output from natural pastures tends to be less vulnerable to drought than crop production. Low rainfall causes poor pasture growth and may also lead to a decline in fodder supplies from crop residues. Insufficient levels of fodder around the village lead to weigh less and increased deaths among stock, especially where immigrant herds put further pressure on limited local pastures. While the response of most pastoral groups to fodder shortage is to move themselves and their herds elsewhere, this is not an option so easily followed by livestock-owning farmers.

Death of aquatic organisms such as fishes: The low rainfall in recent years has resulted in reduced fish production. Fishing is prohibited at certain locations on the river when the water are low. This management allows the fish, whose movement is hampered at low water, to settle down and congregate in deep areas of the minor bed without being disturbed, thus making their capture easier once the fishing ban is lifted (Daget 1956).

High rate of poverty and malnutrition among farmers: Changes in the distribution of wealth usually accompany drought. The experience of farm households will differ according to their ownership of assets, their access to incomes from other sources and the extent to

which these assets and incomes are less affected by drought than are harvests. The most vulnerable amongst those hit by drought will be those with few assets to sell, those who most need to purchase grain due to an absence of their own household reserves and those who cannot gain access to food through other means, such as borrowing, coercion or theft. The richest members of the community may even be in a position to benefit during drought, as they can acquire land and other assets at low prices from distress sales by poorer neighbours. (Sen 1981)

Decline in agribusiness: Although they could not be considered as a loss to the national economy, to the individual farmer drought-induced distress sales of work oxen are as much of a loss as are animal deaths. In addition, since distress sales are associated with reduced prices offered, farmers also incur a substantial financial loss compared to sales under more normal circumstances. The distribution of work oxen losses between deaths and distress sales will vary according to the circumstances in which drought has taken place and the constraints faced by different producers. (Mariam, 1984)

Other effects of drought on agriculture include Reduction in soil water balance, direct effect on the quality of fruits and vegetables etc.

Effects of Excessive rainfall or high moisture on Agricultural Production

Erosion and Washing away of quality soil: Heavy floods damage infrastructure and crops, and wash away productive topsoil. Too much water can also leave the soil waterlogged, which may increase risk of compaction. In addition, oxygen in the soil becomes depleted after a few days under water. "Growers need to watch out for water logging and oxygen depletion in the soil in high rainfall years.

Weed infestation on farm: Weeds evolve rapidly to overcome control measures, aquatic weeds and those well adapted to flooded soils are major problems in lowland rice fields. The cultivation of lowland rice in rotation with upland crops and vegetables in the same fields has resulted in the selection of ecotypes of 'upland' weeds.

Excessive moisture during harvesting: Challenges when harvesting due to excessive moisture on the farm, farm output is affected when crops that are ready to be harvested or about to ripen, get soaked in excessive rainfall.

Death and diseases of livestock especially birds in poultry: Some livestock cannot withstand excessive cold most especially the poultry and as a result of this some dies while some becomes infected by diseases.

Effects of High temperature or Excessive heat on Agricultural Production

Death and diseases of Livestock: Pigs and poultry becomes uncomfortable whenever there is excessive heat, Heat stress is hard on livestock especially in combination with high humidity. This most times lead to: Reduced semen quality, Lower birth weights, excessive loss of water, Lower mating effectiveness and intensity, Decreasing feed intake and appetite Increasing water intake, Lower hormone levels and fertility rates (Heath, 1999).

Other effects of high temperature on agriculture are Reduction of the quality of vegetables, Conducive environment for pathogens and vector, Reduction in the quality of food in storage etc.

Solutions to the problem of climate change on agricultural production

The study proffer some solutions to the problem of agriculture due to the effect on climate change, the solutions include:

Provision of a plentiful supply of clean and cool drinking water for livestock during drought and excessive heat

Water management during drought is also necessary for some crops such as rice and vegetables to thrive well

Adequacy and accuracy of weather forecast to enable proper preparedness of farmers towards the next season

Suitable shade or shelter is required for livestock during the period of high rainfall

Agricultural funding for research and technology development

Provide access to high quality forage

Trade Liberalization and Market Development

Funding and infrastructure development

Consistency in government policy

Availability of veterinary doctors

Conclusion

Findings from this study indicated that agricultural impacts of climate change in Nigeria have a lot of effect on crops and livestock because all crops have its suitable climatic condition and whenever it is excessive or not enough then it starts having negative effect on the crop and livestock such as Livestock death and diseases, Reduction of crop production, Reduction of feed quality, Reduction in soil water balance, Death of aquatic organisms such as fishes and so on, Persistent drought can be devastating financially for agricultural producers and have substantial adverse economic impacts on agribusinesses, However some solutions has been proffer to this negative effects of climate change on agricultural production, this include: Preparedness of farmers towards the next season, Adequacy and accuracy of weather forecast, Availability of veterinary doctors, Agricultural funding for research and technology development, Trade Liberalization and Market Development, Funding and infrastructure development and Consistency in government policy.

The study also shows that there is variability in Nigerian rainfall and temperature which makes change in climate have significant effect on agricultural productivity. The study also identify livestock farmers as the most vulnerable to climate change as all climates activities have direct effect on livestock most especially the poultry. This is clearly revealed in the rainfall variable however temperature seem not an important variable of climate in determinants of agricultural productivity in Nigeria economy.

Recommendations

From the on-going, it could be recommended that Nigerian government needs to give agriculture a serious priority. The current climate change effect can be minimized if policy toward mitigation is geared and more consistent. Agricultural productivity can be increased and sustained by developing agricultural technologies that are environmentally sensitive. Also making available veterinary doctors and training farmers on how to cope with the situation whenever there is an erratic weather or dry spell.

References

- Adejuwon SA 2004 Impact of climate variability and climate change on crop yield in Nigeria. 2-8.
- Daget, J. 1956. La peche a diafarabe, etude monographique. Institut Francais d'Afrique Noire, 18 B
- Drechsel et al. (2001) Population density, soil nutrient depletion, and economic growth in sub-Saharan Africa", Ecological Economics, 38, pp. 251-258.
- Enete IC 2014 Impacts of Climate Change on Agricultural Production in Enugu State, Nigeria
- FAO 2016 Climate change is a fundamental threat to global food security, sustainable development and poverty eradication.
- FAO. 1984. Rapport de la mission FAO/PAM Multi-donateurs. Republique du Mali. Evaluation de la situation de l'alimentation de l'agriculture et de l'elevage. OSRO Rapport no 15/84/F. Rome.
- FGN (1999) Drought Management in Nigeria; What Can People do to Minimize Its Impact? Abuja: Federal Ministry of Environment
- (IPCC), 2007: Climate Change 2007: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Third Assessment
- Antle 2008 Climate Change and Agriculture: Economic Impacts
- Jones D. 1979. Drought and arable farming. In: Hinchey M. T (ed) Proceedings of Symposium on Drought in Botswana.
- Obioha E 2008. Climate change, population drift and violent conflict over land resources in north eastern Nigeria. Journal of Human Ecology, 23(4): 311-324
- Wood A. 1976. Farmers' responses to drought in Ethiopia. In: Hussein A M, Rehabilitation: Drought and famine in Ethiopia. African Environment Special Report no. 2. London.
- Ziervogel et al., 2006 Climate variability and change: implications for household food security. Assessments of Impacts and Adaptations to Climate Change (AIACC) Working Paper No. 20, January 2006

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