Journal of Community & Communication Research
ISSN: 2635-3318
Volume 9, Number 1, June 2024
Accessible at: https://jccr.sccdr.org

ASSESSMENT OF CLIMATE CHANGE, POVERTY, AND AGRICULTURAL GROWTH PERFORMANCE IN NIGERIA (1980 - 2017)

Ubokudom, I. A, Onyeaghala, I. D, Opara J. K

Department of Agribusiness and Management, Michael Okpara University of Agriculture, Umudike.
Corresponding Author's E-mail: ***ubokudomitohowo@gmail.com***

ABSTRACT

The study assessed the climate change, poverty, and agricultural growth performance in Nigeria from 1980 to 2017. It specifically examined and analyzed the trend of climate change, poverty, and agricultural growth performance; examined the effect of climate variability, agricultural growth, and other selected macro-economic variables on economic growth; determined the relationship between climate variability, agricultural growth, poverty index, and economic growth; examined the effect of climate change on poverty level in Nigeria; assessed the impact of climate change on Nigeria's agricultural share of GDP and ascertained the influence of agricultural growth performance on Nigeria poverty index within the reference period. The study made use of data from secondary sources obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin, Annual Report and Statements of Account from the Central Bank of Nigeria (CBN), National Bureau of Statistics (NBS), Food and Agriculture Organization (FAO), Nigeria Meteorological Agency, World Bank and Index Mundi. The data series of interest covered the period from 1980-2017. It was revealed that forest depletion (0.0005), carbon emissions (0.0185*), and government expenditure on agriculture (0.0104*) were negatively significant variables affecting real gross domestic product within the reference period while the agricultural production index (0.0002*) was a positively significant variable affecting economic growth. It was also revealed that temperature (0.0316*) was a negatively significant variable affecting poverty within the reference period while forest depletion (0.0026*) was a positively significant variable affecting poverty level. The study further revealed that temperature (0.0115*) and carbon emissions (0.0213*) were positively significant variables affecting Nigeria's agricultural share of GDP within the reference period and finally government expenditure on agriculture (0.0228*) was revealed to be a positively significant variable affecting poverty index in Nigeria within the reference period. The study therefore recommended that the Federal Government of Nigeria embark on poverty alleviation by providing modern infrastructures in the rural areas and not only in the city. Adequate infrastructures will boost agriculture which can create jobs for the jobless youth and enhance the per capita income of the country, also recycling of the important climate factors should be encouraged in Nigeria to maintain a steady supply of agricultural produce.*

Keywords: *Climate Change, Poverty, Agricultural Growth, Economic Performance*

INTRODUCTION

As the planet warms, rainfall patterns shift, and extreme events such as droughts, floods, and forest fires become more frequent (Zoellick, 2009), which results in poor and unpredictable yields, hereby making farmers more vulnerable, particularly in Africa (United Nations Framework Convention on Climate Change (UNFCCC), 2007). Agriculture and climate are directly related, exerting mutual effects. One of the most serious environmental threats facing mankind worldwide is climate change. Climate change affects most significantly in agriculture out of the other economic sectors because of its worldwide distribution and the strong linkage and dependence of the climate and environmental factors. Thus the effects of climate change on agricultural production impact the socio-economical dimension at both the macro and micro scales (Quasem, 2011). 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, Nyong, Osman, Conde, Cortes, and Dowing, 2006). Available evidence shows that climate change is global, likewise its impacts; but the most adverse effects will be felt mainly by developing countries, especially those in Africa, due to their low level of coping capabilities (Nwafor 2007; Jagtap 2007). Nigeria is one of these developing countries (Odjugo, 2010).

Furthermore, with a wealth of resources, one would expect an average Nigerian to enjoy a good living standard. Paradoxically, however, the reverse is the case. Poverty has been a problem for a large proportion of the population in the past decades, with surges of over 60 % (Daniel, 2011, National Bureau of Statistics, 2007). It was first revealed in June 2018 that Nigeria had overtaken India as the nation with the highest number of people living in extreme poverty across the world, with an estimated 86.9 million people measured to be living on less than $1.25 (N381.25) a day (CNN, 2018. According to available data (World Poverty Clock, 2018), a web tool produced by World Data Lab, that number has increased by nearly four million more Nigerians in just six months. This is despite the fact that the estimated 643.5 million people living in extreme poverty all over the world have dropped to 592.7 million in the same period. As of the time of this report, the 90.8 million Nigerians living in extreme poverty constituted a staggering 46.4% of its estimated 195.6 million total population (Toromade, 2018).

Surprisingly, Nigeria with endowment of abundant human and natural resources, the sixth largest oil producer is enlisted among the most corrupt countries of the world, whose citizens suffer from high rate of poverty (Olayinka and David, 2022). Similarly, Kale (2012) asserted that poverty in Nigeria is a paradox

Consequently, bearing in mind that the effect of climate change can be threatening to agricultural growth and economic development, which could in turn, increase the rate of poverty in Nigeria and the world at large. Hence, for this reason, the study assessed climate change, poverty, and agricultural growth performance in Nigeria over the years. Specifically, the study:

i. examined the effect of climate variability, agricultural growth, and other selected macro-economic variables on economic growth within the reference period;
ii. examined the effect of climate change on poverty level in Nigeria;
iii. assess the impact of climate change on Nigeria's agricultural share of GDP;
iv. ascertain the influence of agricultural growth performance on Nigeria's poverty index

METHODOLOGY

The Study location is Nigeria. The climate is semi-arid in the north and becomes increasingly humid in the south, with mean annual temperature ranging from 280- 310c in the south. Rainfall is one of the important climatic factors influencing agriculture and three broad ecological zones are commonly distinguished: the northern Sudan savannah (500 – 1000mm), the guinea

savannah zone or middle belt (1,000 – 1,500mm), and the southern rainforest zone (1,500 – 4,500mm), (ADB, 2006). Generally, rainfall patterns are marked by an alteration of wet and dry seasons of varying duration (Sawa, B. A., Ati, O. F., Jaiyeoba, I. A., Oladipo, E. O., 2015). In the north, rainfall lasts from May to September with a peak in August, while in the south, rainfall is bimodal, increasing steadily from January and reaching its peak in September. About two-thirds of the area cropped is located in the north with the rest equally divided between the middle and southern zones (ADB, 2006). The study made use of data from secondary sources obtained from the Central Bank of Nigeria (CBN), Statistical Bulletin, Annual Report and Statements of Account and Report of Central Bank of Nigeria (CBN), National Bureau of Statistics (NBS), Food and Agriculture Organization (FAO), Nigeria Meteorological Agency, World Bank and Index Mundi. The data series of interest covered the period from 1980-2017.

Model Specifications

For the effect of climate variability, agricultural growth, poverty index and other selected macro-economic variables on economic growth within the reference period. The baseline model is stated as follows:

$$GDP = \beta_0 + \beta_1 ARF + \beta_2 FDL + \beta_3 CEM + \beta_4 GEXP + \beta_5 PINV + \beta_6 REXR + \beta_7 ITR + \beta_8 DCI + \beta_9 AGP + \varepsilon t \quad \text{eqn 1}$$

Where,
GDP = Gross Domestic Product, measured in millions of naira (a measure of overall economic activities in the Nigerian economy),
ARF = Average Total Annual Rainfall (millimeters per year),
FDL = Forest Depletion (% of GNI),
CEM = Carbon Emission (kt),
GEXP = Government Expenditure (measured in millions of naira),
PINV = Domestic Private Investment (proxied by real gross fixed capital formation), measured in millions of naira,
REXR = Average Official Exchange Rate (naira to a dollar),
ITR = Interest Rate (% percent)
DCI = Discomfort Index (DCI): According to Oswald (2001), economic discomfort (or misery index) is an economic indicator used to determine how the average citizen is doing economically. The assumption here is that both unemployment and inflation creates both economic and social costs for a country. As such, some studies have used this index to measure poverty (i.e. Onyedikachi & Chiweoke, 2013), economic discomfort is computed thus:

$$DCI = UNMPR + INFR \quad \text{eqn 2}$$

Where,
DCI = Discomfort index; UNMPR = Unemployment rate and INFR = Inflation rate.
AGP = Agricultural production given by the index of agricultural production
β_0 = intercept, $\beta_1 – \beta_9$ are the partial slope coefficients, and
εt = stochastic error term.

For the effect of climate change on the poverty level in Nigeria, the Ordinary least squares *function* is stated as:

$DCI = \beta_0 + \beta_1 ARF + \beta_2 FDL + \beta_3 CEM + e$ - - - - - - *eqn 3*

where,
DCI = Discomfort index (a proxy for poverty)
ARF = average total annual rainfall (millimetres per year),
FDL = forest depletion (% of GNI),
CEM = carbon emission (kt),
β_0 = Constant
$\beta_1 - \beta_3$ = Population parameters
e = Estimated error term

For the impact of climate change on Nigeria's agricultural share of GDP, the Ordinary least squares function is stated as:

$AGDP = \beta_0 + \beta_1 ARF + \beta_2 FDL + \beta_3 CEM + e$ - - - - - - *eqn 4*

where,
AGDP = Share of Agric in GDP (%)
ARF = average total annual rainfall (millimeters per year),
FDL = forest depletion (% of GNI),
CEM = carbon emission (kt),
β_0 = Constant
$\beta_1 - \beta_3$ = Population parameters
e = Estimated error term

For the influence of agricultural growth performance and climate change on Nigeria's poverty index, the Ordinary least squares function is stated as:

$DCI = \beta_0 + \beta_1 ARF + \beta_2 FDL + \beta_3 CEM + \beta_4 AGP + e$ - - - - - - *eqn 5*

where,
DCI = Discomfort index (a proxy for poverty)
ARF = average total annual rainfall (millimetres per year),
FDL = forest depletion (% of GNI),
CEM = carbon emission (kt),
AGP = Agricultural production given by the index of agricultural production
β_0 = Constant
$\beta_1 - \beta_4$ = Population parameters
e = Estimated error term

RESULTS AND DISCUSSION

To examine the effect of climate variables, agricultural growth, poverty index, and other selected macroeconomic variables on economic growth, the OLR was used. Forest depletion, carbon emissions, agricultural government expenditure, and domestic private investment were negatively significant variables affecting real gross domestic product within the reference period, while agricultural production index was a positively significant variable, affecting real gross domestic product. The coefficient of real gross domestic product was 35089050 which implied that when the parameters of the model are zero, the real GDP will increase by 35089050 units.

Table 1: Effect of Climate Variables, Agricultural Growth, Poverty Index, and Other Selected Macro-Economic Variables on Economic Growth

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	35089050	15151543	2.315873	0.0284*
RAINFALL	19353.14	72101.33	0.268416	0.7904
TEMPERATURE	3970600.	5750128.	0.690524	0.4958
FOREST_DEPLETION	-19120362	4842846.	-3.948167	0.0005*
CO2_EMISSIONS	-447.0579	178.4114	-2.505770	0.0185*
*AGRIC_GOVT_EXPENDITURE	-0.003452	0.001253	-2.754646	0.0104*
DPI__GFCF_	-2.51E-06	8.15E-07	-3.079376	0.1347
EXCHANGE	13848.99	65222.22	0.212335	0.8334
INTEREST	-96413.41	161802.2	-0.595872	0.5562
DCI	95443.89	278380.2	0.342854	0.7344
AGRIC_PRODUCT_INDEX	-10.05557	229715.6	-4.377401	0.0002*

R-squared	0.844740	Mean dependent var	33724954
Adjusted R-squared	0.787236	S.D. dependent var	19577599
S.E. of regression	9030437.	Akaike info criterion	35.10730
Sum squared resid	2.20E+15	Schwarz criterion	35.58134
Log-likelihood	-656.0387	Hannan-Quinn criter.	35.27596
F-statistic	14.69014	Durbin-Watson stat	1.152909
Prob(F-statistic)	0.000000		

Source: Time Series Data (1980 – 2017) * Significant (Prob. < 0.05)

The coefficient of forest depletion was -19120362, this shows that forest depletion was negatively related to real GDP in Nigeria, and this implied that a unit change in forest depletion will decrease real GDP by 19120362%. This result is consistent with Crespo *et al.* (2017) whose study has implications in particular for countries on the dangerous part of the deforestation curve, where economic growth is likely to lead to major forest cover loss in the near future. The results suggest that Nigeria is expected to be particularly vulnerable to forest cover loss as sub-Saharan economies catch up on income per capita with the rest of the world. The coefficient of carbon emission was -447.0579 which shows that carbon emission was negatively related to real GDP in Nigeria and this shows that a unit increase in carbon emissions will decrease real GDP by 447.06%. This is consistent with Aslanidis and Iranzo (2009) and Ahmed *et al.* (2017) among others who observed a *U*-shaped relationship between economic growth and CO_2 emission whereby increasing economic growth initially leads to declining CO_2 emission levels, reaches a threshold, beyond which increasing levels of GDP increases CO_2. This implies that beyond a certain level of GDP, a further rise of GDP can be achieved at the cost of environmental degradation. When a country industrializes, this will lead to increased pollution. As increasing production and consumption cause rising environmental damage, then economic growth will have a negative environmental impact (Everett, Ishwaran, Ansaloni, & Rubin, 2010). This is intuitive because higher income levels will lead to the pursuit of a more manufacturing economy. If there are no complementary policies that constrain the industries to limit their level of pollution by adopting environmentally friendly production techniques and processes, the presence of these industries will ultimately result in high environmental degradation.

The coefficient of agricultural government expenditure was -0.003452 which shows that agricultural government expenditure was negatively related to real GDP in Nigeria, and this shows that a unit increase in agricultural government expenditure will decrease real GDP by -0.0035%. This may have occurred as a result of information passed to farmers which was not appropriate. This result contradicts the findings by Eyo (2008) which shows that public credit

to the agricultural sector was statistically insignificant in explaining agricultural growth and ultimately economic growth.

The coefficient of the agricultural production index was -10.06 which shows that agricultural production index is negatively related to real GDP in Nigeria and this shows that a unit increase in agricultural production index will decrease real GDP by 10.06%. This is consistent with literature that highlights the lack of attention and investment in the agriculture sector in spite of its proven potentials. Awokuse (2008) made similar observations in three oil-producing countries including Nigeria and concluded that this trend might be a reflection of the Dutch disease which is characterized by the draining of resources from the agriculture sector into the industrial sector.

On the effect of climate change on poverty level in Nigeria, it could be observed that temperature was a negatively significant variable affecting poverty level within the reference period while forest depletion was a positively significant variable affecting poverty level. The coefficient of poverty level was -0.179200 which implies that when the parameters of the model are zero, the poverty level will decrease by 0.18 units.

Table 2: Effect of Climate Change on Poverty Level in Nigeria

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.179200	8.255812	-0.021706	0.9828
RAINFALL	0.058560	0.050127	1.168231	0.2511
TEMPERATURE	-8.243471	3.672658	-2.244552	0.0316*
FOREST_DEPLETION	6.085815	1.866948	3.259766	0.0026*
CO2_EMISSIONS	4.60E-05	7.15E-05	0.644405	0.5238

R-squared	0.379291	Mean dependent var	12.94224
Adjusted R-squared	0.304054	S.D. dependent var	8.261602
S.E. of regression	6.892109	Akaike info criterion	6.820711
Sum squared resid	1567.539	Schwarz criterion	7.036183
Log-likelihood	-124.5935	Hannan-Quinn criter.	6.897374
F-statistic	5.041252	Durbin-Watson stat	1.164308
Prob(F-statistic)	0.002776		

Source: Time Series Data (1980 – 2017) * Significant (Prob. < 0.05)

The coefficient of temperature was -8.243471 which shows that temperature is negatively related to poverty level in Nigeria and this shows that a unit increase in temperature will decrease poverty level by 8.24%.

The coefficient of forest depletion was 6.085815, this shows that forest depletion is positively related to the poverty level in Nigeria and this implies that a unit change in forest depletion will increase the poverty level by 6.09%. This result is consistent with Gbetnkom (2009) who posited that forests influence food security through their impact on supplies of fuel wood which is a major source of income to many poor households forest depletion however is impairing the capacity of forests to contribute to food security and other needs and thereby increasing poverty level. From

Table 3, it could be observed that temperature and carbon emissions were positively significant variables affecting Nigeria's agricultural share of GDP within the reference period. The coefficient of Nigeria's agricultural share of GDP was -3942527 which implies that when the parameters of the model are zero, Nigeria's agricultural share of GDP will decrease by 3942527 units.

Table 3: Impact of Climate Change on Nigeria's Agricultural Share of GDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3942527.	4345730.	-0.907218	0.3709
RAINFALL	12345.83	26386.20	0.467890	0.6429
TEMPERATURE	5.173043	1933230.	2.675855	0.0115*
FOREST_DEPLETION	372406.3	982732.4	0.378950	0.7072
CO2_EMISSIONS	90.96338	37.61261	2.418428	0.0213*

R-squared	0.558995	Mean dependent var	7693524.
Adjusted R-squared	0.505540	S.D. dependent var	5159286.
S.E. of regression	3627898.	Akaike info criterion	33.16828
Sum squared resid	4.34E+14	Schwarz criterion	33.38376
Log-likelihood	-625.1974	Hannan-Quinn criter.	33.24495
F-statistic	10.45729	Durbin-Watson stat	0.811273
Prob(F-statistic)	0.000014		

Source: Time Series Data (1980 – 2017) * Significant (Prob. < 0.05)

The coefficient of temperature was 5.173043 which shows that temperature was positively related to Nigeria's agricultural share of GDP and this shows that a unit increase in temperature will increase Nigeria's agricultural share of GDP by 5.17%. This result is consistent with Dongbei et al (2022) who posited that climate is always significantly negative, indicating that climate change has a negative impact on agricultural productivity.

The coefficient of carbon emissions was 90.96338, this shows that carbon emissions are positively related to Nigeria's agricultural share of GDP and this implies that a unit change in carbon emission will increase Nigeria's agricultural share of GDP by 90.96%.

From Table 4, it could be observed that agricultural government expenditure was a positively significant variable affecting the poverty index in Nigeria within the reference period. The coefficient of the poverty index was 13.91206 which implies that when the parameters of the model are zero, the poverty index will increase by 13.91206 units.

Table 4: Influence of Agricultural Growth Performance on Nigeria Poverty Index

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.91206	3.684736	3.775591	0.0006*
AGRIC_PRODUCT_INDEX	0.094651	0.088426	1.070394	0.2920
AGRIC_GOVT_EXPENDITURE	-8.90E-10	7.17E-10	-1.241798	0.0228*
AGRIC_GDP	-7.18E-07	4.31E-07	-1.667411	0.1046

R-squared	0.118072	Mean dependent var	12.94224
Adjusted R-squared	0.040255	S.D. dependent var	8.261602
S.E. of regression	8.093610	Akaike info criterion	7.119327
Sum squared resid	2227.222	Schwarz criterion	7.291705
Log-likelihood	-131.2672	Hannan-Quinn criter.	7.180658
F-statistic	1.517297	Durbin-Watson stat	0.983027
Prob(F-statistic)	0.227648		

Source: Time Series Data (1980 – 2017) * Significant (Prob. < 0.05)

The coefficient of agricultural government expenditure was -8.90E-10 which shows that agricultural government expenditure is negatively related to the poverty index and this shows that a unit increase in agricultural government expenditure will decrease the poverty index by

8.90%. This result is consistent with Asghar et al. (2012) who posited that increased government investments in sectors such as health, education, agriculture, and social amenities can alleviate poverty, reduce transaction costs as well as increase the nation's human capital capacity. Government expenditure on agriculture is a mechanism which goes a long way to reduce poverty in every nation (Omodero, 2019). This is obvious in the sense that agriculture helps in sufficient food supply at a very low cost as well as industrial raw materials and also reduce the level of unemployment by creating jobs. …. (discuss your findings)

CONCLUSION

In conclusion, the study has provided valuable insight into the relationship between climate change, poverty, and Agricultural growth performance in Nigeria. Based on the findings it could be deduced from this study that climate change, poverty, and agricultural growth performance were significantly linked together as climate change was a significant variable affecting agricultural growth and poverty level within the reference period of which farmers have little or no access to such information. It is therefore recommended that there should be an increase in the awareness level of farmers and general public especially on climate change issues by the extension agents, research and academic institutions. There is also a need for a collaborative approach involving all the stakeholders such as science experts and researchers, governments at all levels, policy makers, farmers' associations, youth and women groups, private sectors: nongovernmental and civil society organizations to work together in turning the critical challenges posed by climate change into viable opportunities.

REFERENCES

African Development Bank (ADB) (2006). National Programme for Food Security (NFPS). Staff Appraisal Report.

Asghar, N., Hussain, Z. & Rehman, H. (2012). The Impact of Government Spending on Poverty Reduction: Evidence from Pakistan 1972-2008. *African Journal of Business Management*, 6 (3), 845-853.

Aslanidis, N., & Iranzo, S. (2009). Environment and development: Is there a Kuznets curve for CO2 emissions? Applied Economics, 41, 803–810. https://doi. org/10.1080/00036840601018994

Awokuse, T. (2008). Does Agriculture Really Matter for Economic Growth in Developing Countries? *American Agricultural Economics Association Annual Meeting*. Milwaukee, WI.

CNN (2018), www.cnn.com\2018\06\26\africa\nigeria

Daniel, A. (2011). Experimental Poverty Measures. Summary of a Workshop Paper presented at the Committee on National Statistics (CNSTAT).

Everett, T., Ishwaran, M., Ansaloni, G. P., & Rubin, A. (2010). Economic Growth and the Environment. Department for Environment Food and Rural Affairs, Evidence and Analysis Series.

Eyo O.E., (2008). Macroeconomic Environment and Agricultural Sector Growth in Nigeria. World *Journal of Agricultural Sciences* Vol.4, no. 6, pp. 781-786, 2008 ISSN 1817-3047. © IDOSI Publications, 2008.

FMARD (2001).*National Fadama Infrastructure Survey Report*, Sheda-Abuja: World Bank/Projects Coordinating Unit, Federal Ministry of Agriculture and Rural Development, Abuja.

Gbetnkom, L.A. (2009). *Hydrology of moist tropical forests and effects of conversion: a state of the knowledge review*. Amsterdam, the Netherlands, Netherlands Committee for the International Hydrological Programme of UNESCO.

Jagtap, S. (2007) Managing vulnerability to extreme weather and climate events: Implications for agriculture and food security in Africa. *Proceedings of the International Conference on Climate Change and Economic Sustainability held* at Nnamdi AzikiweUniversity, Enugu, Nigeria. 12-14 June 2007.

Kale, Y., 2012, *The review of the Nigerian economy*, National Bureau of Statistics (NBS), Abuja.

NBS (National Bureau of Statistics) (2007). Details of the Breakdown of the National and State Provincial Population Totals 2006 Census. National Bureau of Statistics, Federal Republic of Nigeria Official Gazette, 24(94), 1 – 26

Nwafor JC 2007. Global climate change: The driver of multiple causes of flood intensity in Sub-Saharan Africa. Paper presented at the International Conference- General Overview of Climate Change Impacts In Nigeria 55 on Climate Change and Economic Sustainability held at Nnamdi Azikiwe University, Enugu, Nigeria, 12-14 June 2007.

Odjugo, P. A. O. (2010). General Overview of Climate Change Impacts in Nigeria. *Journal Hum Ecol, 29(1): 47-55*

Olayinka, Akanle and David, O. Nkpe (2022). Introduction, Corruption and Development in Nigeria. London: Routledge. www.researchgate.net/publication/357394627

Omodero C.O., (2019). Government Sectoral Expenditure and Poverty Alleviation in Nigeria. Research in World Economy Vol. 10, No. 1; 2019,

Onyedikachi, M. O. and Chinweoke, N. (2013). Poverty and Economic Growth in Nigeria 1990-2011. *The Macrotheme Review: A Multidisciplinary journal of global macro trend.*

Quasem Al-Amin, Walter Leal, Josep Maria de la Trinxeria, Abdul Hamid Jaafar and Zabawi Abdul Ghani, (2011) "Assessing the Impacts of Climate Change in the Malaysian Agriculture Sector and its Influences in Investment Decision", Middle East *Journal of Scientific Research*, Vol. 7, No. 2, pp. 225- 234, 2011

Sawa, B. A., Ati, O. F., Jaiyeoba, I. A., Oladipo, E. O., (2015). Trend in Aridity of the Arid and Semi-Arid Regions of Northern Nigeria. Journal of Environment and Earth Science. Vol.5 No.10, 2015

Toromade, S. (2018). Nigeria ends 2018 with 90.8 million people living in extreme poverty. Pulse Nigeria. www.pulse.ng

United Nations Framework Convention on Climate Change(UNFCCC). (2007). Climatic Change Impact, Vulnerabilities Adaptation in Developing Countries UNFCCC Secretariat, Martin-Luther-King-Straat 8 53175 Bonn, Germany. www.unfccc.int

Ziervogel G., Nyong, A., Osman, B., Conde, C., Cortes, S. and Dowing T. (2006). Climate variability and change: implications for household food security. Assessments of Impacts and Adaptations to Climate Change (AIACC) Working Paper No. 20. The AIACC Project Ofice, International START Secretariat, Washington DC, USA.

Zoellick, R. B. (2009). A Climate Smart Future. The Nation Newspapers. Vintage Press Limited, Lagos, Nigeria. Page 18