



CLIMATE CHANGE AND FOOD SECURITY IN THE NIGER DELTA

LEBARI, GOSPEL NUKOAKA & ONUENGBU, FERGUSON AMAOBI

Abstract

This paper argued that the impact of climate change on food security in the Niger Delta is obvious on both crop and fish productions in the region, as these activities are hugely plagued and threatened. Data for this study were derived from secondary sources and analyzed using qualitative method. This paper concludes that the unpredictability of rainfall and the general changes in weather conditions in the region exposes the height of the situation. The paper therefore, recommended that the Nigerian state must rise up to supporting farmers with needed technology, so as to improve the capacity of food production in the Niger Delta region (and in Nigeria).

Keywords: Climate Change, Global Warming, Food Security, Niger Delta.

Introduction

Man's livelihood and socio-economic development is threatened by several environment-related issues, but, standing tall among popular environmental threats is climate change (Bello et.al 2012). Due to several activities of man, particularly, industrialization and some natural events, 'greenhouse' gases has been on the increase, which has created a bad situation for man as the temperature has increased as a result, thereby bringing about global warming which has a highly negative effect on the growth of crops, the soil as well as its waters, thus leading to the prevalence of infections and diseases on food crops. Furthermore, these changes have infuriated the climate, thereby making it a risk and not very suitable for the overall production of food in the Niger Delta region, as yields from crops and catch from fishery activities have since been negatively affected.

Climate change is the alterations that occur in the atmosphere because of man's activities and natural occurrences. The earth, according to Ifeanyi-obi, Etuk & Jike-wai (2012, p.53), "is surrounded by a layer of gases that act like the glass wall (earth's blanket) and ceiling of a green house." They further observe that for the sustainability and prolongation of life on planet earth, these green house gases are imperative. The challenge of today's world however, is that the unusual thickness of the green house gases in the troposphere which happens because of the emissions from man because of industrial activities, thus, warming up the climate globally to. Surprisingly, the temperature of the earth has suffered a rise of over 0.74C over the last century





(Direct Gov., 2010, in Ifeanyi-obi, Etuk & Jike-wai, 2012). Scientists world over are fast reaching a consensus that the global temperature would further increase, as a result of global warming, weather events have taken a slightly different twist in relation to predicting it, particularly as it relates to floods, forest fires, soil erosion, sea level rise, drying up of lakes drought etc. (Ifeanyi-obi, Etuk & Jike-wai, 2012; Bello et.al, 2012; Olaniyi, Funmilayo & Olutimehin, 2014). However, on the part of the Intergovernmental Panel on Climate Change (IPCC), the foremost basis of climate change is man's activities. The following were observed to be the major ways through which human activities heats up the climate: burning of fossil fuels, deforestation and population growth.

Though the issue of climate change is a global challenge, Nigeria's experience is undesirable, because it impacts on Nigerians in diverse, but adverse ways (Olaniyi, Funmilayo & Olutimehin, 2014). Although, present day Nigeria may not be said to be an agro-based economy when examined strictly despite the move by the government to return to farm, however, most Nigerian citizens are involved in one agricultural activity or the other, and despite the massive technological advancement that the world seem to have at her disposal in this era, some African nations (Nigeria inclusive) are still holding on to traditional forms of agriculture. Agricultural activities in Nigeria, is hugely weather (climate) dependent (Ifeanyi-obi, Etuk & Jike-wai, 2012). So the challenge of climate change would manifest in poor agricultural production, thereby, bringing about poor yields (Apata, 2011). On the other hand, the place of food security in any nation cannot be over-emphasized; any nation whose food requirement is far higher than its supply is one with food crisis. The world's food crisis is something else, and as revealed by Ban Ki Moon, the former Secretary General of the United Nations, over one billion people are still starving, and the world loses six million children to death because of hunger annually, and over 17,000 daily (Nigerian Compass, November,18, 2009:6, in Ojo & Adebayo 2012).

In looking at food security, the work of Dahlberg (1998) is very essential. He recognized four global threats that have implications on food security in cities. In considering the Niger Delta in this regard, we recognize that there are several cities and emerging cities in the Niger Delta region, but that does not negate the fact, that the region is still characterized by rural and peasant livelihood. However, as a result of economic activities from oil exploration and related activities, the region suffers all of these threats observed by. The threats observed are, the rise in population (human, livestock and vehicle), global warming, the loss of biodiversity and poverty and the globalization of injustice (Ojo & Adebayo, 2012). It is against this background that this paper explores the issue of climate change and food security and the likely consequences of continuous changes in the climatic condition of the Niger Delta region, arising particularly from oil and gas exploration and exploitation and other related ecocide ongoing in the region. We also looked at prevention methods in place, in trying to combat food insecurity.

In a globally changing climate, concerns are raised in relation to the agricultural process that guarantees food security in the Niger Delta region of Nigeria. Extant data reveals that rainfall in the southern zone of Nigeria, where the Niger Delta is situated has assumed an irregular pattern (Bello et.al 2012). Crop production and fish farming in the Niger Delta still depends hugely on weather owing to the scarcity of modern technology in this area. They further argue that in a





place like the Niger Delta, the environment is already vulnerable because there is an unusual rise in sea levels, hence the flooding of the Niger Delta communities that leads to the displacement of the people from their homes and communities.

Relating the above to the fact that Niger Deltans like their other Nigerian counterparts were farmers before the exploration and exploitation of crude oil in their domain, and the seeming neglect of the agricultural sector in the region as a result of oil and gas exploitation and exploration, as well as other related economic activities in the area, there are still a number of Niger Deltans, particularly those in the rural areas who are still directly involved in one agricultural activity or the other. However, considering that agriculture and its activities in Nigeria (the Niger Delta) is weather and climate dependent, the emission of greenhouse gases which is on a high side in the area poses a great threat to agriculture and the overall production of food that could of course guarantee food security in the region.

The global call from the international arena regarding the issue of climate change has received a higher dimension (Apata, 2011). While looking at the menace of climate change in relation to food security, it is vital to point out that available technology for agriculture in Nigeria is indeed poor and this technological backwardness could be traced to the high level of illiteracy in the Nigerian society. Whereas, Nigeria has a huge deposit of gas, the failure of successive governments to stop gas flaring leaves Nigeria in an unenviable position where she continues to deplete the climate, thus posing a threat to food security. Hence, the following questions become needful; does the flaring of gas in the Niger Delta negatively affect crop production? Why is the region despite having so much water and fishing communities, not fish-sufficient? Why has the government not done enough in making the environmental conditions of the region conducive for food production? Our thrust in this therefore, is to examine the impact of the global changing climate on the food production and of course its security in the Niger Delta region of Nigeria. Thus, the study set out to achieve the following objectives;

- To investigate climate change patterns in Nigeria's Niger Delta
- To examine the impact of climate change on food security in the Niger Delta.

CONCEPTUAL CLARIFICATION

CLIMATE CHANGE

According to the Intergovernmental Panel on Climate Change (IPCC), climate change is seen as “statistically significant variations that persist for an extended period, typically decades or longer. It includes shift in frequency and magnitude of sporadic weather events as well as the slow continuous rise in global mean surface temperature” (Ifeanyi-obi, Etuk & Jike-wai, 2012, p.54). Olaniyi, Funmilayo & Olutimehin (2014) simply see it as the ascension in the temperature of the universe. He is of the view that this rise is occasioned by both natural events and the activities of mankind. The United Nations Framework Convention on Climate Change sees climate change as “a change of climate which is attributed directly or indirectly to human

This work is licensed under a [Creative Commons Attribution-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-sa/4.0/)





activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods” (UN, 1992:7). From the above therefore, climate change occurs when various socio-economic activities of man leads to outright alterations of atmospheric conditions. Therefore, man is responsible for these changes, and as a result, must be responsible for managing these changes.

Causes of Climate Change

Ifeanyi-obi, Etuk & Jike-wai (2012, p.54) submits that the four foundations of climate change are; “astronomical causes, volcanic eruptions, variations in solar outputs and changes in the earth’s environment as a result of human activity”, however, the Intergovernmental Panel on Climate Change (IPCC) posits that man’s activities are responsible for the changes observed in the climate. The activities of mankind have changed the atmospheric conditions of greenhouse gases in the following ways;

The Burning of Fossil Fuels

Of all the greenhouse gases, carbon dioxide stands tall. Carbon dioxide is emitted as a result of man’s activities like transportation, cooking gas flaring, bush burning and other energy creating activities of man. Nigeria and indeed the Niger Delta is one of the highest emitters of greenhouse gases in the globe, as there are over one hundred and twenty three gas flaring sites in the Niger Delta region. Also, a World Bank study of 2008 revealed that Nigeria is responsible for one-sixth of the entire gas flared in the world. 75% of her gas is also flared, thus, contributing to the accumulation of greenhouse gases, hence, climate change (Ifeanyi-obi, Etuk & Jike-wai, 2012).

Population Growth

The rise in population in Nigeria necessitates the rise in food production, energy and other human activity. Therefore, owing to this rise in demand, there arises an increase in emission (Ifeanyi-obi, Etuk & Jike-wai, 2012). Obviously, as population grows, so does needs, and if that be the case, man must certainly engage in more activities to ensure that these needs are met. In doing so, more energy is needed, and if more energy is used, so will be emissions. Thus, managing and checking the rise in population would amount to preserving the global climate.

FOOD SECURITY

Ogundare (2015, p.5) observed that food security is “the ability of a people to meet their required level of food consumption at all times.” On their part, FOA (1996) in Adegbola, Bamishaiye & Daura (2011, p.57) sees food security as “a situation when all people at all time have physical and economic access to sufficient, safe and nutritious food for a healthy and active life.” From the view above, one salient fact is that food security is beyond the availability of food. Thus, there is a movement from food availability to access. The place of access to food appears very important because there could be the possibility of a country producing or having



the quantity and quality of food that should be enough for her population, yet not accessible to all. Thus, it is “having at all times an adequate level of food and food products to meet increasing consumption demand to mitigate fluctuation in output and price” (Adegbola, Bamishaiye & Daura, 2011, p.57)). In the view of the FAO, the planet does not lack food, as there is sufficient food across the globe, yet there are millions of undernourished people all over the world (in Adegbola, Bamishaiye & Daura, 2011). Also, the place of access is presented here, as the availability of enough food does not actually translate to lack of hunger or availability of food to some persons as they are unable to access food despite its global availability. Therefore, in the Niger Delta, the place of access in defining food security in the region must be central in our mind.

METHODOLOGY

The study area is the Niger Delta of Nigeria. The Niger Delta is situated in Southern Nigeria’s Atlantic Coast, where the River Niger divides into offshoots. The Niger Delta which inhabits over 20,000 square kilometers is one of the largest deltas in the world. According to Awosika (1995) in Uyigue & Agho (2007) of the 20,000 square kilometers, 2,370 square kilometers consists of creeks, rivers among others, whereas 8,600 square kilometers is filled with stagnant swamps. The Niger Delta region falls within the tropical rain forest.

The Niger Delta region is made up of nine states. These states are all in the Southern region, and they are Abia; Akwa Ibom; Bayelsa; Cross River, Delta; Edo; Imo; Ondo; and, Rivers States. The region is quite sensitive ecologically and it is the economic base of Nigeria’s economy (Uyigue & Agho, 2007). There are various ethnic groups in the Niger Delta, among which are the Ijaws, the Ogonis, the Ikwerres, The Ibibios, the Annangs.

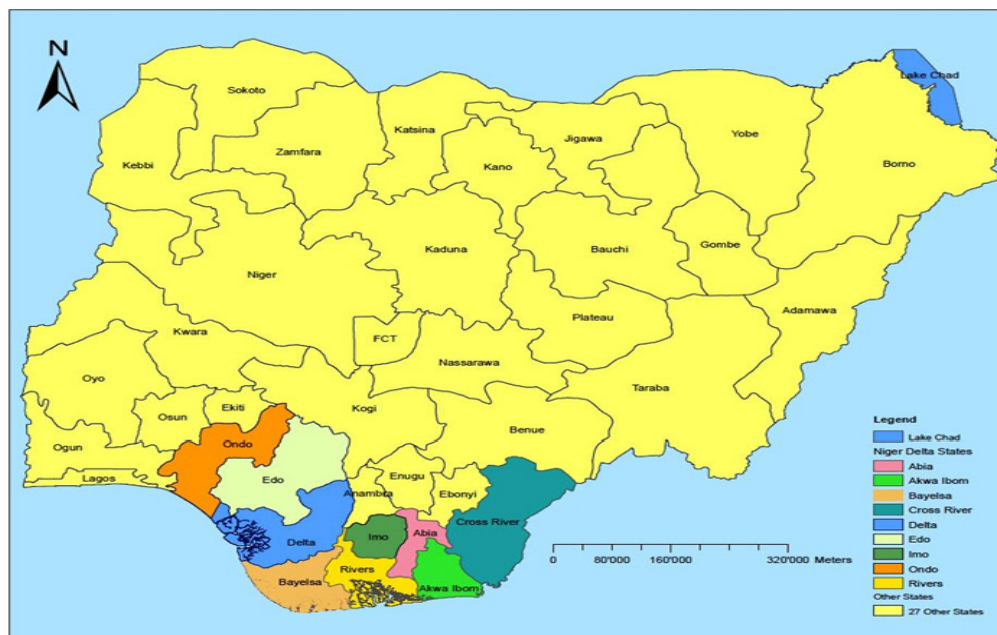


Figure 1: Map of Nigeria showing the states of the Niger Delta.



Source: <http://pubs.sciepub.com/env/1/4/2/figure/1>

Table 1: Population of the states in the Niger Delta based on 2006 Census

State	Population (Male)	Population (Female)	Population (Total)
Abia	1,430,298	1,451,082	2,881,380
Akwa Ibom	1,983,202	1,918,849	3,902,051
Bayelsa	874,083	830,432	1,704,515
Cross River	1,471,967	1,421,021	2,892,988
Delta	2,069,309	2,043,136	4,112,445
Edo	1,633,946	1,599,420	3,233,366
Imo	1,976,471	1,951,092	3,927,563
Ondo	1,745,057	1,715,820	3,460,877
Rivers	2,673,026	2,525,690	5,198,716

Source: <http://www.population.gov.ng/index.php/state-population>

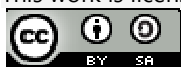
Data for this study were derived secondarily. These data were derived from journal articles, government reports, and reports of the International Panel on Climate Change (IPCC), the United Nations Framework Convention on Climate Change (UNFCCC), book and book chapters, the internet and other relevant materials. The generated data were analyzed qualitatively, using content analysis.

CLIMATE CHANGE AND FOOD SECURITY: THEORETICAL ISSUES

This study adopts the sustainable livelihood approach as the framework of analysis. The sustainable livelihood approach is an approach to food security as well as to development and poverty. It can be traced to Robert Chambers. The approach was expanded by him and other scholars (Burchi & Demuro, 2012; Peterson & Pederson, 2010). On their part, Peterson & Pederson (2010) contend that the framework is an instrument for development work; as a result, it pinpoints how to appreciate and explore those dynamics that impinge on the livelihood of the poor people. The approach have been adopted by NGOs like Oxfam, governmental agencies like DFID and UN agencies like FAO and UNDP, among others ((Burchi & Demuro, 2012). On their part, Chambers & Conway discussed sustainable livelihood this way:

A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets,

This work is licensed under a [Creative Commons Attribution-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-sa/4.0/)





and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term (Krantz 2001, p.6)

The framework spotlights the potencies and assets people possess to guarantee their food defense and livelihood. The framework portrays food security and livelihood as a cyclical process. It inserts the perception of vulnerability and put together the idea of ‘disaster risk reduction’ (ACFIN, 2008).

Thus, in applying this approach to the subject of climate change and food security in the Niger Delta, there is the need for state policies and actions to be influenced to necessitate public and private policy direction targeted at reducing the vulnerability of the people and their food produce from the plague of climatic change in the Niger Delta region. Thus, conscious efforts must be put in to ensure massive reduction in the emission of greenhouse gases, therefore, bringing the impact of climate change on the overall production of food and its security in the Niger delta to a bearable minimum.

CLIMATE CHANGE AND THE NIGER DELTA

The Niger Delta region of Nigeria is the economic nerve centre of the Nigerian state. Almost all the oil and gas activities in Nigeria take place in this region; from crude oil exploration and exploitation to the flaring of gases. Going by the position of the IPCC that there is a significant relationship between greenhouse gas emission change and global temperature and sea level rise (Uyigüe & Agho, 2007). The table below reveals in summary the forecast of climatic challenges in Nigeria, as made known by the National Adaptation Strategy and Plan of Action on Climate Change (NASPA-CCN).

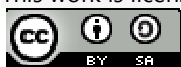
Table 2: A summary of current and future climate challenges in Nigeria

climate variables	mangrove zone	rain forest	tall grass (savanna)	short grass (sahel)
temperature	up	up	Up	up
rainfall amount	up	up	Down	down
rainfall variability	up	up	Up	up
extreme rainfall events: droughts	likely	likely	Up	up
extreme rainfall events: storms & floods	up	up	Likely	likely
sea level rise	up	n/a	n/a	n/a

Source: Nwajiuba (2012).

The Niger Delta can therefore be said to be seating on Nigeria’s hottest seat of climate change. The manifestations of change climate in the Niger Delta include but not limited to the following;

Coastal Erosion and Floods: As earlier pointed out, the region is predominantly a coastal environment. So, in relation to the IPCC report (2001), reveals that “the large scale loss of land





ice and thermal expansion of sea water has very likely contributed to the observed sea level rise” (Uyigüe & Agho, 2007, p.8). Also, another report (International Federation of Red Cross), millions of people globally are already suffering from the rise in sea level. Floods and coastal erosion has become a constant reality in the Niger Delta.

General Flooding: Whereas, Northern Nigeria suffers from desertification as a result of climate change, the Southern part on the other hand, suffers increase in flooding, particularly the coastal parts of the Southern region. The negative impact of flooding in the Niger Delta region has over the years been very high.

As a result of flood, road infrastructure had been destroyed, the top layer of the soil removed, fresh water resources had been affected, and crops destroyed among others. Despite the huge infrastructural deficit suffered in the Niger Delta, flood has actually caused more loss of infrastructure in the region. For instance, the flood that ravaged Nigeria in general, and the Niger Delta in particular, between the year 2012/2013 was so severe that major roads were covered, crops destroyed, houses destroyed and general livelihood of the Niger delta people altered. In a similar twist, communities in the Niger Delta are at the moment being sacked, schools closed down at a time schools should be in session and farm produces destroyed, among other things, as a result of the flood situation that currently bedevils the region and indeed several parts of the Nigerian state.

Flooding frustrates socio-economic activities in the region, as farming activities either in relation to crop production or fish farming are destroyed by flooding or at best, put on hold in the course of the flood. The life of the people in such periods of flood could be very harsh as the cost of goods and services are always on the high side.

Change in rainfall pattern: Reports from meteorologists reveals that Nigeria’s rainfall pattern has over the years seen some changes. (Uyigüe & Agho, 2007). The Niger Delta region lies in the tropics, and has but two seasons; the wet and dry season. However, since food security is the ability of a people to grow and obtain food, and the Niger Delta environment is hugely plagued with environmental degradation and environmental issues, particularly those relating to the emission of fossil fuels.

RESULT AND DISCUSSIONS

The global challenge of climate change does have environmentally-specific impacts on food security in the Niger Delta. These impacts are enormous, and as such, manifests in the following areas;

CLIMATE CHANGE AND FLOODING IN THE NIGER DELTA

Globally, the rise in sea level has been occasioned by the rise in temperature. As a result of this rise, low level areas are vulnerable to flood. Several communities in the Niger Delta have been cut off from others in the region because of flood (Uyigüe & Agho, 2007). This was the reality of





the Niger Delta during the 2012 flood, and it is indeed the reality of most communities of today's Niger Delta.

The Niger Delta being a low-lying environment surrounded by waters is of course vulnerable to flooding (Ifeanyi-obi, Etuk & Jike-wai, 2012). However, issues of flooding in the Niger Delta has reached a frightening echelon as people are been forced to abandon their houses and communities because of flood. In the flood of 2012/2013 and indeed the present, its severity was/is so much that the region had/have an agglomerate of camps for those displaced. Infrastructure was and is not spared in a region that is lacking in basic infrastructure, as roads and bridges were/are destroyed.

The implication of this in relation to food security is that crops are destroyed and aquatic lives are driven from their natural habitats. This leads to scarcity of the commodities destroyed by the affliction, therefore, bringing about significant rise in price of goods and services.

It is pertinent therefore, that in considering the Niger Delta which is an important region economically, particularly as it concerns the existence of Nigeria as an entity, there is the need to forestall further occurrences of flood because, it halts economic and agricultural activities in the region, thus, bringing about a colossal attack on the production of food and indeed its security in the Nigerian state in general and the Niger Delta in particular.

Table 6: Number of Communities at Risk of Flooding From Different Distance from River Body.

States	No. of Rivers Identified	No. of Towns Likely to be Affected	1.5KM Away Less Risk	1KM Away Moderate Risk	500M High risk Town	Average Risk/Town
Bayelsa	143	527	344	268	87	233.0
Delta	240	859	330	219	101	216.7
Rivers	197	762	436	307	56	266.3
Total	580	2148	1110	794	244	716.0

Source: Federal Republic of Nigeria Gazette (2007; 2009) in Amangabara & Obenade (2015).

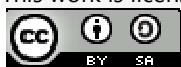




Table 7: Summary of Communities at High, Moderate and Low Risk of Flood

Risk Factor	No. of Towns	Ratio	% Percentage
1.5KM Away: less risk	1110	0.518	51.69
1KM Away: moderate risk	794	0.369	36.96
500M Away: high risk	244	0.113	11.35
Total	2148	1	100

Source: Federal Republic of Nigeria Gazette (2007; 2009) in Amangabara &Obenade (2015).

Beyond the above, there is a post-harvest failure as it relates to food because the intense character of the climate is undeniably damaging to the storage and delivery of food. Thus, placing the poor and vulnerable in a position of further vulnerability.

CLIMATE CHANGE AND FOOD PRODUCTION IN THE NIGER DELTA

Going by the unpredictability of rainfall patterns and the overall dependence of Nigeria's agricultural activities on the climate, there is no gainsaying that crop yield and food security is expected in respond to the negative. This situation is not only present in Nigeria, as rain-fed agriculture happens to dominate agricultural systems in Sub Saharan Africa. McGregor (2008, p.285) states that "changing rainfall patterns will lead to changing crop patterns." Also, the migration of pests and diseases because of the changing climate raises concern, thus, Mendelson et.al (in Ifeanyi-obi, Etuk & Jike-wai, 2012, p. 56) summits that "by 2100, Nigeria and other West African countries are likely to have agricultural loses of up to 4% of GDP due to climate change."

In situating this challenge within the Niger Delta, it is important to refer to McGregor (2008, p.286), who pointed out that "a further issue to be confronted is the rise in atmospheric CO₂." He furthered that from a study, CO₂ will not be beneficial to crops like maize, millet, and sorghum as the rise of CO₂ levels puts them at a disadvantaged position. McGregor didn't fail to recognize it's implication for Sub-Saharan Africa.

But going by the level of CO₂ that is emitted daily in the Niger Delta region and the level at which the rural people grow maize among the crops mentioned above, it becomes a matter of grave concern as the emission of CO₂ has obviously affected the yield and nutritional value of the maize grown. Similarly, the yield of staple crops like cassava and yam that are grown in the region has since diminished. The tubers of these crops are a shortfall of what its yield ought to be. Thus, the table below shows the estimated output of some food crops in the Niger Delta.

This work is licensed under a [Creative Commons Attribution-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-sa/4.0/)

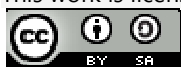




Table 4: Estimates of Output of Selected Crops in Metric Tonnes in the Niger Delta, 2013/2014 Season

Crop	2013 Output	2014 Output	% Change
Maize	872.0	925.2	6.09
Yam	7512.8	8351.3	6.61
Cassava	12166.4	12167.3	0.008
Cocoyam	109.3	709.5	0.17
Okra	1229.3	1229.3	0.0

Source: Adapted from Agricultural Development Programme, Rivers State (2016) in Uche, Ajie & Familusi (2016).

From the above table, one obvious fact is that the region grows some of the foods consumed; however, there is still dependence on other regions and imports from other countries to meet the food need of the Niger Delta. Thus, the Niger Delta is far from achieving food self-sufficiency in any of the foods in the above estimate.

In relation to fishery for instance, the Niger Delta region is majorly a coastal region; as a result, fishing is one of the major occupations of the rural dwellers, particularly those of riverine communities. However, Ozor (in Ifeanyi-obi, Etuk & Jike-wai, 2012) observed that changes in temperature, salinity, wind speed and direction etc. due to changes in the climatic conditions could result in the modification of fish production. Thus, changes in the global climate does or could lead to reduced fish landing in coastal fisheries (African Action, 2009 in Ifeanyi-obi, Etuk & Jike-wai, 2012). All of these lead to the fall in the availability of the required level of fish for consumption in the region. Due to climate change, the development of the fishes is affected negatively and there is volatility in domesticated number of fishes (Vermeulen et. al., 2010).

So, despite the huge availability of water in the region, there has been a reduction in the availability of fish needed within the region as the changes in climatic conditions in the environment has negated not just fish production but the entire business of aquaculture. Thus, Tubeilo (in Ifeanyi-obi, Etuk & Jike-wai, 2012) observed that climate change affects fishing activities in the following ways;

- Overall change in water as well as its temperature.
- Change in fishing patterns and the distribution of the species as a result of climate change
- The extreme nature of climatic conditions that affects fishery resources, resulting from their high level of sensitivity.

In line with the above, the reality of the average Niger Deltan, particularly in the rural areas, is the fact that that the water are hugely contaminated and as such dangerous for the aquatic animal.





As a result, the people are separated from their livelihood as outcomes of industrial activities and changes in climatic conditions have led to massive loss (death) of sea foods in the region. This condition is the reality of the Ogoni people of the region, as the rivers in the region are hugely contaminated. According to the report of the United Nations Environmental Programme (2011) on Ogoniland, the land and water bodies in Ogoniland have been hugely affected and polluted, and as such needs to be remediated, so as to reconnect the people back to nature. In the entire region, fishing activities has fallen greatly. The table below suffices.

Table 5: Analysis of Fish Catch within Selected LGAs of Delta State, Niger Delta (Weight Data-kg).

Sample No.	Before Oil Spill	After Oil Spill	Differences
1	75	15	60
2	80	25	55
3	70	30	40
4	65	10	55
5	70	30	40
6	90	20	70
7	85	45	40
8	65	0	65
9	78	35	43
10	110	60	50
-	-	-	-
-	-	-	-
-	-	-	-
60	70	0	70

Source: Akankali &Oransaye (2006) in Akankali &Jamabo (2011).

From the above table, it is clear that impact of these changes on catch in the fishing industry of the Niger Delta is negative. As the difference from the catch before spill and that after spill shows that catches dropped by over 50 percent in the region. Therefore, we could relate the above figure to the rest of the Niger Delta considering that oil spillage is not an unusual occurrence but a regular occurrence in the region. The fall in fish catch is manifest in the near-scarcity fish caught in locally and high cost of fish in the markets. A situation in which a commodity that was usually available and affordable has become augmented in price has tacitly deprived a section of the society of the right to benefit of such a commodity. This is the reality of the Niger Delta today in relation to climate change and food security, particularly as it concerns fish security.





OTHER EXTERNAL FACTORS

The Niger Delta being the economic hub of the Nigerian state, particularly, in relation to the exploitation and exploration of oil and gas, is indeed the center for the continuous emission of carbon-dioxide, as gas flaring is the order of the day in Nigeria's oil and gas industry. The impact of carbon dioxide on food production appears helpful to some species of crops, however, on a general note, it negatively influences the overall production of food (Wiltshire, Kay, Gornall & Betts, 2013).

Table: Amount of gas production, utilization and flared in Nigeria from 1970 – 2011 (data and information sourced from the Nigerian National Petroleum Corporation (NNPC), Department of Petroleum Resources (DPR) and Central Bank of Nigeria (CBN) Estimates)

Year	Production (Mm ³)	Utilization (Mm ³)	Flared (Mm ³)
1970	8029.0	72.0	7957.0
1971	12975.0	185.0	12790.0
1972	17122.0	274.0	16848.0
1973	21882.0	395.0	21487.0
1974	27170.0	394.0	26776.0
1975	18656.0	323.0	18333.0
1976	21276.0	659.0	20617.0
1977	21924.0	972.0	20952.0
1978	21306.0	1866.0	19440.0
1979	27619.0	1546.0	26073.0
1980	24551.0	1647.0	22904.0
1981	17113.0	2951.0	14162.0
1982	15382.0	3442.0	11940.0
1983	15192.0	3244.0	11948.0
1984	16255.0	3438.0	12817.0
1985	18569.0	3723.0	14846.0
1986	18739.0	1822.0	13917.0
1987	17085.0	4794.0	12291.0
1988	20253.0	5516.0	14737.0
1989	25053.0	6323.0	18730.0
1990	28163.0	6343.0	21820.0
1991	31588.0	7000.0	24588.0
1992	32464.0	7058.0	25406.0
1993	33444.6	7536.2	25908.4
1994	32793.0	6577.0	26216.0
1995	32980.0	6910.0	26070.0
1996	36970.0	10150.0	26820.0
1997	36754.8	10207.0	26547.8
1998	36036.6	10886.5	25150.1
1999	35856.4	12664.6	23191.8
2000	47537.0	21945.0	25592.0
2001	57530.0	29639.7	27890.3
2002	101976.1	26203.4	75772.7
2003	53379.0	30583.0	22796.0
2004	69748.0	45156.0	24592.0
2005	58247.0	34818.0	23429.0
2006	57753.7	39374.8	18376.9
2007	65936.5	43188.4	22748.1
2008	66640.8	48796.0	17844.8
2009	41534.2	28076.5	13457.2
2010	58006.0	44506.6	13499.3
2011	55099.1	38898.2	16200.5

Source: Ite & Ibok (2013)





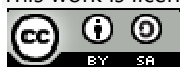
Ite & Ibok (2013) argues that the natural gas being flared is made of the following hydrocarbons, methane; ethane; propane; butane; alkanes; nitrogen; carbon dioxide; hydrogen sulphide and water among others components. Thus, the activities of the oil and gas industries in the Niger Delta, particularly as it concerns emissions, lead to food insecurity as these activities causes poor yields of food crops and it also affect the aquatic lives of the wetland. Specifically, it was found that there were increases in the temperature of the atmosphere, earth and leaf. Similarly, the yield of cassava (*manihot esculenta*) tubers, a popular plant among the Niger Delta people, reduced in both measure and value due to emissions. The reduction in the quality and quantity of crops as a result of emissions, is not limited to cassava (*manihot esculenta*), but is experienced in other crops like waterleaf (*Talinum triangulare*) and pepper (*piper*) (Dung, Bombom & Agusomo, 2008; Isichei & Stanford, 1976 in Ite & Ibok, 2013).

Furthermore, whereas changes in climatic conditions results in rise in changes in rainfall patterns and flooding in Southern Nigeria, it manifests in desertification, drought, landslides etc. in the North (Folami & Folami, 2013). As a result, the North being more of an agro-based society, with animal husbandry forming an integral part of their livelihood, there arises the challenge of providing pasture for the animals despite the circumstances created by desertification. As a result therefore, the nomadic farmers sojourn with their animals to the Niger Delta and parts of Southern Nigeria, where agricultural activities are mainly about the growing of food crops. However, the roving of these animals, most often cattle, portends danger for the food security concern of the people of the Niger Delta region as their crops are potential food for the animals that have relocated to their territory. Furthermore, as argued by Lebari (2018) Fulani herdsmen having moved from the North to the South (Niger Delta) of Nigeria in search of pasture for their herds contributes negatively to the rising issue of food security as there are cases of destruction of crops by the herds, which has resulted in the rising case of conflict between herders and farmers. This unfortunate situation has brought about farmers in some Niger Delta communities staying off their farms as a result of the rising spate of violence, thereby contributing negatively to the issue of food security.

FINDINGS

The study among other things, found the following;

- That, uncertainty in rainfall patterns occasioned by climate change has equally brought about uncertainty in the planting time in the Niger Delta, as studies have shown that local farmers no longer have a fixed or particular time of the year for planting as was the practice years back. Rather, they have to wait for the rains, particularly, since the rains are no longer predictable.
- That, the continuous emission of CO₂ in the region had hindered and would continue to hinder the growth and cultivation of some locally grown crops, as well as their nutritional value. Hence, the best time for the stoppage of gas flaring is now.
- That, the majority of the people of the Niger Delta have been dislodged off their traditional occupation in both crop production and fish farming. These major primary occupations form their livelihood, and as a result of the above, the people are separated





from their livelihood because of climate changes. Thus, its negative impact on food security in the Niger Delta region.

- That in relation to the above, an irony has been created, that rural riverine communities that were fish sufficient, now have to depend on imported fish for their subsistence.
- That, poverty levels in the region has grown to a high but not admirable level. This is because economic activities in the urban centers of the Delta have led to a high cost of living. For instance, Iyayin (2004) in (Uyigue & Agho, 2007) suggests that the cost of living in the urban centers of Rivers State is highest in Nigeria.

CONCLUSION

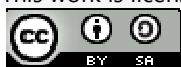
From the foregoing, climate change impacts on the security of food in the Niger Delta. These impacts are indeed enormous owing to the location of the region around the coast and the continuous socio-economic activities, particularly as it relates to crude oil and gas exploration and exploitation; as well as the continuous flaring of greenhouse gases into the atmosphere and the unresponsiveness of the Nigerian state to the quandary of the people. The unpredictability of the rains and general changes in the weather conditions in the Niger Delta proves that the situation has reached an accentuated altitude. Beyond the drawback of poor yield, the people of the Niger Delta have lost a bulky portion of their farm lands and water ways to the industrialization process in the region; therefore, the people are alienated from their farms and craft, thus, making the region food-dependent in spite of her capacity to provide a huge amount of the food needed in the region.

RECOMMENDATIONS

While it is true that climate change (via natural causes) might not be an easy task to stop, its effects can however be effectively managed. Thus, it is important that the state stops such activities, like gas flaring that has direct impact on the changing climate. There is the need to control and manage emissions in the Niger Delta, hence, the state must put in place sanctions and see to the implementations of these sanctions so as to preserve the environment and the natural habitats within the region.

That, the state must see to making technologies obtainable and accessible to the local farmers in the region so as to aid them in food production. While the state is expected to make technology available on the one hand, the local farmers on the other hand, must be ready to let go of stereotypes and accept new methods of farming and applications. These technologies should be such that meet up with the environmental and ecological challenges of the Niger Delta environment.

That, the Nigerian state must see to the clean-up of the entire Niger Delta and not just Ogoniland as recommended by UNEP. As Such, the on-going clean-up of Ogoniland should set the tone for the clean-up of the entire Niger Delta.





REFERENCES

- ACF-IN (2008). Food Security and Livelihoods. ACF International Networks, Policy Paper. Available at https://actioncontrelafaim.ca/wp-files/uploads/2013/08/Food_security_and_livelihood_policy_-_01.2009.pdf
- Adegbola, J.A, Bamishaiye, E.I & Daura, A.M (2011). Food Security in Nigeria: Government's Intervention and the Place of Effective Storage. *Asian Journal of Agriculture and Rural Development*, 1(2), 56-63.
- Akankali, J.A. & Jamabo, N.A. (2011). A Review of Some Factors Militating Against Sustainable Artisanal Fisheries Development in Niger Delta, Nigeria. *Asian Journal of Agricultural Sciences* 3(5): 369-377, 2011
- Amangabara, G.T. & Obenade, M. (2015) Flood Vulnerability Assessment of Niger Delta States Relative to 2012 Flood Disaster in Nigeria. *American Journal of Environmental Protection*, Vol. 3(3), 76-83.
- Apata, T.G (2011). Effects of Climate Change on Nigerian Agriculture: An Empirical Analysis. *CBN Journal of Applied Statistics*, 2(1), 31-50.
- Bello, O.B, Ganiyu, O.T, Wahab, M.K.A, Afolabi, M.S, Oluleye, F., Ig, S.A, Mahmud, J., Azeez, M.A & Abdulmaliq, S.Y (2012). *International Journal of Agriculture and Forestry*, 2(2), 49-55.
- Borchi, F. & De muro, P. (2012). A Human Development and Capability Approach to Food Security: Conceptual Framework and Information Basis. United Nations Development Programme, WP 2012-09.
- Folami, O.M. & Folami, A.O. (2013). Climate Change and Inter-Ethnic Conflict in Nigeria. *Peace Review: A Journal of Social Justice*, 25(1), 104-110.
- Ifeanyi-obi, C.C, Etuk, U.R & Jike-wai, O. (2012). Climate Change, Effects and Adaptation Strategies; Implication for Agricultural Extension System in Nigeria. *Greener Journal of Agricultural sciences*, 2(2), 53-60.
- Ite, A.E & Ibok, U.J (2013). Gas Flaring and Venting with Petroleum Exploration and Production in the Nigeria's Niger Delta. *American Journal of Environmental Protection*, 1(4), 70-77.
- Krantz, L. (2001). The Sustainable Livelihood Approach to Poverty Reduction: An Introduction. *Swedish International Development Cooperative Agency (SIDA)*.
- Lebari, G.N (2018). Amorphous Terrorists? The Nigerian State and the Activities of Fulani Herdsmen. *Nigerian Journal of Oil and Politics*, 3(1), 43-62.
- McGregor, D. (2008). Climate Change and Development. In Desai & Potter (eds). *The Companion to Development Studies*. UK: Hodder Education.
- Nwajiuba, C. (2012). Nigeria's Agriculture and Food Security Challenges. *Agriculture & Food Security*. Available at https://ng.boell.org/sites/default/files/uploads/2013/10/agriculture_-_green_deal_nigeria_study.pdf. Retrieved 06/11/2017
- Ogundare, W. (2015). Sustainable Food Security: Re-igniting Nigeria's Economy via Systems Strengthening. Not Available





- Olaniyi, O.A, Funmilayo, O.A & Olutimehin, I.O (2014). Review of Climate Change and its Effect on Nigeria Ecosystem. *International Journal of Environment and Pollution Research*, 2(3), 70-81.
- Ojo, E.O & Adebayo, P.F (2012). Food Security in Nigeria: An Overview. *European Journal of Sustainable Development*, 1(2), 199-222.
- Peterson, E.K. & Pederson, M.L. (2010). *The Sustainable Livelihood Approach From a Psychological Perspective: Approaches to Development*. University of Aarhus: Institute of Biology
- Uche, C. Ajie, E. & Familusi, I.C (2016). A Survey on Agricultural Prospects and Potentials of the Niger Delta in a Post Oil Era. *Global Journal of Science Frontier Research:D, Agriculture and Veterinary*, Vol. 16(8), 15-20.
- UNEP (2011). *Environmental Assessment of Ogoniland: Executive Summary*. United Nations Environmental Programme.
- United Nations (1992). *United Nations Framework Convention on Climate Change*.
- Uyigüe, E. & Agho, M. (2007). Coping with Climate Change and Environmental Degradation in the Niger Delta of Southern Nigeria. *Nigeria: Community Research and Development Centre (CREDC)*.
- Vermeulen, S.J., Aggarwal, P.K., Ainslie, A., Angelone, C., Campbell, B.M., Challinor, A.J., Hansen, J., Ingram, J.S.I., Jarvis, A., Kristjanson, P., Lau, C., Thornton, P.K. & Wollenberg, E. (2010). Agriculture, Food Security and Climate Change: Outlook for Knowledge, Tools and Action. *Climate Change, Agriculture and Food Security, Report 3*.
- Wiltshire, A.J., Kay, J., Gornall, J.L. & Betts, R.A. (2013). The Impact of Climate, CO₂ and Population on Regional Food and Water Resources in the 2050s. *Sustainability*, 5, 2129-2151.

<http://www.population.gov.ng/index.php/state-population>. Accessed 15/07/2017.

<http://pubs.sciepub.com/env/1/4/2/figure/1>. accessed 15/07/2017

Author's Profile

Lebari, Gospel Nukoaka is a doctoral candidate at the Department of Political and Administrative Studies University of Port Harcourt. He is presently researching (doctoral thesis) on *The Political Economy of Climate Change and Food Security in the Niger Delta*. He has attended several conferences and has a few articles to his credit in reputable journals. His last published article is titled 'Amorphous Terrorist? The Nigerian State and the Activities of Fulani Herdsmen' published in the *Nigerian Journal of Oil and Politics* (2018), 3(4). He has also co-authored several conference papers. His research interests span environmental politics, political economy, gender issues, democracy and elections, federalism and ethnic minority rights. He has several articles awaiting publication in various reputable national and international journals, among which is his article 'Gender Inequality and Elections in Nigeria's Fourth Republic', which explored the fortunes of women in democratic elections in Nigeria, particularly recent elections.

