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The Perceptions to Climate Change among Rural Farming Households in the Niger Delta Area, Nigeria

Emaziye, P. O. (Department of Agricultural Economics and Extension Delta State University, Asaba Campus, Asaba, Nigeria)

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Author(s)

Emaziye, P. O.

Department of Agricultural
Economics and Extension Delta
State University, Asaba Campus,
Asaba, Nigeria

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Abstract

The study focused on the perceptions to climate change among rural farming households in the Niger Delta Area, Nigeria. The basic objective was to determine the rural farming household's perception to climate change in the Area and the specific objective was to determine the direction of change of the climate change indicators (whether increasing, decreasing or constant). Multistage sampling procedure was sampled 739 rural farming households (respondents) for the study. Data were analyzed using descriptive statistic. Socio – economic profile of the respondents indicated that 37.69% of rural farming households falls between the age bracket of 47 to 51 years and majority (60.0%) having educational qualification below secondary school level. The study also reveals 76% had no extension contact during the farming season and 78.6% of respondents are not aware of the phenomenon of climate change. The study noticed an increasing change in the climate change indicators except longer raining season that is decreasing in the Area. The perception to the cause of climate indicators was mostly attributed to natural occurrence by God/gods (67.7%). Awareness campaign on climate change is recommended in the rural areas for climate change information.

Keywords: Perception, Climate change, Rural farming household, Niger Delta Area, Nigeria

Introduction

The Niger Delta area is prone to flooding due to its location in the coastal areas of Nigeria. This corroborated the IPCC (2007b) report that flood and drought will be on the increase, (Okoh *et al.*, 2011) also reported “that the third most pervasive of the hazards of climate change is flood. This derives from overflow of the rivers, the Atlantic Ocean, River Niger and other Rivers in the Niger Delta region. Flooding and coastal erosion in the region destroy roads, properties, crops, fresh water resources and threaten lives by rendering them homeless. Roads used for the transportation of agricultural produce from the farm to market or households usage are destroyed and rendered not accessible, thereby creating inaccessibility of food to the rural farming households. Exposure to climate change, most particularly flooding poses substantial risks to food production in the rural household resulting in food insecurity.

A variety of crops such as maize, yam and cassava produced in the Niger Delta region depend on rainfall for their optimum performance. But in line with IPCC (2007a) reported that precipitation levels are on the downward trend. The decrease and irregular rainfall pattern pose a problem that need to be addressed to save the Niger Delta region from low agricultural production (yield) that will in turn lead to rural farming households' food insecurity. This is in line with the prediction reported by IPCC (2007a) that climate variability and change would severely compromise agricultural production and access to food.

The millennium Development Goals (MDGs) are one of the initiatives aimed at achieving food security globally (in particular the MDG1 – to eradicate extreme poverty and hunger). In meeting the challenges of the Millennium Development Goals, greater effort must be geared toward ensuring rapid progress in

hunger reduction especially among rural households (United Nations, 2005).

The Niger Delta region is already experiencing some important climate change related hazards such as, increased temperature (including seasonal changes), more intensive and frequent storms, sea level rise, more heat waves, more flooding and extreme floods and more extreme rains including seasonal changes (Okoh *et al.*, 2011), and a greater percentage of the population of Niger Delta region lives in the rural areas.

Against the backdrop of these seasonal changes in the Niger Delta Region, this research study sort to find out the rural households perceptions of the indicators of climate variability and the direction of change in the Region. The following research questions were addressed:

- 1) What are the rural households' perceptions of the indicators of climate change?
- 2) What are the directions of change to climate change in the Region?
- 3) What is the awareness level of rural household to climate change the Region?

Literature Review

Concept of Climate Change

Climate change: Firstly, in the most general sense, this term denotes the inherent characteristics of climate that manifests itself as changes of climate over time. The degree of climate variability can be described by the differences between long-term statistics of meteorological elements calculated for different periods. Secondly, the term climate change is often used to denote deviation of climate statistics over a given period (such as during a specific month, season or year) from the long-term climate statistics relating to the corresponding calendar period. (In this sense, climate change is measured by those deviations, which are usually termed anomalies (WMO, 1992).

Causes of Climate Change

Climate changes occurs when carbon dioxide (CO₂) and other green houses gases that are important to human by trapping heat in the

earth's atmosphere and keep it warm enough to support human existence, are in dangerous levels as a result of human activities that boost its concentration in the atmosphere resulting in unstable climate and increasing temperature globally. Climate change can also be defined as a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (UNFCCC, 1992). Climate change according to IPCC (2007a) refers to changes in modern climate which are 90-95 percent likely to have been in part caused by human action. The Niger Delta region with gas flaring related activities are among human actions that causes climate change.

Climate Change and Agriculture

Agriculture production is affected in a number of ways by climate change. For instance, planting season cannot be predicted as a result of changes in rainfall pattern, resulting in crops been burnt by excessive heat. This leads to poor harvest resulting in food scarcity as reported by Okoh *et al.* (2011). There is the occurrence of harsh weather conditions such as windstorm, thunderstorms and diseases of crops and pests that destroy farms leading to poor harvest in the area. Mostly in the northern parts, pests such as as tsetse fly causes a lot of danger to livestock production resulting to lost of investment.

Food Security and Climate Change

The long term sustainability of life on earth rests on the world's vegetation which can be described as the renewable green gold (Odeemi, 1998). The world vegetation acts as a single source of primary biological production that sustains the human population and animal species. The aims of the world conservation strategy (WCS) which include: maintenance of essential ecological processes life support systems. It also involves the preservation of genetic diversity and sustainable development of species and the ecosystems, all these revolve around the land and vegetation. The most significant regional anthropogenic disturbance to the environment is the land-cover changes (Roberts, *et al.*, 1998).

The biophysical life support system including land surface (vegetation), water resources, soil

and atmosphere which constitute the elements that support the long term sustainability of life on earth is caused by climate and environmental change. The biophysical life support system also affects the social and economic structure and framework, and by implication survival, of people. Biophysical life support systems are driven by combination of both natural and anthropogenic causes. Recently, climate was generally taken for granted and there was little thought that the climate could be a problem with severe impacts due to the effects of man's activities on climate variation (Ojo, 1987). The gradual process of environmental deterioration caused by climate change will result in rural households' displacement as a result of excessive flooding and erosion. These will lead to destruction of homes, farms, lost of investment, lost of lives and roads resulting in rural inhabitants' migration. The impacts of continuous flooding and drought will affect women most that work longer hours in the farm and in charge of water administration at home level (UNCEB, 2007). The cultural and social background of rural households and lack of information about climate change pose a lot of problem resulting in food security problem.

Methodology

The Area of Study

The coastal terrain that is situated in the Atlantic coast of Southern Nigeria where River Niger divides into numerous tributaries is the Niger Delta Area, Nigeria. The Niger Delta Area is the second largest delta in the world with a coastline spanning about 450 kilometers terminating at the Imo entrance (Awosika, 1995). The area spans over 20,000 square kilometers and it has been acclaimed as the largest wetland in Africa and among the three largest in the world. It is richest wetland in the world (Iyayi, 2004). The Niger Delta area is divided into four ecological zones namely coastal Inland zone, Mangrove swamp zone, freshwater zone and low forest zone (ANEE, 2004). There are many unique species of plants and animals in the Niger Delta region due to high biodiversity characteristics of extensive swamp and forest areas. The area is rich in oil and several decades of oil companies' activities in the area had much demand on the ecosystem, it has been observed that gas flaring as a component of climate change is a huge issue in the Niger

Delta Area. Okecha (2000) reported that these activities contributed to climate change and other related health and socio-economic problems.

The area Niger Delta is made up of nine states namely, Cross River, Edo, Delta, Abia, Imo, Bayelsa, River, Akwa-Ibom and Ondo States (Table 1). The Niger Delta area is with 25% of the Nigerian population of total of about 140 million people (NPC2006). The Niger Delta area land mass represents 12% of Nigeria's total surface area (NPC, 2006).

About 31 million inhabitants of more than 40 ethnic groups including the Isokos, Urhobos, Annang, Ibibio, Efik, Ijaw and Igbo people speaking some 250 dialects live in the present day Niger Delta region (Jike, 2004). The Area has been described as heterogeneous, multi-cultural and ethnically diverse (Akoroda, 2000). The Niger Delta area lie predominantly in the tropics having two seasons – the wet and dry seasons. The wet season in the Niger Delta area begins from May to September, while the dry season begins in October and ends in April. The Niger Delta area is located on latitude $4^{\circ}15'N$ and $4^{\circ}50'N$ and longitude $5^{\circ}25'E$ and $7^{\circ}37'E$

Materials and Methods

States, local government, communities and rural farming households for the study were selected using multistage sampling procedure. Firstly, were the random selected of four states from the nine states that make up the Niger Delta Area. Secondly, were the random selections of two local Governments from each of these states. Thirdly, were the random selected of two communities from each of the local government areas, making it up to 16 communities. Finally, fifty rural farming households were randomly selected from each of the sampled communities making it up to 800 households. The data for this study were obtained with the aid of structured questionnaire survey and out of the 800 respondents 739 was utilized for this study.

Findings and Discussion

Socio-economic Characteristics of Respondents: The rural farming household in the area is 49 years of age showing maturity of

the respondents and with male headed households (Table 2). Majority of respondents were married confirming that they were responsible, matured and conscious on the level of climate change direction phenomenon in the Area. The area is dominated by primary school level of education with a mean household size 10 persons. The average yearly income of respondents in the area was N73, 896 (\$480) showing a low yearly income level as result of the impacts of climate change in the area.

Direction of Change of Climate

Respondents in the Niger Delta region lack awareness (ignorant) to climate variability and change. Greater percentages of respondents 78.6% are unaware about occurrence of climate change in the region (Table 3), but majority of respondents are aware about changes in agricultural practices, decline in yield and forest resources over the past 30 years without laying claim to concrete proof of what is happening. Respondents noticed changes in climate variables and events like early rains not sustained, crops smothered by excessive heat, crops are planted and replanted, irregular rainfall pattern, delayed onset of rainfall, shorter raining season, floods and higher temperature. Most respondents attributed these changes to natural occurrence with a believe that only God can change the trend. This is corroborated by the findings of Kirina *et al.* (2012) that “the perception of farmers on CCV was fond to be influenced by their social economic status...”

The vital variable to access in terms of food system is temperature and precipitation (Ziervogel *et al.*, 2006). These most critical climate variables, temperature are increasing above a level where crops are been smothered and rainfall are in downward trend (IPCC, 2007a). It is regretted to note that climate variables and events in recent times are having a negative impacts on agricultural production in the Niger Delta area that depends on agricultural production for their survival. Rural farming households (respondents) perception in Table 2 revealed that the occurrence of early rains not sustained 79.43%, crops smothered by excessive heat 77.00%, crops planting and replanting 67.52% and irregular rainfall pattern 76.32%. Table 4.20 also revealed increasing occurrence of extreme weather

events like thunder storm 72.25%, floods 78.62%, sea level rise 70.37%, delayed onset of rainfall 66.58%, shorter raining season 73.61%, higher temperature 81.12% and longer raining period (43.57%) decreasing (Table 3).

The rural farming households (respondents) perception was corroborated from the temperature and rainfall data analysis results from the data collected from Nigerian Metrological Agency (NIMET).

Agricultural production is directly affected by climate change, as agricultural is mostly affected by the impacts of climate change (Parry *et al.*, 1999). Issues of food security are closely connected together. (Winter, 1999.; Reilly, 1995) the variation of environmental conditions (for instance; climate, soil, and water characteristics and land use changes) can place an additional stress on food production (McConnell and Moran, 2000). Climate change is already adding to food production problems in the Niger Delta area. The main obstacle to food security in the developing countries is climate change as agricultural production relies on rainfall for optimal production (Parry *et al.*, 1999; IPCC, 2001a). The rural farming households food security in the Niger Delta area major threat is climate change as agricultural production are decreasing resulting to poverty and hunger.

Perception to Climate Change Awareness

In Table 4 show that 78.6% of respondents were not aware about climate change in the studied area while only 21.4% got awareness about climate change. This was mostly due to illiteracy level and lack of exposure to extension services in the studied area.

Perception to Extension Services Exposure

The information in Table 5 shows that 77.4% and 72.7% were not exposed to extension services in Bayelsa and Cross River state respectively, while 89.4% and 63.4% were not exposed to extension services in Delta and Ondo state respectively. The entire Niger Delta region, 76.0% of respondents were not exposed to extension services. This might have caused the unawareness to climate change level of the rural farming households.

Conclusion and Recommendation

The study findings reveals that perception of rural farming households to climate change was that of ignorant or unawareness and mostly attributed to their believe of natural occurrence by God or gods (67.7%). The study reveals the presents of climate change indicators signifying climate change in the Niger Delta area. This finding is supported by IPCC (2007b) that climate change refers to changes occurring in the climate during a period of time ranges between century and decade. The climate indicators decreasing and decreasing confirming climate change. Climate change awareness campaign with science based data should be the beginning for policy making and implementation targeted at effective dissemination of climate change information to the rural farming households. Also Government policies and programmes should be geared towards rural farming households' education through rural educational programmes, seminars and workshops in order to arrest the danger imposed by climate change in the Niger Delta area, Nigeria.

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Table 1: States in Niger Delta Region, Land Area and Population

States	Land Area (square kilometers)	Population
Abia	4,877	2,833,99
Akwa Ibom	6,806	3,920,208
Bayelsa	11,007	1,703,358
Cross River	21,930	2,888,966
Delta	17,163	4,098,391
Edo	19,698	3,218,332
Imo	5,165	3,934,899
Ondo	15,086	3,441,014
Rivers	10,378	5,185,420
Total	112,110	31,224,587

Source: National Population Commission (NPC, 2006)

Table 2: Socio-economic Characteristics of Respondents

Variables	Bayelsa (n=186)	Cross River (n=172)	Delta (n=198)	Ondo (n=183)	Niger Delta (n=739)
Age (Years)					
30 – 39	24 (12.9)	24 (14.0)	44 (22.2)	19 (10.4)	111 (15.0)
40 – 49	76 (40.9)	62 (36.0)	79 (39.9)	61 (33.3)	278 (37.6)
50 – 59	68 (36.5)	66 (38.4)	64 (32.3)	78 (42.6)	276 (37.4)
60 – 69	18 (9.7)	19 (11.0)	11 (5.6)	23 (12.6)	771 (9.6)
70 – 79	0 (0.0)	1 (0.6)	0 (0.0)	2 (1.1)	3 (0.4)
Mean	49 years	49 years	47 years	51 years	49 years
Gender Distribution					
Female (0)	83 (44.6)	82 (47.7)	94 (47.5)	72 (39.3)	331 (44.8)
Male (1)	103 (55.4)	90 (52.3)	104 (52.5)	111 (60.7)	408 (55.2)
Marital Status					

Single (0)	11 (5.9)	22 (12.8)	14 (7.1)	6 (3.3)	53 (7.2)
Married (1)	120 (64.5)	90 (52.3)	129 (65.2)	118 (64.5)	457 (61.8)
Widow (2)	33 (17.7)	17 (9.9)	29 (14.6)	29 (15.8)	108 (14.6)
Widower (3)	4 (2.2)	2 (1.2)	3 (1.5)	4 (2.2)	13 (1.8)
Divorced (4)	18 (9.7)	41 (23.8)	23 (11.6)	26 (14.2)	108 (14.6)
Educational status					
No formal education	55 (29.6)	48 (27.9)	61 (30.8)	29 (15.9)	193 (26.1)
Primary school	78 (41.9)	61 (35.5)	76 (38.4)	50 (27.3)	265 (35.9)
Secondary school	37 (19.9)	41 (23.8)	42 (21.2)	72 (39.3)	192 (26.0)
Tertiary school	16 (8.6)	22 (12.8)	19 (9.6)	32 (17.5)	89 (12.0)
Mode	Primary school	Primary school	Primary school	Secondary school	Primary school
Household size					
2 – 4	5 (2.7)	7 (4.1)	8 (4.0)	2 (1.1)	22 (3.0)
5 – 7	26 (14.0)	45 (26.2)	41 (20.7)	60 (32.8)	172 (23.3)
8 – 10	71 (38.2)	66 (38.4)	75 (37.9)	86 (47.0)	298 (40.3)
11 – 13	54 (29.0)	38 (22.1)	47 (23.7)	33 (18.0)	172 (23.3)
14 – 16	30 (16.1)	16 (9.3)	27 (13.6)	2 (1.1)	75 (10.1)
Mean (persons)	10	9	10	9	10
Annual Income(₦)					
21,000-60,000	89 (47.8)	62 (36.1)	148 (74.7)	12 (6.6)	311 (42.1)
61,000-100,000	95 (51.1)	85 (49.4)	49 (24.8)	65 (35.5)	294 (39.8)
101,000-140,000	2 (1.1)	25 (14.5)	1 (0.50)	67 (36.6)	95 (12.9)
141,000-180,000	0 (0.0)	0 (0.0)	0 (0.0)	28 (15.3)	28 (3.8)
181,000-220,000	0 (0.0)	0 (0.0)	0 (0.0)	6 (3.3)	6 (0.8)
221,000-260,000	0 (0.0)	0 (0.0)	0 (0.0)	5 (2.7)	5 (0.7)
Mean (₦)	61,790	71,895	50,803	113,068	73,896

Figures in parenthesis () are percentages

Source: Author survey data, 2011

Table 3: Direction of Change of Climate Phenomenon in the Last 30 Years (Niger Delta Region, Nigeria)

S/N	Climate Change Events	Increasing (%)	Decreasing (%)	No Change (%)	Remark
1	Uncertainties in the on-set of the farming seasons				Increasing uncertainties
	a. Early rains not sustained	587 (79.43%)	104 (14.07%)	48 (6.50%)	Increase
	b. Crops smothered by Excess heat	569 (77.00%)	118 (15.97%)	52 (7.04%)	Increase
	c. crops planting and replanting	499 (67.52%)	152 (20.57%)	88 (11.91%)	Increase
	d. shift in the start or end of rains	564 (76.32%)	119 (78.62%)	56 (7.58%)	Increase
2.	Extreme weather events viz:				
	a. thunder storms	534 (72.25%)	153 (20.70%)	52 (7.04%)	Increase
	b. heavy winds	506 (68.47%)	167 (22.60%)	66 (8.93%)	Increase
	c. floods	581 (78.62%)	100 (13.53%)	58 (7.85%)	Increase
	d. more frequent draught	385 (52.10%)	263 (35.59%)	91 (12.31%)	Increase
	e. excessive heat	568 (76.86%)	107 (14.48%)	64 (8.66%)	Increase

	f. heavy rainfall	604 (81.73%)	83 (11.23%)	52 (7.04%)	Increase
	g. sea level rise	520 (70.37%)	151 (20.45%)	68 (9.20%)	Increase
	h. sea surge	400 (54.13%)	231 (31.26%)	108 (14.61%)	Increase
	i. erosion	567 (76.73%)	122 (16.51%)	50 (6.77%)	Increase
	j. higher temperature	600 (81.19%)	86 (11.64%)	53 (7.17%)	Increase
	k. erratic rainfall pattern	583 (78.89%)	97 (13.13%)	59 (7.98%)	Increase
	l. less rain	505 (68.34%)	155 (20.97%)	79 (10.69%)	Increase
	m. Delayed onset of rainfall	492 (66.58%)	151 (20.43%)	96 (12.99%)	Increase
	n. Earlier onset of rainfall	517 (69.96%)	146 (19.76%)	76 (10.28%)	Increase
	o. Short rainy season	544 (73.61%)	152 (20.57%)	43 (5.82%)	Increase
	p. Longer rainy season	322 (43.57%)	350 (47.36%)	67 (9.07%)	Decrease
3	Crop pest and diseases	458 (63.32%)	187 (25.30%)	94 (12.72%)	Increase
4	Animal diseases	485 (65.63%)	158 (21.38%)	96 (12.99%)	Increase
5	Weeds	516 (69.82%)	143 (19.35%)	80 (10.83%)	Increase
6	Land degradation viz				
	a. Sheet erosion	554 (74.97%)	141 (19.08%)	44 (5.95%)	Increase
	b. coastal erosion	588 (74.97%)	93 (12.59%)	58 (7.85%)	Increase
	c. Rill erosion	514 (69.55%)	137 (18.54%)	88 (11.91%)	Increase
	d. Gully erosion	514 (69.55%)	153 (20.70%)	72 (9.74%)	Increase
	e. Wind erosion	482 (65.22%)	163 (22.06%)	94 (12.72%)	Increase
	f. Deposit of eroded materials	600 (81.19%)	102 (13.80%)	37 (5.01%)	Increase

Table 4: Distribution of Respondents According to Climate Change Awareness

Climate change Awareness	Bayelsa (n=186)	Cross River (n=172)	Delta (n=198)	Ondo (n=183)	Niger Delta (n=739)
No (0)	141 (75.8)	134 (77.9)	168 (84.8)	138 (75.4)	581 (78.6)
Yes (1)	45 (24.2)	38 (22.1)	30 (15.2)	45 (24.6)	158 (21.4)
Mode	No	No	No	No	No

Figures in parenthesis () are percentages

Source: Author survey data, 2011

Table 4: Distribution of Respondents According to Exposure to Extension Services

Extension services	Bayelsa (n=186)	Cross River (n=172)	Delta (n=198)	Ondo (n=183)	Niger Delta (n=739)
No (0)	144 (77.4)	125 (72.7)	177 (89.4)	116 (63.4)	562 (76.0)
Yes (1)	42 (22.6)	47 (27.3)	21 (10.6)	67 (36.6)	177 (24.0)
Mode	No	No	No	No	No

Figures in parenthesis () are percentages

Source: Author survey data, 2011

Table 5: Respondents Perception to the Cause of Direction of Change of Climate Indicator

Causes of Change	Bayelsa (n=186)	Cross River (n=172)	Delta (n=198)	Ondo (n=183)	Niger Delta (n=739)
God/gods	122 (65.6)	120 (69.8)	148 (74.7)	110 (60.1)	500 (67.7)
Climate Change	64 (34.4)	52 (30.2)	50 (25.3)	73 (39.9)	177 (24.0)
Mode	God/gods	God/gods	God/gods	God/gods	God/gods

Figures in parenthesis () are percentages

Source: Author survey data, 2011