

## Evaluation of Rural Farming Households Awareness Level to Climate Change Indicators in Bayelsa State, Nigeria

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**Abstract:** The study focused on the evaluation of rural households' awareness level to climate change indicators and their direction of change in Bayelsa state, Nigeria. The main objective was to determine the rural household's perception to climate change in the state 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 used in random selection of local government areas, communities and rural households for the research study. Two hundred and seventy eight respondents were utilized for this research study. Data for this study were obtained using structured questionnaire survey and also annual mean time series data from Nigerian Meteorological Agency (NIMET) that include the following; temperature and rainfall were collected. Descriptive statistic was used to analyze the respondents' socio-economic characteristics, climate change awareness and perception to climate change and direction of change in the state. Rural farming households noticed increase 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, coastal erosion and higher temperature. The rural farming households' perception to the cause of direction of change of climate change indicators that is increasing in the state believes that it is a natural occurrence by God or gods. The study therefore recommends 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. Climate change awareness should be of immense importance for proper climate change adaptation. This will in turn reduce rural household's food insecurity situation in the state.

**Keywords:** Awareness, Bayelsa state, climate change, indicators, Nigeria, rural household

### INTRODUCTION

Bayelsa state is a coastal area in the Niger Delta region, Nigeria. There is high oil exploration related activities due to large crude oil deposit in the state which results in oil spills most often. This is brought about by climate variability/change caused by emission of carbon dioxide and other green house gases that are in excess concentration in the atmosphere. This renders agricultural production marginal in the state. Thus results in rural farming households' food insecurity situation. Climate change is 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" (United Nations Framework Convention on climate change (UNFCCC, 1992). Climate change according to IPCC (2007) refers to changes in modern climate which are 90-95% likely to have been in part caused by human action. Climate change leads to gradual changes in mean temperatures and rainfall that will lead to loss of sea ice, glacier and permafrost melting resulting to sea level rise. This rise of sea level will lead to flooding

especially Bayelsa that is located along the river Niger. The state will experience added risk of survival and worsen food insecurity situation with the impact of climate change resulting from excessive flooding of farmlands without rural households' climate change awareness. IPCC (2007) reported that there will be increase in the occurrence of both floods and droughts, (Okoh *et al.*, 2011) also reported "that the third most pervasive of the hazards of climate change is flood. Hoeppe and Gurenko (2006) stated that economic losses caused by storms, floods and droughts are rising. Climate change has a negative impact on rural farming households' food security. The immediate impacts result from irregular rainfall patterns, flooding, rising sea level, extreme weather conditions and drought (FAO, 2008). This study is of importance as climate change without awareness will place the rural farming households in hunger and food insecurity situation.

### METHODOLOGY

**The study area:** Bayelsa State is located within Latitude 04° 15' North, 05° 23' South and longitude 05° 22' West and 06° 45' East. It shares boundaries with

Delta State on the North, Rivers State on the East and the Atlantic Ocean on the West and South. A lot of her communities are almost (and in some cases) completely surrounded by water, making these communities inaccessible by road, (Nigeria Exchange, N.D.). The entire state is formed of abandoned beach ridges and due to many tributaries of the River Niger in this plain, considerable geological changes still abound. The lower Delta plain is believed to have been formed during the Holocene of the quaternary period by the accumulation of sedimentary deposits. Sedimentary alluvium is the major geological characteristic of the state (Online Nigeria, 2003).

Bayelsa State covers a total land area of about 11,007 km<sup>2</sup> with a population of about 1,703,358 (NPC, 2006). More than three quarters of this area is covered by water, with a moderately low land stretching from Ekeremor to Nembe. The area lies almost entirely below sea level with a maze of meandering creeks and mangrove swamps. The network of several creeks and rivers in the South, all flow into the Atlantic Ocean via the major rivers such as San Bartholomew, Brass, Nun, Ramos, Santa Barbara, St. Nicholas, Sangana, Fishtown, Ikebiri Creek, Middleton, Digatoro Creek, Pennington and Dobo, (Bayelsa state union of great Britain and Ireland, N.D.).

The state experiences equatorial type of climate in the southern part and tropical rain towards the northern parts. Rain occurs generally every month of the year with heavy downpour. Precipitation in the state is high but this decreases from north to south. Akassa town in the state has the highest rainfall record in Nigeria. The amount of rainfall is adequate for all-year-round crop production. (Online Nigeria, 2003.)

Bayelsa State was created on October 1, 1996 out of the old Rivers State. The name, Bayelsa, is an acronym of three former Local Government Areas (LGAs)-Brass, Yenagoa and Sagbama. The then Brass LGA has been divided into the present Nembe, Brass and Ogbia Local Government Areas while the then Yenagoa LGA consist of the present Yenagoa, Kolokuma/Opokuma and Southern Ijaw Local Government Areas. Sagbama and Ekeremor Local Government Areas were created from the old Sagbama LGA. (Bayelsa State Due Process and E-governance DSP Information Technology Center, N.D).

## **MATERIALS AND METHODS**

Multistage sampling procedure was used in the randomly selection of local government, communities and rural farming households for the study. Firstly,

three local government areas were selected from 8 local government areas in the state. Secondly, 2 communities from each of the local government areas were selected, making it up to 6 communities. Finally, fifty rural farming households were randomly selected from each of the sampled communities making it up to 300 households. Data for this study were obtained with the aids of structured questionnaire survey and out of the 300 respondents 278 were utilized for this study.

### **Data collection:**

**Method of data collection:** Data for this study were obtained using structured questionnaire survey and also annual mean time series data from Nigerian Meteorological Agency (NIMET) that include the following; temperature and rainfall were collected.

### **Method of Data Analysis:**

**Descriptive statistics:** Descriptive statistic was used to summarize the respondents' socio-economic characteristics, climate change awareness and exposure to extension services. Also to analyze the respondents perception to climate change and direction of change in the state.

## **RESULTS AND DISCUSSION**

**Socio-economic characteristics of respondents in Bayelsa state:** The study reveals that primary school level of education was dominant while the household size was with a mean size of 10 persons showing a large household size in the state. Most rural farming households were married with a mean age of 48 years. The mean annual income of the rural farming households in Bayelsa was ₦62, 678 (\$ 404) revealing a low annual income of \$ 1.1 a day which is less than the global poverty line of less than \$ 2 a day (Table 1). This is in line with the findings of IFAD (2010) that climate change effect is directly evident in crop failures and livestock death causing higher economic losses and low income.

**Direction of change of climate:** Rural farming households noticed changes in climate change factors 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, coastal erosion and higher temperature. The study reveals the increasing occurrence of extreme weather events like sea level rise 77.8%, delayed onset of rainfall 62.2%, shorter raining season 70.5%, thunder storm 69.0%,

Table 1: Socio-economic characteristics of respondents in Bayelsa state

Variables	Respondents (n = 278)	Percentages (%)
<b>Age (Years)</b>		
30–39	36	13
40–49	113	40.7
50–59	102	36.7
60–69	27	9.6
70–79	0	0.0
Mean	48 years	
<b>Gender</b>		
Female	124	44.6
Male	154	55.4
<b>Marital status</b>		
Single	17	6.1
Married	179	64.4
Widow	49	17.6
Widower	6	2.2
Divorced	27	9.7
<b>Educational status</b>		
Informal	82	29.5
Primary	116	41.7
Secondary	55	19.8
Tertiary	25	9.0
Mode	Primary school	
<b>Household size</b>		
2–4	8	2.9
5–7	39	14.0
8–10	106	38.1
11–13	81	29.1
14–16	44	15.9
Mean (persons)	10	
<b>Annual income (₦)</b>		
21,000-60,000	133	47.8
61,000-100,000	141	50.7
101,000-140,000	3	1.1
141,000-180,000	1	0.4
181,000-220,000	0	0.0
221,000-260,000	0	0.0
Mean (₦)	62, 678 (\$404)	

Author computed result, 2011

floods 82.2%, longer raining period 34.5% and higher temperature 87.1% (Table 2). The result also reveals that 76.1% rural farming households with the perception of the increase in the occurrence of early rains not sustained and 80.6% respondents with the perception of crops smothered by excessive heat. Crops planting and replanting is 70.9% and irregular rainfall pattern 86.0%. Rural farming households show that there were increase in coastal erosion 89.2%, gully erosion 71.9% and deposit of eroded material 83.8%. This clearly shows that the direction of change is increasing in the state. This in line with findings of IPCC (2007) that most critical climate variables, temperature are increasing above a level where crops are been smothered and rainfall are in downward trend. The rural farming households perceptions were further corroborated from the temperature and rainfall data analysis results from the data collected from Nigerian Metrological Agency (NIMET). The Direction of Change of Climate is clearly shown in Table 3

**Perception to extension services exposure in Bayelsa state:** The result reveals that 88.5% were not exposed to extension services in the state while only 11.5% were exposed to extension services. This may probably have caused the unawareness level to climate change in the state.

**Perception to climate change awareness in Bayelsa state:** The results indicated that 80.6% of the rural farming households in the state were unaware about climate change while only 19.4% got awareness about

Table 2: Direction of change of climate phenomenon in the last 38 years (Bayelsa state)

S/N	Climate change events	Increasing (%)	Decreasing (%)	No change (%)	Conclusion remark
1	Uncertainties in the on-set of the farming seasons				Increasing uncertainties
	a. Early rains not sustained	215 (77.3%)	39 (14.0%)	24 (8.7%)	Increase
	b. Crops smothered by Excess heat	224 (80.6%)	42 (15.1%)	12 (4.3%)	Increase
	c. crops planting and replanting	197 (70.9%)	54 (19.4%)	27 (10.0%)	Increase
	d. shift in the start or end of rains	209 (75.2%)	46 (16.6%)	23 (8.2%)	Increase
2.	Extreme weather events viz				
	a. Thunder storms	226 (81.3%)	39 (14.0%)	13 (4.7%)	Increase
	b. Heavy winds	212 (76.3%)	45 (16.2%)	21(7.5%)	Increase
	c. Floods	244 (87.8%)	21 (7.5%)	13 (4.7%)	Increase
	d. More frequent draught	170 (61.1%)	51 (18.3%)	57 (20.6%)	Increase
	e. Excessive heat	235 (84.5%)	31 (11.2%)	12 (4.3%)	Increase
	f. Heavy rainfall	239 (86.0%)	25 (9.0%)	14 (5.0%)	Increase
	g. Sea level rise	217 (77.8%)	49 (17.6%)	12 (4.6%)	Increase
	h. Sea surge	161 (57.9%)	79 (28.4%)	38 (13.7%)	Increase
	i. Erosion	245 (88.1%)	18 (6.5%)	15 (5.4%)	Increase
	j. Higher temperature	242 (87.1%)	19 (6.8%)	17 (6.1%)	Increase
	k. Erratic rainfall pattern	239 (86.0%)	22 (7.9%)	17 (6.1%)	Increase
	l. Less rain	182 (65.5%)	60 (21.6%)	36 (12.9%)	Increase
	m. Delayed onset of rainfall	173 (62.2%)	63 (22.7%)	42 (15.1%)	Increase

Table 2: Continue

S/N	Climate change events	Increasing (%)	Decreasing (%)	No change (%)	Conclusion remark
	n. Earlier onset of rainfall	187 (67.3%)	57 (20.5%)	34 (12.2%)	Increase
	o. Short rainy season	196 (70.5%)	67 (24.1%)	15 (5.4%)	Increase
	p. Longer rainy season	96 (34.5%)	135 (48.6%)	47 (16.9%)	Decrease
3	Crop pest and diseases	179 (64.4%)	64 (23.0%)	35 (12.6%)	Increase
4	Animal diseases	184 (66.2%)	73 (26.3%)	21 (7.6%)	Increase
5	Weeds	190 (68.3%)	58 (20.9%)	30 (10.8%)	Increase
6	Land degradation viz				
	a. Sheet erosion	229 (82.4%)	39 (14.0%)	10 (3.6%)	Increase
	b. coastal erosion	248 (89.2%)	18 (6.5%)	12 (4.3%)	Increase
	c. Rill erosion	211 (75.9%)	42 (15.1%)	25 (9.0%)	Increase
	d. Gully erosion	200 (71.9%)	58 (20.9%)	20 (7.9%)	Increase
	e. Wind erosion	167 (60.1%)	78 (28.1%)	33 (11.9%)	Increase
	f. Deposit of eroded materials	233 (83.8%)	28 (10.1%)	17 (6.1%)	Increase

Field survey data, 2011

Table 3: Respondents awareness level to the cause of direction of change of climate indicators

Causes of change	Bayelsa (n = 278)	Percentage %
God/gods	259	93.2
Climate change	19	6.8
Mode	God/gods	

Field survey data, 2011

Table 4: Distribution of respondents according to exposure to extension services

Extension services	Bayelsa (n = 278)	Percentages %
No (0)	246	88.5
Yes (1)	32	11.5
Mode	No	

Field survey data, 2011

Table 5: Distribution of respondents according to climate change awareness

Climate change awareness	Bayelsa (n =278)	Percentages %
No (0)	224	80.6
Yes (1)	54	19.4
Mode	No	

Field survey data, 2011

climate change. This may probably due to lack of exposure to extension services and illiteracy level in the state. The perception to climate change awareness in Bayelsa state is clearly shown in Table 3

**Perception to the cause of direction of change of climate indicators in Bayelsa state:** The information in Table 5 shows that 93.2% of the rural farming households' perceptions to the cause of direction of change of climate change indicators in the state believe that it is a natural occurrence by God or gods while only 6.8% respondents believe that it was caused by climate change. This might be as result of the low level of climate change awareness and low education level of the respondents. The Perception to the Cause of Direction of Change of Climate Indicators in Bayelsa State is clearly shown in Table 4.

## CONCLUSION

The mean annual income of the rural farming households in Bayelsa was ₦62, 678 (\$ 404) revealing a low annual income of \$ 1.1 a day which is less than the global poverty line of less than \$ 2 a day (Table 1). Rural farming households noticed changes in climate change factors 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, coastal erosion and higher temperature. The rural farming households' perceptions to the cause of direction of change of climate change indicators in the state believed that it is a natural occurrence by God or gods. Rural farming households were not exposed to extension services and climate change awareness is low in the state. Climate change awareness should be created for proper adaptation to the impacts of climate change. This will in turn reduce rural households' food insecurity situation in the state.

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