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Awareness of Climate Change Impacts and Adaptation in Delta State, Nigeria

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ABSTRACT

This study investigates the awareness of climate change impacts and adaptation in Delta state, Nigeria. The multistage sampling technique was employed in the selection of the respondents in the study area and 600 copies of questionnaire were administered in the 3 senatorial districts of the state. Statistical means and percentages were used to analyze and present results. Major findings include; (58.8%) of respondents did not have awareness of climate change while 41.2% claimed they are aware of the issue of climate change and its impacts; 33% of respondents identified that they know the causes of climate change while about 67% did not

know, yet majority of respondents agreed that they have noticed long term changes in temperature (77.8%) and rainfall (65.5%) in the area. furthermore, adaptation strategies include adjusting of planting date (41.5%), switching to other crops most of which are early maturing crops (37.8%) and saving food and seed (20.7%). Respondents however, suggested that, tree planting (59.8%), prayer (15.8%), changing crop type (20.3%) will help mitigate and/or reduce the impacts of climate change in the area. The study recommends that the Government, Non-Governmental Organisations (NGOs) and civil society organizations should intensify efforts in environmental education and awareness campaign on climate change impacts, mitigation and adaptation in the State; encouragement of observational studies in the state to have a data base on the state of the climate; tree planting be pursued vigorously so that the problem of climate change is alleviated in the area.

Keywords: Awareness, Climate Change, Impact, Adaptation, Delta State, Nigeria

1. INTRODUCTION

Climate is the observed and measured weather characteristics for a period of 30-35 years. Thus any departure from such known characteristics in any delineated area or the globe, is termed climate change. The recent disastrous incidences of climate change recorded at worldwide scale presents new challenges to agricultural production in developing countries (Adebayo & Oruonye, 2013), and particularly in sub-Saharan Africa (NEST, 2003; Intergovernmental Panel on Climate Change (IPCC), 2007). In the past decades, IPCC had forecasted that, Africa is the most susceptible to climate change impacts due to the fact that anthropogenic activities which lead to climate change is increasing and there are no corresponding efforts to mitigate climate change (IPCC, 2007). Uncertainty in weather forms and their environmental implications such as, rainfall, drought and flooding, have meant that rural farmers who implement their regular annual farm business agenda, risk total crop/livestock failure due to climate change effects (Ozor & Nnaji, 2010). Furthermore, climate change impacts have also been traced to crop agriculture, create food shortage and insecurity. Also, some studies (Edris Alam, 2017; Mangala De Zoysa, Makoto Inoue, 2017) have also identified that climate change leads to social violence, spread of diseases, malnutrition or even death.

Similarly, due to various human stresses on the environment, coastal areas worldwide are already experiencing acute environmental problems, such as coastal erosion, pollution, degradation of dunes, and saline intrusion of coastal aquifers and rivers. Speeded up sea level rise will intensify the stress on these areas, causing flooding of coastal lowlands, erosion of sandy beaches, and destruction of coastal wetlands. The sea-level rise due to the thermal expansion and melting of glaciers, ice caps and ice sheets is a topical issue on global as well as regional scales (Mukesh & Venerando, 2011).

The above review shows quite a range of research works in the science of various aspects of climate change (Odjugo, 2011). But the germane question is that, how available are the findings of several researches on climate change to individuals in Africa in general and Nigeria in particular? Rukevwe (2008) in Odjugo (2011), shows that much emphasis has been devoted to the science of climate change but the education of the people and how they perceive the causes and impacts is lacking. Pam (2007) also reveals that while the concept of climate change is fully known to majority of those in the atmospheric science, it might not be so for many informed individuals in other disciplines and the uninformed ones. He therefore called for studies on climate change education and awareness.

In a similar development, Delta State is perceived to be witnessing the effects of climate change. This is because of the episodic events that have been experienced in various locations, which manifests in flooding, poor harvest, rise in temperature, changes in rainfall regime, early onset of rainfall, change in the pattern of August hiatus, etc. More worrisome issue is that while people are complaining that weather and climate patterns are changing, their activities which have slowly but steadily changed the climate have not changed. It therefore follows that the people are not properly informed of the climate change issues. Hence this study investigates awareness of climate change impacts and adaptation in mechanisms in Delta State, Nigeria.

2. MATERIALS AND METHODS

2.1. Study Area

The study was conducted in Delta State, South-South geopolitical zone of Nigeria which has been described by Ojeh *et al.,* (2012). Delta State sits on $5^{0}00^{1}$N and $6^{0}30^{1}$N, & Longitude $5^{0}00^{1}$E & $6^{0}45^{1}$E and occupies an area of 17,001Km^{2} (Ashimolowo & Odiachi, 2012). At the North section, the state is bounded by Edo State, at South-East by Bayelsa State, on the West section by Ondo State and to the East the state is bounded by Anambra State (see Fig 1). It is one of the oil-producing States of Nigeria (Enaruvbe & Yesuf,

2012) and these activities affect the environment of the state, thus leading to climate change (Enaruvbe & Yesuf, 2012). Delta State falls within Agbada, Akata and Benin soil Formation. The soils are sedimentary in origin characterised with silt, clay and sand (Okoye et al., 1987). Generally, elevations are low and the highest point is about 150m above sea-level (Tibi & Aphunu, 2010; Anomohanran, 2011).

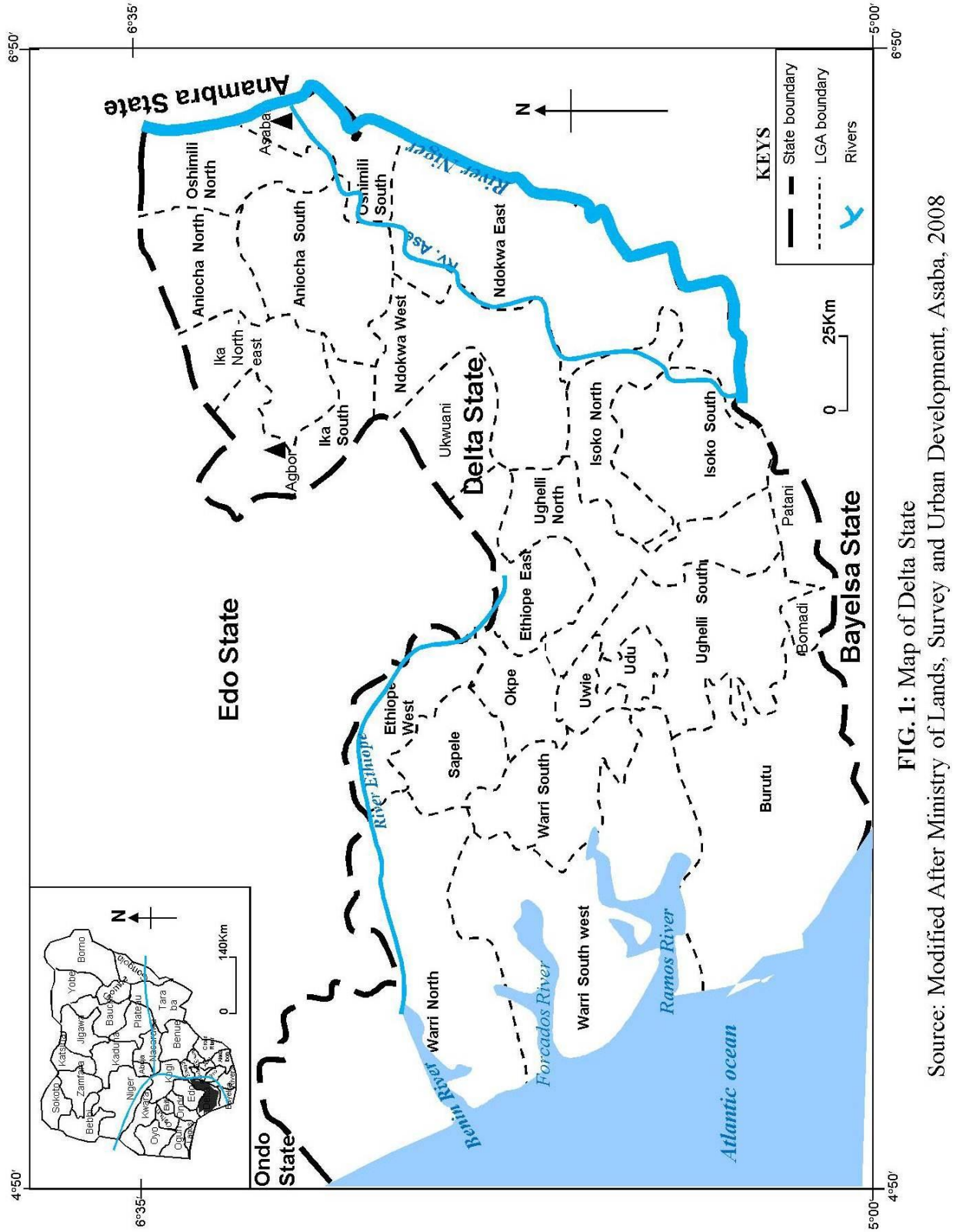

FIG. 1: Map of Delta State
Source: Modified After Ministry of Lands, Survey and Urban Development, Asaba, 2008

Having many rivers and inland waterways, the area is characterised with swampy and water logged land which occupies about 1/3 of the land in the state. Despite the water bodies, the temperature of the area has increased dramatically because of high rate of urbanization by the use of impervious surfaces and blocking of natural water channels connecting the various water bodies.

The area is characterised by a tropical type of climate as classified by Koppens and therefore experiences high temperatures, low pressure and high relative humidity throughout the year. The area witnesses rainfall from February to October with mean yearly rainfall of over 266.5cm in the southern corner of the state and 190.5cm in the Northern borders of the area. Temperatures are high and ranges between 21°c to 29°C.

2.2. Research Method

A multistage sampling technique was employed in the selection of the respondents. The first stage involved the selection of senatorial districts/ zones. Delta State has been divided into three senatorial districts namely Delta North senatorial District (DNSD), Delta Central senatorial District (DCSD) and Delta South senatorial Districts (DSSD). The second stage is the selection of two local government areas in each senatorial districts as follows: DNSD: Ukwuani and Aniocha South LGAs were selected; DCSD: Ethiope East and Isoko South LGAs were selected; DSSD: Burutu and Warri South LGAs were selected.

From each LGA, two rural settlements were further selected. From each of the rural settlements, 25 respondents were randomly selected. The last stage involves the selection of one major urban centre in each zone namely Asaba, Ughelli and Warri from northern, central and southern senatorial districts respectively and one hundred (100) copies of the research instrument was administered in each urban settlement (Table 1). For the analysis of the data collected, descriptive statistics such as means and percentages were used.

Table 1 Sampling Frame for the Survey Source: Field Survey, 2015

Senatorial Districts	LGA	Rural Settlement	Urban settlement	
Delta North SD	Ukwuani Aniocha South	Ezionum and Obiaruku Idumujunor and Ewulu	Asaba	
Delta Central SD	Ethiope East Isoko South	Isiokolo & Okpara Inland Igbide and Uzere	Ughelli	
Delta South SD	Burutu Warri South	Okpokunu and Odimodi Obodo and Ubeji	Warri	
No. of Questionnaires		Rural= 300	Urban= 300	Total=600

3. RESULTS AND DISCUSSION

3.1. Socio Economic Characteristics of the Respondents

This section examines some of the socio-economic features of the respondents. As shown in Table 2, majority of the respondents (30.3%) fall between the age brackets 26-30. This closely followed by respondents between 31-40 years which accounted for 25.5% while those between 41-50 years constitute 15.3%; those between 51-60 years constitute 12.3% and those above 60 years are 4.7%. This indicates that about 58% of the respondents are above 30 years and are therefore old enough to assess environmental changes in the study area. On the gender representativeness of the respondents, 53.7% of the respondents were female while the rest (46.3%) are male (Table 2). The same table indicates that only 9% of the respondents have no formal education while the rest have one form of education or the other with the majority having secondary education (41.1%) and tertiary education (29.7%). The occupational status in table 2 shows that most of the respondents (24.1%) are Business men/women, 20.3% are in the private sector, 15.5% are unemployed, 13% are farmers, 10.8% are students, 9.3% are artisans, 4.8% are civil servants and 2% are housewives.

Table 2 Socio Economic Characteristics of the Respondents from the State Source: Field Survey, 2015

Age Group	Number	Percentage
≤ 25	71	11.8
26-30	182	30.3
31-40	153	25.5
41-50	92	15.3

51-60	74	12.3
>60	28	4.7
Total	600	100
Gender	**Number**	**Percentage**
Male	278	46.3
Female	322	53.7
Total	600	100
Education	**Number**	**Percentages**
No Formal	54	9
Primary	121	20.2
Secondary	247	41.1
Tertiary	178	29.7
Total	600	100
Occupation	**Number**	**Percentage**
Civil servants	29	4.8
Private sector	122	20.3
Business	145	24.1
Artisan	56	9.3
Farming	78	13
Students	65	10.8
Unemployed	93	15.5
Housewife	12	2
Total	600	100

3.2. Awareness of Climate Change and Knowledge of its Causes

Many of the respondents (58.8%) from the whole state (Table 3) indicated that they do not have awareness of climate change while 41.2% claimed they are aware of the issue of climate change and its impacts. This shows that there is a low level of awareness of climate change among the citizens of the state. This result is congruent with the one reported by Nzeadibe et al, (2011) that the level of awareness of local communities on climate change impacts was still low in the Niger Delta region of Nigeria and that of Aphunu and Nwabeze (2012) which reported that nearly 77% of respondents in their study actually know little or nothing about climate change and its impacts on fish production in Delta State. But this result is at variance with Adebayo et al., (2013) which reported high level of awareness of climate change among the citizens of Adamawa state in the North eastern part of Nigeria. Perhaps this could attributed to long history environmental degradation and changes in the savannah belt of Nigeria where the study was carried out. Only 33% indicated that they know the causes of climate change while about 67% said no. According to the table 3, majority of the respondents agreed that they have noticed long term changes in temperature (77.8%) and rainfall (65.5%) in their areas.

Table 3 Awareness of Climate Change Source: Field Survey, 2015

Aware of Climate Change	**Number**	**Percentage**
Yes	247	41.2
No	353	58.8
Total	600	100
Know causes of climate change	**Number**	**Percentage**
Yes	198	33
No	402	67
Total	600	100

Notice changes in Temperature	Number	Percentage
Yes	467	77.8
No	133	22.2
Total	600	100
Notice changes in Rainfall	**Number**	**Percentages**
Yes	394	65.7
No	206	34.3
Total	600	100

When asked to assess the trend of temperature (hot days) in recent years, about 70% of the respondents claimed that the number of hot days are increasing. In the same vein, about 83.2% claimed that amount of rainfall and number of rain days is increasing (Table 4). These findings corroborated the experts' reports that the mean temperature is increasing in Nigeria (Umar, 2011 and Odjugo, 2009) and increase in rainfall leading to inundation of farmlands in Delta State (Ojeh and Victor-Orivoh, 2014)

Table 4 Assessment of Climatic Elements Source: Field Survey, 2015

Temperature	Number	Percentage
The Same	106	17.7
Decreasing	73	12.2
Increasing	421	70.1
Total	600	100
Rainfall/ Rain days	**Number**	**Percentage**
The Same	45	7.5
Decreasing	56	9.3
Increasing	499	83.2
Total	600	100

3.3. Perception of the Impacts of Climate Change and their Adaptation/Mitigation Strategies

Table 6 shows that Climate change affects the respondents' domestic activities in several ways. The most affected domestic activity affected is fuel wood harvesting (46.3%). As a result of high rate of deforestation, people have to travel longer distances into the wild to source fuel wood. The second affected activity is sources of animal folders (24.5%), and other domestic activity (29.2%). However, sources of water for domestic activities are not affected by climate change. This might be due to the increasing rainfall that leaves most environment inundated especially during the rainy season in the Delta.

Table 5 Domestic Activities Mostly Affected by Climate Change Source: Field Survey, 2015

Options	Number	Percentage
Source of water	Nil	00
Fuel wood harvesting	278	46.3
Sources animal folders	147	24.5
Others	175	29.2
Total	600	100

Most of the respondents in the study are not full time farmers but they are also engaged in part time farming activities. Their adaptation strategies according table 7 are adjusting of planting date (41.5%), switching to other crops most of which are early

maturing crops (37.8%) and saving food and seed (20.7%). However, the respondents claimed that they do not apply irrigation as an adaptation strategy.

Table 6 Adaptation Strategies Adopted by Respondents Source: Field Survey, 2015

Options	Number	Percentage
Adjusting planting date	249	41.5
Switching to other crops	227	37.8
Applying irrigation	Nil	00
Saving food, seed	124	20.7
Total	600	100

When asked how they can mitigate climate change (Table 8), majority (59.8%) indicated tree planting while 15.8% suggested prayer. Other options given are changing crop type (20.3%) and do nothing (4%).

Table 7 Ways to Mitigate Climate Change Source: Field Survey, 2015

Options	Number	Percentage
Prayer	95	15.8
Plant trees	359	59.8
Changing cropping	122	20.3
Do nothing	24	4
Total	600	100

3.4. Perception on the role of the Government on Adaptation/Mitigation Strategies

Table 9 shows the respondents suggestions on what government should to reduce the impact of climate change. The government should provide preventive measures (37.5%); provide education and awareness campaign, (27.8%). 23.8% suggested provision of early warning system and 10.8% suggested provision of relief measures.

Table 8 What Government should do to reduce the Impacts of Climate Change Source: Field Survey, 2015

Options	Number	Percentage
Early warning system on	143	23.8
Education & awareness	167	27.8
Provide relief measures	65	10.8
Provide preventive measures	225	37.5
Total	600	100

On type of assistance expected from the government, majority indicated subsidizing the prices of agro products/implements (25.8%) and agricultural insurance for farmers (20.5) (Table 10). Other options in order of hierarchy are other form of assistance (24.2%), resettlement of flood victims (13.1%), provision of relief materials (9.3%) and loan to start business (7%).

Table 9 Assistance Expected from Government Source: Field Survey, 2015

Options	Number	Percentage
Subsidizing the prices of agro products/implements	155	25.8
Loan to start business	42	7

Agricultural insurance for farmers	123	20.5
Resettlement of flood victims	79	13.1
Provision of relief materials	56	9.3
Others	145	24.2
Total	600	100

4. CONCLUSIONS AND RECOMMENDATIONS

The study was on awareness of climate change, impacts and adaptation in Delta State. Arising from the data analysis, the conclusion drawn from this study is that the general public in Delta State are not fully aware of climate change phenomenon but its manifestations in terms of climate change impacts on domestic and agricultural activities are known and they are making efforts to mitigate the challenge through tree planting and changing cropping patterns as well as adapt to the impacts through adjusting of planting dates and switching to other crops most of which are early maturing plants. For effective mitigation of and adaptation to climate change in the Delta State, the following recommendations are made.

a. Government, Non-Governmental Organisations (NGOs) and civil society organizations should intensify efforts in environmental education and awareness campaign on climate change impacts, mitigation and adaptation in the State. State owned television and radio stations and other media houses is an important platform for such campaign.
b. Tree planting should be pursued vigorously by all stake holders with government providing the necessary inputs and encouragements. Students in secondary and tertiary institutions in the state especially those studying environmental science and weather/climate related subject/courses should be encouraged by their institutions and government in tree planting campaigns where each school could target a number of trees to be planted each year.
c. The state Ministry of Environment should prepare a strategic plan for combating climate change and other environmental problems. This can be done with joint efforts from environmental experts in the state.
d. The state government through the Ministry of Environment should provide basic weather observation equipment for climate/weather monitoring in different senatorial districts in the state. This will enable the state to have a data base for past and present weather which can be used in operational weather system forecast.

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