

A Survey of Climate Change and Livelihood in Selected Rural Coastal Communities in Waterside Local Government Area in Ogun State

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ABSTRACT

This study is on climate change and rural livelihood in Makun-Omi, Ode-Omi and Iwopin communities in Waterside Local Government Area in Ogun State, Nigeria. Descriptive survey ex post facto design was adopted and three hundred and forty nine respondents randomly selected participated in the study. An adapted Climate Change and Livelihood Questionnaire were administered. 20% of the respondents engaged in agricultural production, 61% engaged in fishing and fishing related activities and 19% in non-farm livelihood activities. Temperature, flooding and water salinity have negative significant correlation with agricultural production. Eight types of manifestation of climate change were identified in the communities. Flooding had mean score 3.7, second was temperature with mean score 3.64, third was rainfall with mean score 3.6 and fourth was water salinity with mean score 3.54. Sea level had the fifth highest mean score 1.51, sixth was heat waves with mean score 1.48, and seventh was drought with mean score 1.45 and storm activity recorded the eighth mean score 1.36. Temperature, flooding and salinity have a negative significant correlation with fishing and fishing related activities. Rainfall and flooding have negative significant correlation with livelihood assets while temperature, rainfall and flooding have negative significant correlation with livelihood income at 0.05alpha significance. It is concluded that climate change increased poor livelihood through reduction in agricultural production, poor outcomes of fishing and fishing related activities, low non-farm activities outcomes, loss of livelihood income. It is recommended that inhabitants of these communities should be trained on new strategies for sustainable livelihood strategies.

Keywords: climate change, rural, livelihood, coastal communities

Living in rural coastal areas of Nigeria is becoming unbearable as the trends over time show that people have been contending with hardships caused by poor access to health services leading to high mortality rate, low income levels and poor ways of making a living. This situation occurs because the natural resources many coastal communities depend on for making a living have been declining due to exposures to disasters induced by climate change. As a result of the high level of human dependence on natural resources in these rural coastal communities, the rate and intensity of adverse effects of any long-term significant change in

the “average weather” and shocks arising from climate change and perturbations directly lead to poor income and low productivity (Olawuyi and Rahji, 2012; Dube and Phiri, 2013).

The importance of climate change and its influence on people’s means of making a living has attracted attention from researchers which has led to several studies. Some of the previous studies conducted include Households’ Perception of Climate Change and Human Health Risks Using Community Perspective by Haque, Yamamoto, Malik and Sauerborn (2012), Impacts of Climate Change on Rural Livelihood in Madagascar and The Potential For

Adaptation by United States Agency for International Development (2008) and An Assessment of The Trends of Climatic Variables in Taraba State Nigeria by Oruonye (2014). However, literatures show that there is the need for more studies to focus on relationship between effect of climate change and livelihood in rural coastal communities (Jayaweera, 2010; Egbe, Yaro, Okon and Bisong, 2014). Therefore, this study focuses on climate change and livelihood in rural coastal communities of Makun-Omi, Ode-Omi and Iwopin in Waterside Local Government area in Ogun State. The main objectives of this study are to determine the relationship between climate change and livelihood activities. It is also to determine whether there is any significant relationship climate change and livelihood income in the rural coastal communities. To achieve these, answers were provided to the research questions: is there any relationship between climate change and livelihood activities of the rural coastal communities under study, and what is the relationship between climate change, livelihood and income in the rural coastal communities under study? The two null hypotheses tested are there is no significant relationship between climate change (i.e change in temperature, rainfall, flooding and water salinity) and livelihood in the rural coastal communities and there is no significant relationship between climate change and livelihood income in the rural coastal communities.

Literature Review

Climate is the “average weather” that a given region experience. Climate change occurs when there is variation in the mean state and other statistics of climate on all temporal and spatial scales beyond that of individual weather events. These events are in forms of high or low, cool or hot or warm temperature, changes in rainfall pattern and melting of glaciers. All these changes affect water resources, agriculture and food security, human health, terrestrial ecosystems and biodiversity and coastal zones (United Nations Framework Convention on Climate Change, 2007, 8; “Author”, 2014, 10). This is important because climate plays a dominant role in having a direct impact on productivity and physical production factors. With this, any change in climate equally generates high level of concerns (Aderogba, 2014).

Food and Agriculture Organisation (2016) notes that climate change has diverse effects on environment, human health, food security, economic activities, natural resources, physical infrastructure and agriculture. It also degrades environmental conditions of coastal communities thereby causing impoverishment of the population as a result of poor livelihood, making them the most vulnerable. The issue of climate change has become critical because of its likely negative effects on mankind in agricultural production, human health, fisheries, forest and forestry activities, impoverished soils, water scarcity, floods, droughts, poverty and hunger etc. (Pongiglione, 2012; Food and Agriculture Organisation, 2016).

Worldwide, climate change are observed in several forms like prolonged flooding, heat waves, drought, sea level rises, water salinity, temperature and rainfall variations etc, all have become evident. People are directly exposed to changing weather patterns (temperature, precipitation, sea-level rises and more frequent extreme events) and indirectly through changes in the quality of water, air and food in addition to changes in ecosystems, agriculture, industry, human settlements and the economy. This has also led to the frequent incidences of increasing temperature, floods and storms as well as the transmission of infectious diseases which have persisted and frequently occurring in coastal areas (Intergovernmental Panel on Climate Change, 2001; Kennedy, Twilley, Kleypas, Cowan, Jr and Hare, 2002; World Health Organisation, 2009).

The extent of the effects of climate change on the vulnerable poor is directly associated with their livelihood activities and level of survival. To this end, livelihood has become an important determinant of the survival rate of vulnerable poor especially in communities where making a living is threatened by effects of climate change. In understanding this phenomenon, Chambers and Conway (1992) and Jayaweera (2010) state that livelihood includes “adequate stocks and flows of food and cash” to meet basic needs. It is broken down to include “capabilities, assets, (stores, resources, claim and access) and activities required” for a means of living. In the context of rural coastal communities, they stated that livelihood may be a complex and changing

process based on the peculiarity of the environment but it is widely accepted as the indicator of how people make their living. It also involves a person's ability and capacity to perform certain works of sustaining a basic lifestyle.

The severity of climate change globally has deprived people of their means of livelihood, possessions eroded and their possible survival threatened. As a result of this, the level to which individuals understand the causes and effects of climate change, and the extent, to which they regard it as harmful to their ways of making a living and well-being correspond to their personal lifestyle decisions, survival instincts and the quality and quantity of natural resources available (Kangalawe and Lyimo, 2013). Apata (2016), Manyatsi, Mhazo and Masarirambi, (2010) and Oruonye (2014) all reported that climate change is felt in Nigeria like other sub-Saharan Africa countries, and the vulnerability level caused by climate change on the environment is community-wide particularly in rural coastal communities covering sources of livelihood like agriculture, food security, land use, energy consumption, biodiversity, health and water resources. These authors and Aderogba (2014) avow that abnormal changes in temperature and rainfall and the increasing frequency and intensity of drought and floods occur in most parts of the states in Nigeria such as Benue, Cross River, Imo, Anambra, Kogi, Sokoto, Kaduna, Rivers, Bayelsa and others.

These abnormal changes have brought long-term implications for the viability and productivity of the world agro-systems especially among rural coastal communities. Arising from these, rural coastal livelihood is no longer restricted to the traditional means of making a living due to changes brought about by several factors. They further note that in the context of climate change, households' decision to participate in different livelihood activities is a common sign underscoring how the victims of these changes are striving to cope and stay alive. Olawuvi and Rahji (2012) observed that livelihood in rural coastal communities are made up of numerous activities and strategies. They noted that because of the level of impacts of climate change, livelihood diversification has been increasing, and strategies pursued by households and individuals

are shaped by several factors like access to natural resources, which is getting restricted due to its rapid depletion.

The colossal effects of climate change on rural coastal communities cannot be taken for granted. In the opinion of Hassan, Khanam, Ibrahim and Zaman (2018) climate related changes are in form of potential additional stress on systems and the ecology in coastal areas degraded. These make inhabitants of coastal communities contend with conditions like floods, salinity intrusion, river bank erosion, cold waves, cyclone, tornado, arsenic contamination in ground water and water logging. In extreme weather conditions, coastal people are faced with risks and hazards that affect their livelihood in many sectors including extreme poverty, malnutrition, and damage in crop cultivation, poultry, vegetables garden and fisheries. Other consequences like unemployment, food scarcity, health problems, and water crisis have been identified as major challenges in coastal communities. As a result, the affected people are losing their means of livelihood and forced to take several alternative ways to survive with the adverse impact of climate change associated disasters (IPCC, 2001; WHO, 2009). In countries experiencing highest effects of climate change induced disasters, the poorest with the least resources and capacity to adapt, are the most vulnerable. With these projected changes, the incidence, frequency, intensity, and duration of climate extremes (for example, heat waves, heavy precipitation, and drought), as well as more gradual changes in the average climate, will notably threaten their livelihood, further increasing inequities between the developing and developed worlds (IPCC 2001).

Methodology

This study is a descriptive survey ex-post-facto design because the researchers did not manipulate the independent variables. The population of the study is the inhabitants of selected rural coastal communities of Makun-Omi, Ode-Omi and Iwopin in Waterside local government area of Ogun State. The communities were purposively selected because they are rural in nature and are located on the coastal portion of Ogun State between Omu Creek to the North and the Atlantic

Ocean/Coast to the South. The western boundary extends approximately 3 km into Lagos State and the eastern boundary also extends about 3 km into Ondo State (Olawuyi and Rahji, 2012). Because of their location they have also been experiencing climate change. Data and information collected about the population were of good representation of the population. Simple random sampling technique was used to select a total of 349 participants for the study. For the instrumentation, an adapted instrument i.e. Climate Change and Livelihood Questionnaire subjected to face and content validity and reliability using Cronbach Alpha test of internal consistency, which yielded 0.93 was administered to generate data on demographic information, ranking of climate change and livelihood activities and the relationship between climate change and livelihood activities and income. The procedure for data collection involved the researchers and two research assistants in the administering and collection of the questionnaire from the respondents in all the communities.

RESULTS AND DISCUSSION

Data were analyzed using descriptive statistics including frequency counts, percentage, mean and inferential statistics i.e. multiple correlation matrix at 0.05 alpha level.

Table 1: Distribution of participants by Gender, age and livelihood activities

Sl. No.	Demographic Variables	Frequency	Percentage
	Gender	187	58
1	Male	162	42
2	Female	349	100
	Total		
	Age		
1	Below 30	63	18
2	31-40	105	30
3	41-50	94	27
4	51-60	70	20
5	61-70	17	5
	Total	349	100

Main Livelihood			
1	Activities	71	20
2	Agriculture Production	213	61
3	Fishing and Fishing Related Activities	65	19
	Non-Farm Activities	349	100
	Total		

Source: Field Survey by Researchers 2019.

Table 1 above shows that a total of three hundred and forty nine (349) respondents participated in the study. Data generated reveals that they were made up of one hundred and eighty seven (58%) male and one hundred and sixty two (42%) female. The age distribution shows that sixty three (18%) of the respondents were below (30) years, one hundred and five (30%) were between (31-40) years, ninety four (27%) were between (41 -50) years old, seventy (20%) were within the range of (51-60) years while seventeen, five per cent were between (61-70) years old. This shows that bulk of the respondents two hundred and sixty nine (77%) were within the age range of (31-60) years which indicates that majority of the respondents were in their active years. The table shows that three main livelihood activities were listed by the respondents.

Table 2: Ranking by mean score of manifestations of climate change

Sl. No.	Observed Changes	Mean	Rank
1	Rainfall	3.6	3 rd
2	Flooding	3.7	1 st
3	Water Salinity	3.54	4 th
4	Temperature	3.64	2 nd
5	Sea Level	1.51	5 th
6	Heat Waves	1.48	6 th
7	Drought	1.45	7 th
8	Storm Activity	1.36	8 th

Source: Field Survey by Researchers 2019.

Further, three major livelihood activities were reported by the respondents out which agricultural production accounted for seventy one (20%), fishing and fishing related activities accounted for two hundred and thirteen (61%) and non-farm activities accounted for sixty five

Table 3: Correlation Matrix and Hypothesis One

	Agric. Prod.	Temperature	Rainfall	Flooding	Water Salinity
Agric. Prod.	1				
Temperature	-0.4221	1			
Rainfall	0.0788	0.1414	1		
Flooding	-0.7469	0.2957	0.78803	1	
Water Salinity	-0.1949	0.0030	0.1160	0.0266	1
<i>Fishing and Fishing Related Activities</i>					
Fishing and Fishing	1				
Related Activities					
Temperature	-0.4102	1			
Rainfall	-0.5477	0.0213	1		
Flooding	-0.5813	0.0436	0.4268	1	
Water Salinity	-0.5412	0.0630	0.0106	0.07324	1
<i>Non-Farm Activities</i>					
Non-Farm Activities	1				
Temperature	-0.0410	1			
Rainfall	-0.5462	0.0023	1		
Flooding	-0.5703	0.0436	0.6268	1	
Water Salinity	-0.0547	0.0930	0.0160	0.0932	1

0.05 Level of Significance.

(19%). This shows that the predominant livelihood activities depend mostly on available natural resources and conform to the coastal nature of the study area.

Table 2 above shows the mean score of the manifestation of climate change as the independent variables identified and ranked by the respondents. From the ranking, flooding has the highest mean score 3.7, second is temperature with mean score 3.64, third is rainfall with mean score 3.6 and fourth is water salinity with mean score 3.54. It also shows that sea level has the fifth highest mean score 1.51, sixth is heat waves with mean score 1.48, and seventh is drought with mean score 1.45 and storm activity recorded the eighth mean score 1.36. The participants identified these eight manifested changes as the consequences of climate change that constitute the major determinants of the success of the livelihood activities in the communities.

From the correlation matrix result presented in Table 3 above, it shows the relationship exist between dependent

variable i.e. agricultural production and all the independent variables. The matrix shows temperature -0.4221, flooding -0.7469 and water salinity -0.1949 have negative significant relationship with agricultural production while rainfall 0.0788 has positive relationship with it. Thus, as these independent variables increase, the dependent variable declines. Then the table shows the relationship between non-farm activities and all the independent variables. The correlation matrix indicates temperature -0.4102, rainfall has -0.5477, flooding -0.5813 and water salinity -0.5412 indicating negative significant relationship with fishing related activities. The increase in the independent variables bring decline of the dependent variables that is fishing and fishing related activities.

Further, the table shows the relationship exist between dependent variable that is non-farm activities and all the independent variables. The matrix indicates temperature is -0.0410, rainfall has -0.5462, flooding -0.5703 and

salinity 0.0547. This result indicates that temperature and salinity have no significant relationship with non-farm activities while rainfall and flooding have negative significant relationship with non-farm activities. This means that as independent variables increase the dependent variable i.e. non-farm activities decline. Based on these results, hypothesis one is rejected.

This result on relationship between dependent variable i.e. agricultural production and all the independent variables is similar to the findings of World Bank (2013) that climate change contributes to loss of harvest and rising unemployment of agricultural workers. It is also corroborated by the earlier finding of Le, Nguyen and Jolly (2016) that temperature increases and sea level rise as a result of climate change has been causing permanent inundation, increasing coastal flooding, salt water intrusion with joint negative effects on agricultural production.

Table 4: Correlation Matrix and relationship between independent variables and dependent variables (Livelihood Income)

	Livelihood Income	Flooding	Salinity	Temp.	Rainfall
Livelihood	1				
Temperature	-0.6480	1			
Rainfall	-0.5754	0.0200	1		
Flooding	-0.5813	0.0710	0.0390	1	
Water	-0.0547	0.0648	0.0470	0.0297	1

0.05 Level of Significance.

The result on the relationship between non-farm activities and all the independent variables is corroborated by a similar findings of Kennedy, Twilley, Kleypas, Cowan, Jr and Hare (2002) that increasing temperature negatively affects fisheries and related fishing activities. World Bank in Shepard (2017) also confirms this result in their report that climate change like rainfall variations, flooding and increasing ocean salinity negatively affect fisheries significantly in Cote d’ivoire, Ghana, Liberia, Nigeria, Sierra Leone and Togo. Furthermore, result of the analysis on the relationship between dependent variable that is non-farm activities and all the independent variables is similar to the earlier findings of Amare and Herman (2014) that climate change induced higher rainfall,

reduces non-farm activities and displaces labor outside the farm in coastal communities. It also corroborates the earlier findings of Huq, Huge, Boon and Gain (2015) that temperature increases glacier melting promoting sea level rise, which cause permanent inundation, increased flooding, as well as salt water intrusion, have together negatively affected non-farm livelihood activities like industrial production, essential social service provision in communities affected by climate change.

Table 4 above shows the relationship between livelihood income and all the independent variables. Temperature is -0.6480, rainfall is -0.5754, flooding is -0.5813 and water salinity is -0.0547. The results indicate that temperature, rainfall and flooding have negative significant relationship with livelihood income while water salinity have no significant relationship with livelihood income. This means that as these three independent variables increase the dependent variable i.e. livelihood income declines. Based on this, hypothesis two is rejected. This result is similar to the earlier finding of Amare, Mulubrhan and Waibel, Herman (2014) that higher rainfall variability negatively affects non-farm activities by displacing, reducing demand for labour thereby causing reduction in household income. FAO (2016) also corroborates this finding that climate change induced changing temperature, rainfall and flooding cause economic consequences that negatively affect livelihood income and limit household expenditures on critical needs like health and education. In this regard, it means that where the changes of these three variables occur, livelihood income of the inhabitants without additional income sources decline.

CONCLUSION AND RECOMMENDATIONS

This study was on effects of climate change and livelihood in rural coastal communities in Waterside local government area in Ogun State. Three hundred and forty nine (349) respondents from Makun-Omi, Ode-Omi and Iwopin communities in Waterside local Government area of Ogun state participated in the study. The study revealed that the major livelihood activities were fishing and fishing related activities and agricultural production Majority of the respondents depended on natural resources for sourcing their

livelihood using the ocean and arable land for fishing and fishing related activities and agricultural production. The respondents identified flooding, temperature, rainfall and water salinity as the most importantly felt effects of climate change and the independent variables that affect their livelihoods' activities.

The multiple correlation matrix at 0.05 level of significance show that temperature, flooding and salinity have negative significant relationship with agricultural production while rainfall did not have any significant relationship with the dependent variable. It also indicated that temperature, rainfall, flooding and salinity all have negative significant relationship with fishing and fishing related activities. Further, temperature and salinity have no significant relationship with livelihood assets while rainfall and flooding have negative significant relationship with livelihood asset. And temperature, rainfall and flooding have negative significant relationship with livelihood income while water salinity have no significant relationship with income.

Fishing and fishing related activities were also affected negatively by temperature, rainfall, flooding and water salinity. Therefore, all the dependent variables that were negatively correlated with the independent variables will decline as the independent variables increase. It can be concluded that climate change have negative correlation with livelihood and is felt by the inhabitants of the three rural coastal communities this study covered. The result of the analysis correlates with the fears of the inhabitants that climate change affects negatively their livelihood activities, income and environment as a whole. As a result of this, it is likely the people of these communities will be compelled to evolve new livelihood strategies as the effects of climate change are becoming more devastating and unbearable.

Based on the findings of this study, it is recommended that:

1. Awareness campaigns and training should be embarked upon by government and other stakeholders to emphasize the causes and effects of climate change and adoption of sustainable use of natural resources. People highly vulnerable

to climate change should be trained to develop new livelihood strategies to cope with the current challenge.

2. Government at all levels in Nigeria should invest more on rural infrastructure and provision of livelihood assets in rural coastal communities in order to strengthen the livelihood capabilities of the people.
3. It is necessary for relevant government agencies to assess the level of resilience and vulnerability of rural coastal communities using broad indicators and provide alternative activities based on needs for the people.

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