

NON-FARM ACTIVITIES AS ADAPTATION STRATEGIES TO CLIMATE CHANGE AMONG FARMERS IN COASTAL COMMUNITIES IN ONDO STATE, NIGERIA

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Abstract

This study investigated the effect of non-farm activities as adaptation strategy to climate change among farmers in coastal communities in Ondo State, Nigeria. One hundred and forty-five rural household farmers were selected using multistage sampling procedure for the study. Structured questionnaire was used to gather information on socio-economic characteristics, non-farm and effect of non-farm activities on climate change, among others. The descriptive statistics and ordinary least square regression were the analytical tools employed for the study. Results showed that the mean age of farmers was 48.6 ± 7.4 years, 57.9% were male and 56.5% were married with 5.0 ± 3.0 household size. The regression analysis revealed that age, household size, education, non-farm income, cultivated land size, access to information and credit were the significant variables influencing farmers' participation in non-farm activities as adaptation strategy to climate change in the study area. Results further revealed that participation in non-farm activities supplement low income from farm due to climate change, combat climate-induced migration, provides alternatives to farm work affected by climate change. It could be concluded that non-farm activities serve as pathway out poverty and the devastating effect climate, among farmers in the coastal communities of Ondo State, Nigeria. Based on the findings of the study the following recommendations were made, information and awareness about climate change should be created among farmers, cottage industries should be provided for more non-farm activities, access to credit should be encouraged through review of interest rate, among others.

Keywords: Climate change, non-farm activities, climate-induced migration, coastal communities

Introduction

Agriculture and fish farming are the major occupations of people in the rural areas particularly in the coastal communities of the developing countries. These activities provide food, employment, income and means of livelihoods (Oni, 2013). Crop production or agriculture in the coastal communities is severely affected by climate change vagaries and this continues unabated due to its inherent problem and higher vulnerability of the area. Despite the significant contributions of crop and fish production to the economy of the coastal communities, the activities of this sector of our society is confronted by myriads of factors such as sea rises and flooding, shortage of land, natural hazards, inadequate finance, shortage of labour, among others of which climate change or climate-related disasters are the major challenges (Deressa, et al., 2007). Climate change and its associated effects constitute an inevitable and urgent challenge across the globe with long-term consequences for the sustainable development of all nations (Tharani et al., 2019). This has been widely documented as a key environmental issue affecting natural and human systems globally (Biratu, 2018). However, the coastal communities and low-lying areas are projected to be increasingly at risk during this 21st century and beyond due to global climate change (IPCC, 2018). Coastal communities are particularly exposed to a wide range of climate-related hazards such as high precipitation, rising sea levels, accelerated coastal erosion, higher flood levels and storm surges, increasing ocean acidity and surface temperatures, among others.

Climate change refers to long term shift or variations in climatic factors such as extreme drought, increase in temperature or excessive heat, weather patterns, precipitation, among others resulting in wide spread consequences on the environment, economies and the ecosystem (Kennedy. 2024; Apata, 2009). Generally, in Africa and Nigeria especially, farmers in the coastal communities are vulnerable to climate change because their agricultural system is rain-fed, lack adaptive capacity and due to socio-economic challenges. Climate change has become an important topical issue globally as it has attracted the attention of scholars, farmers and government, due to its effects on crops and livestock productivity and environment; hence the quest for mitigation or adaptation practices (Kennedy. 2024).

Coastal areas are characterized by high concentrations of people and human settlements with high population density are on an average three times the global mean population. The geographical locations of the coastal communities are inherently under constant threats of climate change vagaries like sea-level rise, frequent flood events, water-erosion, extreme temperature, low awareness of communities towards improved livelihood-technologies, and inadequate response as well as preparedness towards forecasting to combat the damaging impacts of extreme events (Bhattacharyya et al., (2020). The effects of climate change are already being felt in many coastal areas on their agricultural and fishing activities. Hence, these unexpected effects of climate change on the coastal region require a drastic adaptation or approach that could mitigate the devastating effect of climate change on the people.

Adaptation is one of the policy options to reduce the negative impacts of climate change (Abidoye et al., 2017). Moreover, adaptation to climate change means the adjustment in natural or human systems in response to actual or expected climatic stimuli or effects, which moderates harm or exploits beneficial opportunities (IPCC 2018). Studies revealed the common adaptation practices in agriculture or among farmers in the coastal communities to include; planting new crop varieties, changing planting dates, integrated pest management, irrigation, crop diversification, adoption of mixed cropping, among others (Oyekale, 2021; Schroth et al., 2016). However, despite the significance of the various adaptation practices above, there are scanty or limited empirical evidence or literature on the adoption of non-farm activities as climate adaptation practices among farmers in the coastal communities. Coastal communities are among the most vulnerable to climate change as a result of extreme temperature, variations in extreme weather patterns, drought and changes in ecosystems. Many households in these areas depend on small-scale farming and fishing which are increasingly being threatened by unpredictable weather conditions, flooding, coastal erosion, among others. Moreover, as the effect of climate change increases or intensifies, the livelihoods of the coastal farmers become threatened and less sustainable thus forcing the communities to diversify into alternative income activities.

Non-farm activities entail all activities performed by the farmers outside the farm and this could be divided into non-farm self-employment and non-farm wage-employment (Danso-Abbeam et al., 2020). Non-farm activities constitute one of the major adaptation strategies to climate change among the coastal communities. Engagement of coastal farmers in non-farm activities helps to diversify income sources, reducing risks associated with climate dependent farming practices (Nagler & Naudé, 2017; Parveen, & Cheema, (2018).). Non-farm activities include tailoring, motorcycle repairs, night guard, household cleaning, selling of herbs, barbing, transport and GSM business, among other activities in the neighbourhood or urban centres (Seng, 2015; Asmare et al., 2019). In the coastal communities, non-farm activities serve as insurance against production shock, supplement household income, provides employment, as means of livelihoods and as pathway out of poverty. Moreover, non-farm activities as adaptation strategies has the potentials to stabilize the households finances, mitigate the effects of climate change, curbs climate-induced migration, shift

labour away from agriculture and prevent land degradation and excessive land use in coastal communities, thus promotes sustainable management of land, among others (Fufa, 2015; Asmare et al., 2019). However, despite the significance of non-farm activities on coastal farming households, the extent at which non-farm activities build resilience against climate change is yet to be explored or adequately investigated in the study area.

Non-farm activities can provide financial stability to coastal farming households in advent of dwindling agricultural and fishing productivity (Igbal et al., 2015). The relevance of non-farm activities as adaptation strategies cannot be overemphasized among coastal communities. Non-farm activities such as petty trading, handcraft, tailoring, barbing, among others provide alternative income streams when farming or fishing activities of coastal farmers is adversely affected by flooding or sea level rises in the coastal areas (Oyekale, 2021). Moreover, farmers' engagement in non-farm activities provide farmers with the opportunities to spread economic risk when agricultural activities are disrupted by climate events or agents (Deresa et al., 2007). In addition to the significance of non-farm activities as adaptation approach to climate change, non-farm increases employment of youth and women in the coastal communities' resilience and reduces the dependency on climate-vulnerable sectors on the farm (Dedehouanou et al., 2018; Igbal et al., 2015).

Coastal farming households' participation in non-farm activities enhance the coastal farmer to diversify income sources thus reducing overdependence on the climate dependent sector such as farming. Moreover, having other alternative sources of earnings could enable the coastal farmers to invest in climate adaptation strategies such as education, integrated pest and soil management practices, and resource management sustainably (Tharani et al., 2019). Non-farm activities as climate adaption strategies could boost temporary migration or seasonal movement thus earning the migrant households with remittances that could be used to support other adaptation strategies while the period of short time migration reduces undue pressure on the land for further farming (Tharani et al., 2019). However, the success of these strategies depends on factor such as access to credit, rural infrastructure, and other supportive government policies and programmes (Oyekale, 2021). Hence, an understanding of these dynamics is crucial to formulation of effective policies for building resilience against climate change in the coastal communities.

Despite the significance of non-farm activities in farming households in the rural areas, the effects of non-farm activities as climate change adaptation strategies on small-scale farmers in coastal communities has not been well and adequately investigated. It is not known to the researcher the various non-farm activities engaged in or employed by smallholders' farmers in coastal communities as adaptation strategies to climate change. Findings of this study will helpful formulation and designing of policies related to climate change on agricultural production in coastal communities, equip small-scale farmers in coastal communities with adequate knowledge on non-farm activities as adaptation strategies to climate change. This study will contribute to literature in understanding of effects of non-farm activities on climate change adaptation strategies for the coastal farmers. Specifically, the objectives of this study are to: examine the socio-economic characteristics of small-scale farmers in coastal communities; identify the effects of climate change on the activities of small-scale farmers in coastal communities; identify the non-farm activities employed to mitigate the effects of climate change by small-scale farmers in coastal communities, and determine factors influencing small-scale farmers in coastal communities participation in non-farm activities as mitigation strategies to climate change.

Methodology

The study was conducted in the coastal communities of Ondo State (Okitpupa, Irele, Ese-Odo and Ilaje LGAs) with estimated population of 1.9 million people (NPC, 2022) and the area favours the cultivation of

arable crops and fishing activities. The population for the study comprised all small-scale farmers in the coastal communities in the study area. The primary data for this study were collected using structured questionnaire with interview schedule. Information was collected on socio-economic characteristics of small-scale coastal farmers, effects of climate change, non-farm activities engaged in by farmers, among others. Multistage sampling technique was employed in the selection of 145 small-scale farmers in the coastal communities in the study area. The first stage entailed the random selection of 2 local government areas (Okitipupa and Ese-Odo) in the coastal area of the state while the second stage consisted of random selection of five (5) communities in each of the selected LGAs for the study. The final stage comprised the selection of small-scale farmers in the selected communities based on probability proportionate to size of farmers in the communities. Data collected for this study were analysed using descriptive statistics and logistic regression analysis. The logistic regression is a binary dependent model where the dependent variable for the study is household participation or engagement in non-farm activities. The value of 1 for farmers who participated in non-farm activities; and 0 otherwise which is specified as:

$$Y_i = \beta X_i + u_i \quad 1$$

where;

Y_i = (1 = household head take part in non-farm activities; 0 = otherwise)

β = estimated parameter; X_i = independent explanatory variables; and u_i = random error term. The probability of coastal farmer i participation or otherwise in non-farm activity is postulated to depend on socio-economic, farm, non-farm and locational characteristics.

X_1 = Age of hhold head (years);

X_2 = Gender of hhold head (1 = male, 0 = otherwise);

X_3 = Marital status of household head (1 = married, 0 = otherwise);

X_4 = Household size (numbers)

X_5 = Education (completed years of tertiary education)

X_6 = Non-farm income (₦)

X_7 = Cultivated land size (hectares)

X_8 = Total Livestock Unit (TLU)

X_9 = Access to Information (1 = yes, 0 = others).

X_{10} = Access to Credit (1 = yes, 0 = others).

X_{11} = Distance (kilometer).

X_{12} = Road access (1 = yes, 0 = otherwise)

Results and Discussion

The results on Table 1 revealed the socio-economic characteristics of the farmers in coastal communities. On age which is responsible for decision making and actions on any activity, the mean age of the coastal farmers was 48.6 ± 7.4 years. This portends that farmers in the coastal communities are with the active working age and this would help them participate well in non-farm activities. This finding is agreement with Adesiji et al. (2015). It was discovered that majority of coastal farmers (57.9%) participating in non-farm activities as adaptation strategies to climate change were male. This is not unconnected with the findings by Danso-Abbeam et al. (2004) and Amsalu et al. (2020) that male participate more in non-farm activities than the female. On marital status of the coastal farming households, findings showed that 56.5% were married and this concurs with the fact that traditionally, most rural dwellers are married as mark of responsibility to be able to take care of members of the households.

The results on the educational attainment of the coastal farmers indicated 51.0% had secondary education. This corroborated the finding by Otoo (2019) that more years of completed education promote participation in non-farm activities. Furthermore, the mean household size was 7.0 ± 2.0 members. This implies that there were more people in the farming households in the coastal communities which serve as impetus to participation in non-farm activities. This is in accordance with Kimhi (1994) that increase in the number of adult and other household members' increases participation in non-farm activities among Israeli farm households.

Table 1: Distribution of Smallholder Farmers in Coastal Communities n = 145

Socio-economic Characteristics	Percentage (%)
Age	
< 30	11.2
30 – 45	28.5
46 – 60	51.2
>60	9.1
Mean(SD)	48.6±7.4
Gender	
Female	42.1
Male	57.9
Marital Status	
Single	16.3
Married	56.5
Widowed	19.8
Divorced	7.4
Education Status	
Primary Education	13.5
Secondary Education	51.0
Tertiary Education	9.5
Non-formal Education	26.4
Household Size	
< 5	6.1
5 – 8	58.3
9 – 12	30.1
>12	5.5
Mean(SD)	7.0±2.0

Source: Field Survey; 2024

Analysis of coastal farmers based on results on effects of climate change on their activities revealed excessive or fluctuations in climate change accounted for 31.4% and precipitation or rainfall was represented by 20.1%. However, other effects included increase in sea-level, wide spread erosion, and extreme weather, rural-urban drift, among others. It was further revealed on Table 2 that petty trading (20.2%), okada/transport activities (18.0%), night/day guard activities (14.0%), among others were the non-farm activities employed as the adaptation strategies to climate change among farmers in the coastal communities. This may be attributed to the facts that these activities serve as other sources of income to the households. Moreover, they provide means of livelihoods and as insurance to mitigate the adverse effects of climate change in agricultural production.

Table 2: Distribution of Small-Scale Farmers in Coastal Communities n = 145

Variables	Percentage (%)
Effects of Climate Change	
Temperature fluctuations	31.4
Changes in rainfall patterns	20.1
Increase in Sea-level	11.6
Widespread erosion/Flooding	19.3
Rise in weather extremes	7.0
Rural-Urban Drift	3.3
Poverty/Low Productivity	7.3
Non-Farm Activities of Small-Scale Farmers	
Hand Crafts/Weaving	12.0
Barbing	8.5
Tailoring	7.5
Night /Day Guards	14.0
GSM and Cell-phone Repairs	5.2
Okada/Transport Activities	18.0
Petty Trading	20.2
Agro- Processing/Restaurants	10.2
Selling of Secondhand Clothes	4.4

Source: Field Survey, 2024

Table 3 showed factors that significantly influence coastal farmers engagement in non-farm activities as adaptation strategies to climate change in the study area were age, household size, education, non-farm income, cultivated land size, access to information and credit. Age and cultivated land size were found to have negatively influence farmers engagement in non-farm activities as adaptation strategies at 1% and 5%, respectively in the study area. This indicates that as age and cultivated land size increase by one year and one hectare of land size, participation in non-farm activities decrease by 0.085 and 0.073, respectively. These findings are in line with Asmare et al. (2019) in Ethiopia that as age of farmers increases engagement in non-farm activities declined. This may be attributed to loss of physical strength to engage in non-farm activities. Babatunde (2015) stated that increase in cultivated farm size reduce non-farm participation.

Household size, education, non-farm income, access to information and credit showed significant and positive influence at 1% and 5% on the participation of coastal farmers in non-farm activities as measures to mitigate the effects of climate change in the coastal communities in the study area. This suggests that a member, a year and one naira increase in increase in household size, years of schooling and non-farm income increase involvement in non-farm activities by 0.162, 0.063 and 0.127, respectively among the coastal farmers in the study area. These findings corroborate with Perveen and Cheema (2018), Otoo (2019) and Asmare et al. (2019). Access to information on non-farm activities and credit has significant and positive influence of coastal farmers' engagement in non-farm activities to cushion the effects of climate change in the coastal communities. This implies that having access to information and credit facilities will increase participation in non-farm activities in the study area.

Table 3: Analysis of Drivers of Coastal Farmers Participation in Non-farm Activities as Climate Adaptation Strategy

Variables	Coefficient	P>/z/	Marginal Effect
Age (yrs)	-0.598(0.275)	0.000***	-0.085
Gender (1= male; 0 = otherwise)	-0.288(0.303)	0.301	-0.041
Marital Status (1 = married; 0 = otherwise)	0.400(0.427)	0.347	0.057

Household Size (number)	1.033(0.246)	0.000***	0.162
Education (years of schooling)	1.145(0.247)	0.000***	0.063
Non-farm Income (₦)	3.790(0.837)	0.000***	0.127
Cultivated Land Size (hectares)	-0.514(0.245)	0.036**	0.073
Total Livestock Unit (TLU)	0.155(0.256)	0.546	0.022
Access to Information (1= yes; 0 = no)	1.006(0.348)	0.022**	0.142
Access to Credit (1 = yes; 0 = no)	1.450(0.439)	0.041**	0.205
Distance to Urban Centre (km)	-0.461(0.229)	0.344	-0.065
Road Access (1= yes; 0 = no)	-0.142(0.269)	0.597	-0.020
Constant	-15.339(5.397)	0.000***	

Source: Author's Computation, 2024; No of Observation = 145; Log Likelihood = -128.549; LR $\chi^2 = 169.83$; Prob> $\chi^2 = 0.000$; Pseudo $R^2 = 0.4885$; *** and ** significant @ 1% and 5%.

Conclusion and Recommendations

The study revealed that non-farm activities are the activities performed outside the farm and they serve as insurance against production shocks that could result due to climate change and other hazards. Climate change was observed to have adverse and devastating effects on the farming activities of people in the coastal communities due to socio-economic challenges and lack of adaptive capacity to cope with climate change. Non-farm activities among the coastal farmers help in the diversification of resources to supplement household income that could be invested in farming during adverse effects of climate change. Based on the findings of this study it was recommended that coastal farmers should be encouraged to diversify their economic sources and activities for more income. Moreover, more access to education and credit facilities would boost their diversification strategies against the severe and harsh or devastating effects of climate change particularly among the coastal communities in Ondo State.

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