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PERCEPTION OF FARMERS TO CLIMATE VARIABILITY AND RESILIENCE TO CLIMATE ISSUES ON AGROFORESTRY FARMERS AROUND ONIGAMBARI FOREST RESERVE OF OYO STATE

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ABSTRACT

Resilience is a multidimensional issue that is generally based on addressing vulnerability and focusing on human, social, natural as well as political capital. Therefore natural disasters in the forest zones as a result of climate variability require natural resilience strategies in the practice of agroforestry systems of farming. This study therefore assessed the perception of farmers to climate variability and resilience to climate issues faced by farmers participating in agroforestry around Onigambari forest reserve. A multistage sampling technique was used to select eighty three (83) respondents in the enclaves around the reserve. Data were obtained using both interview guide and focus group discussion. Frequency counts and percentages were employed for the descriptive analysis while Pearson Product Moment Correlation Coefficient was used to operationalize the hypothesis test. The level of perceived effects of climate variability was high (90.4%) which resulted in negative effects on the respondents activities around the forest. The categorization level of the dwellers to resilience to climate variability was slightly low with majority (50.6%) responses unfavorable to resilience achievement. A positive relationship was observed between the perception of farmers to climate variability (P= 0.901, r = 0.014) and resilience to climate variability. In conclusion, despite all the resilience strategies and methods adopted by the dwellers in the study area, the perception of the farmers towards climate variability was negative. The outcome of the study revealed that the resilience to climate variability was low in the study area

Keywords: Climate Variability, Climate Change, Agroforestry, Forest Reserve, Resilience

Introduction

The word agroforestry is synonymous to natural resource management grounded in ecology through which the tree is integrated into farm (Kitalyi *et al.*, 2010). It is not surprising that the practice is common among the dwellers around forest zones and environs globally. According to (ICRAF, 1997), there is a strong correlation as well as interface between agriculture and forestry. This intermediary land use system for sustainable forestry and agriculture is currently attracting serious attention from natural resources stakeholders. Agroforestry has been in existence for ages, the increasing conflict between agricultural practices and deforestation induced climate change has further brought the practice into the limelight in Nigeria. Agroforestry and Forestry plays a pivotal role in the reduction of CO_2 emissions into the atmosphere as well as militating against climate change in the environment.

According to Manning *et al.* (2009) agroforestry practices could help in achieving mitigation as well as soften the effect of climate change in Africa.

Climate change encompasses so many factors and it is an issue that is very difficult to understand within the shortest period. Metrological records as been regarded as a very effective tool to capture climatic trends and forecast future trends (Agbo, 2021). On the other hand, the effect of climate within the shortest time (climate variability) is been neglected most time by scientists and people in developing countries. It is an issues of concern that micro level climatic variable changes are not been considered in most climatic studies in Nigeria. Globally, climate variability is consequential and had a major impact on humans and natural systems (IPCC, 2001).

Farmers' perception of climate variability is a complex process that includes a range of psychological constructs such as knowledge, beliefs, attitudes, and practices related to how the local climate has varied (Whitmarsh and Capstick, 2018).The belief , altitude and the culture agroforestry farmers towards climate issues areimportant factors that determined the interest of the farmers in the area of practices, provision of food and other basic needs (i.e. fuel wood, staking materials, fibres, timber, medicinal concentrates, oils, fruits, and fodder for animals) for a large proportion of the rural population. In this study,climate variability is defined as variations in the mean state and other statistics of the climate on all temporal and spatial scales, beyond individual weather events.

In the tropics, most especially in Nigeria where the rate of poverty is at its peak, human activities as been considered as one of the factors contributing to climate change. People depend on natural resource in the forest for their livelihood. Rural dwellers in forest communities tend to engage in the destruction of forest resources in the process of carrying out their livelihood activities (Aluko *et al.*, 2020).

According to IFAD (2011) resilience is described as the extent to which social or ecological systems can maintain, recover and improve their integrity and functionality when subject to disturbance. It is helpful in such a way and manner to absorb and recover against climatic disaster in an environment. It is expected that resilience could assist against any vulnerability events at a particular approach and specific time. Existing literature on environmental disaster tend to focus on the effect of climate change rather can short term effect which is focus on climate variability (Thornton, 2014).The perceived effect of climate variability on forestry related activities could increase damage to trees and soils due to drought, flooding and land degradation (Akinbile, 2018).

It is believed that the world is sitting on gunpowder if proper attention by different stakeholders is not given to resilience strategies to resolve the issue of climate variability which could threaten both human and natural resources globally. Positive perception towards agroforestry systems have been shown to increase on-farm production resilience to climate variability by buffering crops from the effects of temperature and precipitation variation as well as strong winds associated with storms (Lin et al., 2013).

It is against thisbackground that this research was designed to assess the perception of the framers to climate variability and resilience to

climate issues on agroforestry farmers as well as relationships between and resilience to climate variability in the zone. The goal of the study was to form a synergy between forest and agriculture through proper understanding of agroforestry practices with the aim to maintain the environmental conservation in the forest reserve

Methodology

Area of Study

The study was conducted in Onigambari Forest Reserve in Oluyole Local Government Area of Oyo State. The reserve is bounded by the Abanla and Odo-ona settlements in Oluyole Local Government Area(LGA) of Oyo State in the north and in the south by Mamu and Abatan settlements in theIjebu-ode LGA of Ogun State. Both dry and wet season are experienced in the reserve. The dry season lasts for 3months (December-February). The average annual rainfall is about 1140mm and the average annual temperature is about 26.40◦C (Aluko, *et al.*,2019).

Target Population

The target populations of the study were agro foresters' households in the communities around Onigambari enclaves of OluyoleLGA, in Oyo State.

Sampling Procedure

A purposive strategic method was used to obtain the data using questionnaire and Focus Group Discussion (FGD). Five communities selected based on 10km proximity to the reserve were Aba-Igbagbo, Akintola, Ajibodu, Okeseyi, and Lagunju. Forty percentage sampling proportionate techniques was used to select the respondents in each communities. 18 respondents from Aba-Igbagbo out of 42 respondents, 12 respondents from Akintola out of 30 respondents, 15 respondents from Ajibodu out of 38 respondents, 23 respondents from Okeseyi out of 58 respondents and 15 respondents from Lagunju out of 58 respondents in the community. In all, 83 respondents were selected.

Data Analysis

Data were analyzed with both descriptive and inferential analysis.

Measurement of Variables

Perception of farmer to climate variability: It was operationalized on 3 points scale of decline, no change, and increase. A score of 1 was assigned to decline, 2 to no change and 3 to increase. Six parameters were listed: hence the maximum point obtained was 18 and the minimum point was 6 while the mean was the benchmark for the categorization. The source question was categorized to high and low.

Resilience to climate variability: It was measured on 5 point scale of very large extent, large extent, little extent, very little extent, and not at all. Eight resilience statements were listed, therefore the highest score obtained was 40 and the lowest was 8 while the mean was the benchmark. The resilience was categorized as high and low.

Results and Discussion

Table 1 shows that 62.7% of the dwellers were male and 37.3% were female. This is in line with view of Udofia, 2007 who reported in a similar study that females have less energy to work when compared to men and most time busy with other family chores. This implies that males tend to be energetic when it comes to farming operations in a natural resources based environment.

The percentages of those who are singles, married, divorced, widowed and separated were 8.4%,72.3%, 4.8% , 9.6% and 4.8% respectively. Married (72.3%) people were dominant in the communities. Furthermore, Table 1 reveals that 56.6% of the household heads interviewed were within the age range of 40-59 years of age and 22.9% of the dwellers were above the age of 60 years while 20% of the respondents' age range within 20-39years in the forest zone. This is in line with Ofuoku. *et al*., (2008) who reported in their study, that most of the respondents involved in agricultural activities falls within the age category ranging between 40- 60years which is the active age where productivity increased .94% had one form of educational certificate .50.6% had secondary school certificate, 42.2% and 1.2% in possession of primary school and tertiary certificate respectively. Educational level of the respondents could determine the level of information on adoption of agroforestry practices in the area. Table above shows that majority (56.6%) of the respondents had 10-19 years agroforestry practices experience; followed by 36.2% with above 20 years' experience and 7.2% of the respondent had 1-9 years practicing agroforestry experience.

Table 1: Socio-Demographic Profile of Respondents

Socio-Demographic Profile of Respondents		Frequency(%)
Gender	Male	52(62.7)
	Female	31(37.3)
Marital Status		
	Single	7(8.4)
	Married	60(72.3)
	Divorced	4(4.8)
	Widowed	8(9.6)
	Widowed	4(4.8)
Age		
	20 -39 years	17(20.5)
	40-59 years	47(56.6)
	Above 60 years	19(22.9)
Level of Education		
	No formal education	5(6.0)
	Primary school certificate	35(42.2)
	Secondary School certificate	42(50.6)
	Tertiary Certificate	1(1.2))
Agroforestry Experience		
	1-9 years	6(7.2)
	10-19 years	47(56.6)
	Above 20 years	30(36.2)

Table 2 shows that 90.4% of the people noticed a decline in rainfall pattern in the study area .It was also observed that temperature and sunshine patterns were similar with 55.4% of the respondents affirming that there is increase in the sunshine

pattern as well as atmospheric temperature respectively in the study area while 41% and 3.6% reported no changes and declined in both variables respectively. This is in agreement with Donner and McDaniles(2013) who reported that climate change is found to be significantly correlated to U.S. mean temperature anomalies over the previous 3–12 months.

This could perhaps be the sign of climate variability and serious affecting the activities around the reserve. About 80.7% of the people reported an increase in the level of wind blowing in the area. This excessive wind might probably result to trees falling down from the stands as reported by 70% of the dwellers. This is an indicator that the trees in the forest are falling down possibly as a result of scattered patterns of trees in the reserve. This is in line with the findings of one of the discussants in the FGD reported that *"In the event of heavy storms, nearby tree branches used to fall on buildings resulting in destruction of properties"* The assumption was supported by the observation of all the respondents (100%) who reported that declined in the tree closing up to each other in the reserve. It was not surprising when 79.5% of the respondents affirmed to the fact that the soil quality used for agroforestry activities had declined drastically.

Table2: Perception of farmers to climate variability

Variables	Decline	No change	Increase	Weight Mean
Rainfall variability	75(90.4)	7(8.4)	1(1.2)	2.05
Sunshine pattern	3(3.6)	34(41.0)	46(55.4)	1.35
Atmospheric Temperature variability	3(3.6)	34(41.0)	46(55.4)	1.35
Excessive wind	3(3.6)	13(15.7)	67(80.7)	1.95
Trees falling from stand	13(15.6)	0(0.0)	70(84.3)	1.99
Trees closing up	83(100)	0(0.0)	0(0.0)	2.10
Quality of soil	66(79.5)	15(18.1)	2(2.4)	1.88

In summary, Table 3 shows that the perception of farmers to climate variability was high (90.4%) based on the mean obtained from composite scores of the respondents

Table 3: Level of Farmers Perception to Climate Variability.

Level	**Frequency**	**Percentage**	**Mean = 5.28**
High	75	90.4	
Low	8	9.6	
Total	**83**	**100.0**	

Table 4 shows the resilience to climate variability of the agro foresters in the reserve. 77.1% of the dwellers agreed to a very large extent that temporary relocating of

households is a resilient method to the threat posed as a result of the bad atmospheric condition i.e. flood, erosion wind storms and so on . This is in agreement with the study of David King *et al.,* 2014who reported that relocation is a strategy available to the dwellers as part of an extensive range of responses to extreme weather events. This implies that the majority of the respondents might properly have alternative households in urban locations. Furthermore it was reported by the majority (73.5%) respondents to a large extent that pruning and trimming of grown trees and shrubs branches within and around households prevent damage during extreme weather event in the study area. It was reported in the focus group discussion.

"It is not safe to leave the outgrown branches and tree shrubs without trimming to avoid destruction of our building. This prevent the direct falling of trees and buildings during storms or excessive wind blow"

Also, 73.5% of the respondents established the fact to a very large extents that planting of trees served as resilience strategies to climate variability which could lead to flooding in the study areas. In addition it was reported by the majority (65.2%) to a very large extent that the respondents past experiences assisted dwellers on how to resilience against climate variability. About 95.2% of the respondents lack information on weather forecasts which made it difficult to use information to guide against been caught unaware during weather disaster in the reserve. Corroborating this finding, the people in the reserve in the course of the FGD thus: "*We have never seen instruments to forecast rainfall or temperature in this forest and it is even difficult to predict the work of God"*

All the respondents (100%) in the study area had another sources of income apart from agro forestry practices. This implies that the respondents' livelihood diversification helped in finding alternative sources of income for household survival in the midst of climate variability which could lead to major disasters in the study.

It was further reported by all the respondents (100%) that available resources might not be enough to resilience against any major climatic weather disaster in the study area. More than half (59.0%) of the respondents depend on family support as a means of resilience strategy to cope with the stress from climate variability in the study area. This implies that family remittances and support both in kind and cash assisted the respondents households in case of negative effects associated with climate change or variability. The findings were supported by one of the discussants during FGD affirmed that

"My children send money to me to feed never it is difficult to enter the forest for farming probably as a result of damage to crops by heavy rainfall or multiple trees collapsing on farmland "

Table 4: Resilience to Climate Variability by Agroforestry Farmers

Variables	VL	LE	LI	VL	N
Temporary relocating my household t is a resilient method to threat posed by changes in weather condition.	64(77.1)	0(0.0)	12(14.5)	7(8.4)	-
Cutting and trimming trees within and around households prevent.	0(0.0)	61(73.5)	16(19.3)	6(7.2)	-

damage during extreme weather event					
Coping successfully to the threats posed by flood through planting vegetation.	61(73.5)	0(0.0)	16(19.3)	4(4.8)	2(2.4
I have learned considerably on how to deal with threat.	54(65.2)	33(39.8)	21(25.3)	8(9.6)	-
posed by drought from past experience					
My households prepare for future occurrences of harsh weather condition by have access to early warning information.	-	-	-	96(95.2)	4(4.8)
I am fully prepared for any kind of threats emanating from climate change through livelihood diversification	100(100)	-	-	-	-
Availability of excess resources to help my household to recuperate from the threat of climate disaster	-	-	-	-	100(100)
Family support goes a long way in the period of climate disaster	63(59.0)	-	17(20.5)	12(14.5)	5(6.0)
I would easily cope with any climatic threat without much reliance from external supports.	1(1.2)	22(26.5)	42(50.6)	10(12.0)	8(9.6)

Note : VLE=Very large extent, LE=Large extent, LI=Little extent, VI=Very little extent, N=Not at all.

Table 5 reveals that resilience to climate variability was low based on the composite mean score (26.29) obtained. This implies that majority of the dwellers were unable to recover from climate variability in the study area.

Table 5: Level of resilience to climate variability by agroforestry farmers

Level	**Frequency**	**Percentage**	**Mean = 26.29**
Low	42	50.6	
High	41	49.4	
Total	83	100.0	

Table 6 shows that there is no significant relationship between the perception of farmers and resilience to climate variability in the study area (P=.0901 and r=0.014).This implies that the perception of the farmers towards climate variability dose not determine their resilience to climate variability

Table 6: Relationship between the perception of farmers to climate variability and resilience to climate variability

Variables	r-value	p-value	Decision
Perception of farmers and Resilience	0.014	0.901	NS

Conclusion and Recommendation

The study clearly showed that the perception of farmers towards climate variability was low. The unfavorable perception is associated with the fluctuation in parameters such as rainfall, atmospheric temperature, sunshine as well as the pattern of wind.Despite all the resilience strategies and methods adopted by the dwellers in the study area, the perception of the farmers towards climate variability was negative. The outcome of the study revealed that the resilience to climate variability was low in the study area.

This is an indicator that the agroforestry farmers found it difficult to recover from issues of climate variability in the study area. Evidence from the resilience strategies revealed negative relationship with the respondent perception to the climate variability. Based on the findings , there is a need for urgent an campaign through extension services so as to improve the performance and agroforestry skills , ideas and innovations in the forest reserves in the state .There is need for government to review the agroforestry practices which will encourage farmers to practice agroforestry without fear of being displaced from the forest .

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