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CLIMATE CHANGE PARTNERSHIP ACTIONS FOR SUSTAINABLE FUTURE AND RESTORING LIFE ON EARTH

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PREFACE

There is a growing concern on the adverse impacts of climate on biodiversity. This phenomenon is greatly manifested in form of shifting weather patterns threatening global food security, health and species existence. Humanity is at the receiving end of the consequences of climate change hence there is a need to step up actions on all fronts- overtime, everywhere all at once.

This calls for collaboration, partnership and networking to strengthening synergy among relevant stakeholders in a bid to tackling climate change menace. This forms the basis for the theme of this year world Environmental conservation conference: **CLIMATE CHANGE PARTNERSHIP ACTIONS FOR SUSTAINABLE FUTURE AND RESTORING LIFE ON EARTH.** The theme is conceived with a view to create an interface for information sharing and offer opportunities for participants to refine their commitments and pledges in the quest to achieving Sustainability in the face of climate change.

This year World Environmental Conservation Conference is memorable in the sense that it received overwhelming funding from the host - West African Science Service on Climate Change and Adapted Land use). WASCAL is posed to provide information and knowledge at the local, national and regional level to cope with the adverse impacts of climate change. Thus, this conference will offer opportunities for participants to learn from good practices demonstrated and showcase by WASCAL during the course of the conference. It will also strengthen staff-student exchange and provide prospect for Doctorate Research Doctoral Research in West Africa Climate System Programme (DRP WACS) – WASCAL among others.

Special appreciation goes to the management of The Federal University of Technology, Akure the host institution, National Park Service and African Regional Center for Space Science and Technology Education-English (ARCSSTE-E) that co-host this conference. We equally acknowledge other private, individual and corporate organizations that have contributed towards the success recorded in this event.

All the submitted articles were subjected to strict double blind peer-review process by the reviewers that are experts in the area of the particular submitted manuscript. The accepted manuscripts are published in WECC 2023 proceedings and also available for download on the organization website (www.necorng.org).

The accepted manuscripts fall within the underlisted subthemes:

- Climate change adaptation strategies in Agriculture, Forestry and Other Land Use (AFOLU)
- Climate smart city and architectural landscape design
- Retrofitting and decarbonization in tourism and hospitality industry
- Indigenous knowledge and local innovation in climate change adaptation
- Climate risk management, health, safety and hygiene
- Carbon credit-offset marketing/circular economy
- ICT development in environmental conservation (image processing and acquisition, computer vision, graphics, speed, interface technology, HMD devices, GIS: Body Tracking, AI and IOT, VRT, IVE).

We commend our keynote speaker Prof. Douda Kone Director Capacity Building Department, WASCAL Headquarter, Ghana and other guest speakers Prof. Babatunde Rabiu, Director General, Chief Executive Office, African Regional Centre for Space Science and Technology Education-English (ARCSSTE-E) and Dr. Goni I. M., Conservator General National Park Service.

It is hoped that researchers, students and policy makers will find the papers in this book very useful. Even though all the papers were reviewed and edited, the content and option expressed remain essentially that of the authors and not necessarily that of Netlink Environmental Conservation Organization.

Dr. Oladeji S. O.

President Netlink Environmental Conservation Organization

Convener World Environmental Conservation Conference

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ASSESSING FARMERS' USE OF CLIMATE CHANGE ADAPTATION PRACTICES AMONG YAM FARMERS IN OSUN STATE, NIGERIA

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ABSTRACT

This study assessed climate change adaptation practices (CCAP) among yam farmers in Osun State, Nigeria. Objectives included identifying the socioeconomic characteristics of the farmers, assessing the perception of yam farmers about climate change, identifying adaptation practices used by the farmers, and examining constraints associated with the use of CCAP among yam farmers in the study area. A multi-stage sampling procedure selected 120 farmers. Data analysis involved Likert scale and descriptive statistics. Results showed that 51% of farmers were 50 years and above, 43.1% had at least secondary education and the majority (90%) were males. Farmer perceptions revealed that they agreed topresence of climate change. Regarding CCAP, the respondents use planting of early maturing yam, changing in planting period, changing in harvesting dates, planting of trees, lengthened fallow, irrigation practice, use of weather forecast, chemical fertilizer application and use of alternative fallowplanting of cover crops, mulching, mixed farming, crop rotation and organic fertilizer application. Inadequate fund and high cost of practices input were identified as the highest constraints associated with the use of CCAP by the farmers.Based on the findings of the study, it was concluded that yam farmers in the study area were well aware of climate change occurrences and uses different kind of CCAP to cope mitigate the impact of climate change in the study area.Key recommendation is to improve farmers' access to essential resources such as finance, inputs, and technologies.

Keywords: Climate, Change, Adaptation, Perception, Farmers.

INTRODUCTION

Nigeria, like other countries of Sub-Saharan Africa, is highly vulnerable to the impacts of Climate Change. The country particularly has a high vulnerability to effects of climate change such as fierce storms and sea-level rise due to its long (800 km) coastline (Apata *et al*., 2009). Despite contributing only, a tenth of the world's annual global carbon dioxide emissions, developing countries like Nigeria still remain the most vulnerable to the effects of climate change (Ali &Erenstein, 2017). Increasing crop failures and livestock deaths are already imposing high economic losses and undermining food security. According to projections by the Food and Agricultural Organization (FAO), by 2080, there may be a 20% reduction in agricultural yield of developing countries because of climate change. First world countries will only experience about 6% decrease (FAO, 2008). This would significantly worsen the quality of life of the population particularly the vulnerable (Fatoki*et al*., 2020). The effects of climate change will be seen most vividly through changes in land and water regimes, that is changes in the frequency and intensity of droughts, flooding, water shortages, worsening soil conditions, desertification, disease and pest outbreaks on crops and livestock. Moreover, climate change adaptation strategies (CCAS) such as; using of an improved variety of seeds; agroforestry or afforestation practices; irrigation and drainage; early-maturing, drought-resistant and nutritionally enhanced crop variety; a mixed crop or crop rotation farming; gender-smart agriculture; conservation agriculture; and soil and water conservation (FAO, 2017) could increase sustainability, productivity and resilience of farming systems to the adverse effects of climate change. However, the rate of adoption of CCAS has been slow particularly in the vulnerable and food insecure areas of Sub-Saharan Africa (Saguye, 2017). Root crop farming system, which is centred on yam and cassava, is threatened by climate change. Yam is one of Africa's most significant food crops. Its production is essential to guaranteeing the security of food supplies in Nigeria (Chukwuone&Amaechina, 2021). The stability of crop yield and food supplies is negatively affected by variable weather conditions. Physical, economic, and social access to food is also affected negatively by climate change because agricultural production declines, food prices rise, and purchasing power decreases. To ensure economic stability and food security, Africa needs to revolutionize agricultural development and combat climate change without further depletion of natural resources (FAO, 2014).

Therefore, it becomes pertinent to gather relevant information, know the stance of the local farmers on climate change, keep them abreast of the latest innovation and to provide adaptation practices that meet their peculiar needs. Otherwise, Nigeria will remain prone to the adverse effects of climate change given that most food producers in the country are small-scale farmers (Akintonde& Shuaib, 2016). Therefore, this study was to assess the use of climate change adaptation practices in Osun State, Nigeria and specifically to assess the perception of yam farmers about climate change; identify the climate change adaptation practices used by yam farmers; determine factors

influencing the choice of climate change adaptation practices used by yam farmers and; examine constraints associated with the use of climate change adaptation practices among yam farmers in the study area.

MATERIAL AND METHODS

Study Area

The State is situated in the tropical rain forest zone. It covers an area of approximately 14,875km^2 and lies between latitude 7° 30′ 0″ N and longitude 4° 30′ 0″ E. It receives roughly 596 inches of rain year and experiences an average yearly temperature of 64 °F. It is boundaried by Ogun State to the south, Kwara State to the north, Oyo State to the west and Ekiti and Ondo State to the east. The state is within the tropical rain forest with abundance of resources. Osun State's economy is mostly focused on agriculture particularly the production of cocoa, cassava, millet, maize, potatoes, and yams.

Data Collection

Data for the study were gathered from primary sources through a well-structured questionnaire which included both open and close ended questions administered through personal interview with the respondents.

Sample and Sampling Procedure

A multi-stage sampling procedure was used to select a representative sample of yam farmers in Osun State. At the first stage, two local government areas namely were purposively selected due to the prevalence of yam farming in the local government. Second stage involved the selection of six farming communities using random sampling method and in the last stage, snowball sampling method was adopted to select ten yam farmers from each of the communities. This sums up to a total of one hundred and twenty (120) respondents.

Data Analysis and Model Specifications

For this study, descriptive statistics andLikert scaleswere utilized as the analytical tools.

Descriptive Statistics

The descriptive statistics such as frequencies, percentages, mean, standard deviation, tables and charts was used to describe the socioeconomic characteristics of the respondents and identify the climate change adaptation practices used by yam farmers in the study area.

Likert Scale

Likert scales were used to assessthe perceptions of the farmers towards climate change and constraints associated with the use of climate change adaptation practicesamongthe respondents.

RESULTS AND DISCUSSIONS

Socioeconomic Characteristics of the Respondents

The result on Table 1 reveals socioeconomic characteristics of the yam farmers in the study area. Regarding the age of the yam farmers, majority (51%) of the farmers are 50 years and above, 28% are between 40-49 years, 8% are between 30-39 years while 2% others are less than 30 years. This implies that the respondents are in their old age. This is in line with the findings of Ema *et al.,* (2023) that almost 70% of yam producers in Nigeria are aged 50 years and above. The findings revealed that 43.4% of the farmers had attained a secondary education level and only 1% do not have any form of education. This indicates that a significant portion of the farmers surveyed are educated. This corroborates the findings of Sobalaje and Adigun (2013)that yam farmers in Osun State are educated. The table furtherindicated that the respondents have a mean of about 16 years of experience in the study area. This suggests that yam farmers in the study area have acquired a considerable amount of practical knowledge and skills through a decade or more of active engagement in farming practices. Gender disparities were observed among the yam farmers in the study area. The study findings indicated that there was a higher representation of male farmers, accounting for approximately 86% of the respondents. This is in agreement with Awosusi(2021) findings that yam farming is primarily a male occupation, with women playing supportive roles. Furthermore, the mean farm size among the yam farmers was 4.7hectares.The implication is that the respondents are smallholder yam farmers.As regards ownership of farmland, most of the farmers own the land used for farming, 28% rented it, some 24% use the family land, about 2% use the family land while others (16%) leased the land used for farming. Furthermore, access to credit finance is an important factor influencing the farming activities of yam farmers. The study findings revealed that approximately 55% of the farmers have access to credit finance, while the remaining 45% do not have such access. This negate the apriory expectation that yam farmers do not have access to credits according to Kalu *et al.,* (2023).

Table 1: Distribution of Respondents by Socioeconomics Characteristics

Socioeconomic Characteristics	Frequency	Percentage
Age of farmers		
Less than 30 years	2	1.8
30-39 years	9	8.3
40-49 years	31	28.4
50 years and above	67	61.5
Level of Education		
None	1	0.9
Primary	15	14.2
Secondary	46	43.4
Tertiary	44	41.5
Years of Farming Experience		
Less than 10 years	17	15.6
10-20 years	66	60.6
21 years and above	26	23.9
Mean ± SD	15.8 ± 6.9	
Gender		
Male	91	85.8
Female	15	14.2
Farm size (hectare)		
Less than 3 hectares	69	63.3
3-7 hectares	14	12.8
8 hectares and above	26	23.9
Mean ± SD	4.7 ± 6.3	
Land Ownership		
Own land	48	44.9
Rented land	30	28.0
Family land	25	23.4
Community land	2	1.9
Leasing	17	15.9
Access to credit finance		
No	46	44.7
Yes	57	55.3

Source: Field Survey, 2023

Perception of Yam Farmers about Climate Change

Table 2 reveals the perception of yam farmers about climate change. A five-point Likert-type scale was used to analyse the respondents' response. Grand mean for attitudes towards climate change perception was 3.0, perception questions with mean score above the grand mean is considered favourable while those below are considered unfavourable. The Table showed that the farmers agreed to the perception statement about climate change that there are occurrences of erratic rainfall, late rainfall, extreme temperature, long dry spells, unusual rainfall, prolonged winter, intense winds, increased sunshine, poor rain distribution, short winter season, increased drought, heavy rainfall, lower humidity with the mean 4.20, 3.96, 3.95, 3.90, 3.75, 3.65, 3.59, 3.54, 3.50, 3.49, 3.32 and 3.06 respectively. On the other hand, the farmers disagreed with the statement that there is unexpected dry spell in the study area with mean 2.98. This implies that respondents recognise that there are occurrences of climate change in the study area.

Table 2: Perception of Yam Farmers about Climate Change

Perception Statement	SD		D		U		A		SA		Mean
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	
Erratic rainfall	2	1.8	0	.0	0	.0	79	72.5	28	25.7	4.20
Late rainfall	3	2.8	21	19.3	11	10.1	68	62.4	6	5.5	3.96
Extreme temperature	0	.0	6	5.5	6	5.5	85	78.0	12	11.0	3.95
Long dry spells	0	.0	11	10.1	18	16.5	67	61.5	13	11.9	3.90
Unusual rainfall	1	.9	4	3.7	3	2.8	91	83.5	10	9.2	3.75
Prolonged winter	4	3.7	22	20.4	25	23.1	49	45.4	8	7.4	3.65
Intense winds	9	8.3	35	32.1	17	15.6	45	41.3	3	2.8	3.59
Increased sunshine	0	.0	7	6.5	10	9.3	78	72.2	13	12.0	3.54
Poor rain distribution	0	.0	21	19.4	6	5.6	71	65.7	10	9.3	3.50
Short winter season	6	5.5	33	30.3	26	23.9	37	33.9	7	6.4	3.49
Increased drought	3	2.8	13	11.9	13	11.9	77	70.6	3	2.8	3.32
Heavy rainfall	2	1.8	21	19.3	8	7.3	72	66.1	6	5.5	3.28
Lower humidity	5	4.6	20	18.3	27	24.8	53	48.6	4	3.7	3.06
Unexpected dry spell	1	.9	23	21.1	13	11.9	64	58.7	8	7.3	2.98

Source: Field Survey, 2023.

Climate Change Adaptation Practices Used by Yam Farmers

Table 3 reveal the climate adaptation practices that were adopted by the farmers.It further revealed that few percentages (33.9, 11.0, 14.7, 9.2, 19.3, 25.7, 33.9, 36.7, 30.3) of the respondents uses planting of early maturing yam, changing in planting period, changing in harvesting dates, planting of trees, lengthened fallow, irrigation practice, use of weather forecast, chemical fertilizer application and use of alternative fallow practice respectively. Whereas, majority (55.0%, 69.7%, 54.1%, 58.7% &52.3%) of the respondents uses planting of cover crops, mulching, mixed farming, crop rotation and organic fertilizer application respectively. This result reiterates the assertion of Elijah *et al.*, (2020) that yam farmers in Nigeria uses Multiple cropping/ varieties, Land fragmentation, Use of alternative fallow practices, Multiple planting dates, Irrigation practice types, Crop diversification, Mulching, Cover cropping, Fertilizer application, Organic manure and Planting of trees as adaptation strategies against the impact of climate change.

Table 3: Climate Change Adaptation Practices Used by the Respondents

Adaptation Practices	Yes		No	
	Freq	%	Freq	%
Planting of cover crops	60	55.0	49	45.0
Mulching	76	69.7	33	29.3
Mixed farming	59	54.1	50	45.9
Planting of early maturing yam	37	33.9	72	66.1
Crop rotation	64	58.7	45	41.3
Changing in planting period	12	11.0	97	89.0
Organic fertilizer application	57	52.3	52	47.7
Changing in harvesting dates	16	14.7	93	85.3
Planting of trees	10	9.2	99	90.8
Lengthened fallow	21	19.3	88	80.7

Adaptation Practices	Yes		No	
	Freq	%	Freq	%
Irrigation practice	28	25.7	81	74.3
Use of weather forecast	37	33.9	72	66.1
Chemical fertilizer application	40	36.7	69	63.3
Use of alternative fallow practice	33	30.3	76	69.7

Source: Field Survey, 2023

Constraints Associated with the Use of Climate Change Adaptation Practices among Yam Farmers in the Study Area

Table 4 presents the constraints associated with the use of climate change adaptation practices among yam farmers in the study area. A three-point Likert-type scale was used to analyse the respondents' response. Grand mean for constraints associated with the use of climate change adaptation practices among the respondents was 2.0. Constraint statement with mean score above the grand mean is considered acceptable while those below are considered unacceptable. Information shows that far distance to farm land, inadequate fund, lack of information, inadequate technical knowhow, scarcity of labour, high cost of application, lack of required tools and equipment, inadequate size of land holding and inadequate training and demonstration were significant constraints in the study area with the mean of 2.07, 2.82, 2.79, 2.55, 2.67, 2.82, 2.20, 2.28 and 2.53 respectively.

Table 4: Constraints Associated with the Use of Climate Change Adaptation Practices

Constraints	No		Not sure		Yes		
	Freq	%	Freq	%	Freq	%	Mean
Far distance to farm land	50	45.9	1	0.9	58	53.3	2.07*
Inadequate fund	9	8.3	2	1.8	98	89.9	2.82*
Lack of information	8	7.3	7	6.4	94	86.2	2.79*
Inadequate technical knowhow	20	18.7	3	2.8	84	78.5	2.55*
Scarcity of labour	16	14.7	4	3.7	89	81.6	2.67*
High cost of application	7	6.5	6	5.5	96	88.1	2.82*
Stunted growth	44	40.4	25	22.9	40	36.7	1.96
Lack of required tools and equipment	43	39.4	1	0.9	65	59.6	2.20*
Inadequate size of land holding	35	32.4	5	4.6	68	62.9	2.28*
Inadequate training and demonstration	11	10.1	5	4.6	93	85.3	2.53*

Source: Field Survey, 2023

CONCLUSION

In conclusion, the findings from this study provide valuable insights into the socioeconomic characteristics, climate change perceptions, adaptation practices, and associated constraints among yam farmers in the study area. Firstly, the study revealed that a majority of yam farmers in the study area were in their old age. Additionally, a substantial percentage of the yam farmers in the study area possessed a reasonable level of education. Furthermore, the study demonstrated that these yam farmers had acquired considerable practical knowledge and experience and there is dominance of male farmers in the study area supporting the notion that yam farming is primarily a male occupation in the region. The study also highlighted that the majority of yam farmers were smallholders with most farmers owned the land they cultivated, but a significant proportion rented or used family land. Access to credit finance was shown to be prevalent, contradicting earlier expectations that yam farmers lack access to credit.

The study further concluded that yam farmers in the study area have a clear perception of the presence of climate change, with high agreement on various climate-related phenomena such as erratic rainfall, extreme temperatures, and prolonged dry spells. This acknowledgment underscores the vulnerability of these farmers to the impacts of climate change in their agricultural practices. Regarding climate change adaptation practices, the study determined that yam farmers employed a range of strategies to mitigate the effects of climate change, including planting cover crops, mulching, mixed farming, crop rotation, and organic fertilizer application. Finally, the study concluded that several constraints associated with the use of climate change adaptation practices among yam farmers in the study area were far distances to farmland, inadequate funds, lack of information, limited technical knowledge, labour shortages, high application costs,

insufficient tools and equipment, land size constraints, and inadequate training and demonstrations. These constraints underscore the need for targeted interventions and support to enhance the adaptive capacity of yam farmers in the study area.

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