THE IMPLICATIONS OF CLIMATE CHANGE ON STAPLE CROPS PRODUCTION IN EKPOMA, EDO STATE, NIGERIA

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ABSTRACT
This paper examined the implications of climate change on staple crops production in Ekpoma, Edo State, Nigeria. The paper identified the causes of climate change,the staple crop cultivated, the major evidence of climate change having implications on staple crops production, the implications of climate change on staple crops production, and the several adaptation strategies that have been proposed and implemented to mitigate its implications on staple crops production. To achieve these objectives, the researcher used both primary and secondary research methods to collect the data used for the study. Four hundred (400) staple crop farmers which represent two-point five percent (2.5%) of the staple crops farmers' population in the study area were considered. Consequent upon the above, four hundred questionnaires were administered across the study area.The data obtained were analysed using tables, graphs and, percentages. The results reveal the causes of climate change in Ekpoma, the staple crops produced in Ekpoma at present, the major evidence of climate change having implications on staple crops production in Ekpoma, the implications of climate change on staple crops production in Ekpoma, Nigeriaand the adaptation strategies that have been used to mitigate its implications on staple crops production.Arising from the above findings, the following recommendations are made which include: effective and regular training and retraining of staple crops farmers on the knowledge of climate change, climate change related- hazards, the place of staple crops in Ekpoma, climatic conditions should be monitored to help predict potential climate change related hazards and how to circumvent them, practicing climate-smart agriculture which includes incorporating climate-hazard resistant crops and improving cultural practices, sustainable practices to manage diseases without harming the environment. governments at all levels should as a matter of urgency promulgate laws on the granting of soft loans, climate change related-hazards and diseases resistant species of staple crops and other inputs to staple

crops farmers annually to encourage them.This paper is therefore concluded by advising the governments at all levels to effect the recommendations made by the researcher.

Introduction

Climate change refers to any significant change in the measures of climate lasting for any extended period of time. In other words, climate change includes major changes in temperature, precipitation (in all its forms), or wind patterns among other effects that occur over several decades or longer. It can also be seen as the physical modification of the general circulation of the earth's atmosphere on which climate ultimately depends (Ayoade, 2004).Okhakhu (2019) and IPCC(2020) observed that climate change is the realistic increase in the average temperatures of the global environment (atmosphere, lithosphere, hydrosphere, biosphere, cryosphere) and other constituent elements which constitute the planet earth mainly as a result of the unguided human activities. From the foregoing, climate change can be referred to as the technical terminology used to describe the significant and long-lasting change in statistical distribution of weather patterns over periods ranging from decades to millions of years.

Staple simply means something that is produced regularly or in abundant supply.Oxford Advance Learner's Dictionaries (2024), conceives of staple crops as the crops that are widely cultivated , consumed and relie upon as primary of food, nutrition, for a particular region or community. Typically, staple crops are high yielding, , nutritious, easy to cultivate and maintain. Additionally, staple crops are adaptable to local climate and soil condition, and are significant culturally. Therefore, staple crops are the common and regular crops that produce food that is often eaten and usually available in plenteous supplies and it constitutes a dominant part of a standard diet for an individual person or a group of individual persons. Typical examples of staple crops are corn (maize), rice, cassava, yam, plantain, millet, wheat, guinea corn, sorghum, potato, and amongst others.

Climate change is one of the most significant global challenges of the 21st century, with far-reaching impacts on various aspects of human life, particularly agriculture and food security. In Nigeria, which relies heavily on agriculture for food production and livelihoods, climate change has exacerbated existing vulnerabilities in the agricultural sector. Changes in temperature, rainfall patterns, and the frequency and intensity of extreme weather events are threatening food security by affecting crop yields, farming practices, and the availability of natural resources essential for agriculture (Adelekan, 2020; Nwafor, 2021).

In recent decades, climate change has had observable effects on the agricultural systems of Ekpoma. According to a study by Ojo et al. (2021), there has been a noticeable shift in seasonal rainfall patterns, including both delayed onset and early cessation of rainfall, leading to reduced crop yields. Additionally, increased temperatures, coupled with unpredictable rainfall, have resulted in a shortened growing season for food crops such as maize, yam, and cassava which are critical for food security in Ekpoma (Nwafor et al., 2022). Such climatic fluctuations compromise the productivity of smallholder farmers, who form the backbone of the kingdom's food production system.

The altered rainfall regime has implications for crop phenology, with some crops now being more susceptible to drought stress during the dry season or waterlogging during periods of intense and excessive rainfall. Research by Ojo et al. (2021) observed that farmers in Ekpoma have reported a decline in the reliability of rain-fed agriculture, which they rely on for food crop production. This situation has forced many farmers to shift to less water-demanding crops or adopt different coping strategies, such as the use of irrigation or agro-forestry, though these solutions are often not sustainable in the long term due to limited financial resources.

This study focuses on the implications of climate change on food security in Ekpoma, a town located in the central part of Edo State, Nigeria. Ekpoma lies at approximately 6.7612° N latitude and 6.0769° E longitude and is situated within the forest-savannah transition zone. This unique geographical location means that Ekpoma's climate is characterized by a mix of

both tropical forest and savannah conditions, leading to a diversity of agro-ecological conditions that are critical for food production. However, this also makes the area particularly sensitive to fluctuations in weather patterns, which can have substantial consequences on the production of staple crops and thereby affects the lives of its inhabitants.

2. Statement of the Problem

In recent decades, climate change has had observable effects on the agricultural systems of Ekpoma. According to Ojo *et al.* (2021), there has been a noticeable shift in seasonal rainfall patterns, including both delayed onset and early cessation of rainfall, leading to reduced crop yields. Furthermore, increased temperatures, coupled with unreliable rainfall, have resulted in a shortened growing season for food crops such as maize, yam, and cassava which are critical for food security in Ekpoma (Nwafor *et al.,* 2022). Such climatic fluctuations compromise the productivity of smallholder farmers, who form the backbone of the region's food production system.

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From the several detailed studies carried out, it is unequivocally obvious that studies in the area of climate change and its implications on staple crops production in Ekpoma,Edo State, Nigeria arenon-existent. This non-existent situation of the above subject matter represents the research gap which this current paper intends to fill, that is, the implications of climate change on staple crops production in Ekpoma,Edo State, Nigeria

3. Objectives of the Study

The overall aim of this paper is to examine the implications of climate change on staple crops productionin Ekpoma, Edo State, Nigeria. The specific objectives are to:

i. examine the causes of climate change in Ekpoma;

ii. examine the major staple crops produced in Ekpoma;

iii. examine the major evidences of climate change havingimplications onstaple crops productionin Ekpoma;

iv. examine the implications of climate-related hazards on staple crops production in Ekpoma;

v. examine the adaptation strategies and policies implemented by farmers to foreclose the negative implications of climate change on staple crops production in Ekpoma.

4. The Study Area

The study area is Ekpoma. It is one of the seven clans that constitute Esan West Local Government Area of Edo State (Eseigbe, 2011 and Ehisuoria, 2012). Ekpoma lies approximately within latitude 06^0 04^1 and 06^0 45^1 North of the Equator and longitude 06^0 05^1 and 06^0 10^1 East of the Greenwich Meridian (Eseigbe, 2011). The study area comprises of twelve (12) communities which are Eguare, Emaudo, Ujoelen, Ukpenu, Uhiele, Illeh, Emuhi, Iruekpen, Uke, Ihumudumu,Idumebo and Ujemen. Ekpoma is located in the humid tropics. It has the humid tropical climate characterized by wet and dry seasons. The climate is controlled by the position of the Inter Tropical Convergence Zone (ITCZ). The Northerly and the Southerly movements of the ITCZ throughout the year are marked by outset of the wet and dry seasons (Eseigbe, 2011). The hottest period of the year in the study area is recorded between January and March (34^0C) while the lowest temperature is recorded between June and July (24^0C).

The soils in Ekpoma are ferri soils on loose sandy sediments. These soils are less leached and consequently retain water and encourage agricultural practices.

The economic activities of the people of Ekpoma encompass agricultural and non –agricultural sectors. The agricultural sector includes crops cultivation, and animal grazing. The crops cultivated include yams, cassava, maize, cocoyam, pepper, plantain, banana, pineapple, pawpaw and mango. Others are oil palm, cocoa, cashew, pear, orange and ducanut. The animals domesticated are goats, dogs and sheep. Poultry farming is also a famous agricultural activity carried out by the people of Ekpoma. The non –agricultural sector is industrialization. The industrial sector of Ekpoma is comprised of both agro and non –agro based industries. The agro-based industries include cassava grating and processing, rice milling and processing, vegetable oil processing and palm oil milling. The non agro-based industries in the study area encompasses block moulding, black smiting, welding, vulcanizing, hair dressing and banking –industries(Ehisuoria, 2012).

The population of Ekpoma is relatively high. The 1991 population census estimated the population of Ekpoma at 45,488 persons. The population of the study area in 2006 population census rose astronomically (though the figures for the locality are not made available by the National Population Commission (NPC). However, the population census conducted in 2006 estimated the population of the entire Local Government Area at 127,718. Ekpoma has over 70% of the total population of Esan West Local Government Area because of the pull factor of Ambrose Alli University which is located in the study Area. The population of Ekpoma is made up of indigenes as well as non-indigenes (Okojie, 1994). The non indigenes are the immigrants who are either staff or students of Ambrose Alli University Ekpoma, Staff of Irrua Specialist teaching Hospital, Staff of Esan West Local Government Ministries and parastatals. The other non-indigenes are the workers employed by trading activities and industries located to service the university such as the banks, private schools, and hotels (Ehisuoria, 2012).

5. Conceptual Framework and Literature Review

Relevant numbers of concepts and models in agro-climatology have been used in the low, middle and high latitudes in line with crop yield. Some of these concepts and models are the Palmer's (1965) Drought Severity Index (PDSI), and Palmer's (1968) Crop Mixture Index (CMI). These concepts were examined and applied in this paper.

5.1. Drought Severity Index (PDSI)

The Palmer's drought index, often described as the Palmer drought severity index and usually abbreviated PDSI, is a measurement of dryness based on recent precipitation and temperature. It was developed by meteorologist Wayne Palmer, who first published his method in the 1965 paper entitled Meteorological Drought. It was developed for the office of Climatology of the United States of America's Weather Bureau. The Palmer's Drought Index is based on a supply-and-demand model of soil moisture (Ped,1975; Bhalla and Singh, 1997; Adekalu and Okunade, 2008). Supply is by comparison easy to calculate but, demand is more complicated as it depends on many factors, not just temperature and the amount of moisture in the soil but also hard to calibrate factors including evapotranspiration and recharge rates. He made effort to surmount these difficulties by developing an algorithm that approximated them based on the most readily available data: rainfall and temperature (Ped, 1975; Adekalu and Okunade, 2008).

The index has proven most effective in determining long-term drought, a matter of several months, but it is not as good with conditions over a matter of weeks. It uses a 0 as normal, and drought is shown in terms of negative numbers; for example, negative 2 is moderate drought, negative 3 is severe drought, and negative 4 is extreme drought. Palmer's algorithm is also used to describe wet spells, using corresponding positive numbers (Bhalla and Singh, 1997; Adekalu and Okunade, 2008). Palmer also developed a formula for standardizing drought calculations for each individual location based on the variability of rainfall and temperature at that location. The Palmer's index can therefore be applied to any site for which sufficient rainfall and temperature data are available.

The Palmer index is widely used operationally, with Palmer's maps published weekly by the United States Government's National Oceanic and Atmospheric Administration. It has also been used by climatologists to standardize global long-term drought analysis. Global Palmer's data sets have been developed based on instrumental records beginning in the 19th century. Furthermore, dendrochronology (dating of trees by their annual growth rings) has been used to generate estimated Palmer's index values for North America for the past 2000 years, allowing analysis of long-term drought trends. It has also been used as a means of explaining the late Bronze Age collapse (Ped,1975; Bhalla and Singh, 1997; Adekalu and Okunade, 2008). Despite the above merits, critics have complained that the utility of the Palmer's index is weakened by the arbitrary nature of Palmer's algorithms, including the technique used for standardization. The Palmer's index's inability to account for snow and frozen ground is another strong criticism leveled against it.

5.2 Crop Mixture Index (CMI)

As some of the criticisms leveled against Palmer's Drought Severity Index (PDSI) of 1965 became obvious, the Palmer responded to them rapidly by developing Crop Mixture Index (CMI) in 1968. CMI is intended to be a drought index especially suited to drought impacts on agriculture, in that it responds quickly to rapidly changing conditions. It is calculated by subtracting the difference between potential evapotranspiration and moisture, to determine any deficit. CMI is a continuation of the original work done by Palmer in the early 1960s, precisely in 1965. CMI is usually calculated weekly along with the Palmer's Drought Severity Index (PDSI) output as the short-term drought component in which the impact on agriculture is considered (Ped,1975; Bhalla and Singh, 1997; Adekalu and Okunade, 2008). The input parameters in CMI include weekly precipitation, weekly mean temperature and the previous week's Crop Mixture Index value.

Crop Mixture Index (CMI) is useful for investigating crop yield because it is used to monitor drought in which agricultural impacts are of major interest. Also, in applying CMI the output is weighted, so it is possible to compare different climate regimes. Finally, Crop Mixture Index (CMI) responds quickly to fast changing conditions. The above merits notwithstanding, CMI is strongly criticized because it was developed specifically for the grain-producing regions in the United States of America. Also, CMI may show a false sense of recovery from long- term drought events, as improvements in the short- term may be inadequate to offset long-term issues.

Palmer's Drought Severity Index (PDSI) and Crop Mixture Index (CMI) are of great relevance to this research work because they give an insight on precipitation and temperature and how to apply them in investigating crop yield. Furthermore, because of their wide applicability, Thompson (1969 and 1970), Alley (1984) and Tannura, Irwin and Good (2008) used them in United States of America.

5.3 Literature Review

Climate change has emerged as one of the most critical global challenges of the 21st century, with profound implications for various sectors, particularly agriculture. Nigeria, as one of the most populous countries in sub-Saharan Africa, is highly vulnerable to the impacts of climate change, especially in its rural and agrarian communities. Ekpoma, a town in the Esan West Local Government Area of Edo State in southern Nigeria, is not an exempt. Agriculture is the primary livelihood for many households in Ekpoma so, any adverse climatic changes can have severe consequences on staple crop production in the study area.This literature review synthesized existing research on climate change andcrop production in the Nigerian context, with particular emphasis on the situation in Ekpoma.Ojo *et al.;* (2021) observed that farmers in Ekpoma have reported a decline in the reliability of rain-fed agriculture, which they rely on for food crop production. This situation has forced many farmers to shift to less water-demanding crops such as maize, cassava, melon, groundnut, pineapple or adopt different coping strategies, such as the use of irrigation or agro-forestry. However, these solutions are often not efficient, effective, effectual and sustainable in the long term due to highly limited financial resources.

The people of Ekpoma predominantly depend on subsistence farming, with agricultural activities contributing significantly to the local economy and food security. The population of Ekpoma is made up of various ethnic groups, including the Esan, who traditionally engage in farming activities using family labour. Despite

their reliance on agriculture, farmers in Ekpoma face considerable challenges due to climate change. In particular, their vulnerability is amplified by limited access to modern farming techniques, poor infrastructure, and inadequate climate adaptation strategies (Adewumi et al., 2020).

As smallholder farmers are often unable to invest in climate-resilient agricultural practices due to financial constraints, food security becomes increasingly precarious. While some farmers have adapted by diversifying their crops or integrating livestock, many remain highly vulnerable to the unpredictable nature of climate change. This situation is compounded by a lack of awareness regarding the impacts of climate change and the availability of adaptation strategies (Fasina&Fashina, 2016).

A significant body of research has highlighted that climate change has already begun to affect crop yields in Nigeria. In particular, staple crops such as maize, cassava, yam, and rice are highly sensitive to climatic shifts. For example, studies by Adejumo *et al;* (2021) and Nwoke *et al.;* (2022) have indicated that rising temperatures and unpredictable rainfall patterns have led to reduced yields of maize and cassava, essential food crops in Nigeria.

Olanrewaju *et al.,* (2022) noted that increasing occurrences of floods, droughts, and storms have been reported across the country, leading to reduced agricultural productivity and significant losses in food production.

Ogunjimi *et al.,* (2023) observed that changes in precipitation patterns and higher temperatures contribute to soil degradation and loss of fertility, which greatly affects the long-term sustainability of farming. In the case of Ekpoma, where soil types are primarily ferralsols and acrisols, climate change-induced erosion and nutrient depletion are becoming concerns for crop production.

Water is crucial for agricultural production, particularly for irrigation in areas that experience elongated dry spells and season. In many parts of Nigeria, including Ekpoma, the availability of water resources for agriculture has been threatened always by both decreasing rainfall and growing competition from other sectors (Nwafor, M. P.*et all,*Akinyemi *et al.,* 2023). This can aggravate food insecurity by reducing crop irrigation capacity.

Climate change also affects livestock farming, a key aspect of the food sources in Ekpoma. Extreme temperatures and fluctuating rainfalls affect the availability of pasture and water for animals, leading to reduced livestock productivity. This has been evident in various studies such as those by Bello *et al*. (2021), who observed a decrease in livestock productivity due to heat stress and scarcity of feeds.

On the whole, the literature review showed that the impacts of climate change on food securityhave been carried out in the humid tropics of the world in general and Ekpoma in particular. The specific case ofthe implications of climate change on staple crops production in Ekpoma, Edo State, Nigeria has not been examined in any study in the study area. This recent vacuum is what this current paper intends to bridge scientifically.

6. Research Methodology

The data required for this study were collected from both primary and secondary sources. The primary source formed the major source of data needed for this paper. The primary data were collected by the use of structured questionnaire administration and personal observation in the field. Sixteen thousand, one hundred and six staple crops farmers were found in the study area. So, 400 staple crop farmers which representtwo point five percent (2.5%) of the staple crops farmers' population in the study area were considered. Consequent upon the above, four hundred questionnaires were administered across the study area. The preliminary and actual field surveys revealed that the staple crops farmers' population is not evenly distributed across the study area. Owing to the above, the questionnaires were distributed in the various communities in this proportion: Iruekpen (50), Ujemen (30), Uke (20), Idumebo (25), Ihumudumu (35), Ujoelen (40), Ukpenu (30), Eguare (25), Emaudo (35), Illeh (30), Uhiele (40) and Emuhi (40).All thefour hundred questionnaires were retrieved and used for the study.Random sampling technique was used to select the respondents for interview. Questions were asked on the causes of climate change, thetypes of staple crops cultivated, the impact of climate change on the production of staple crops, the level of awareness of staple crops farmers on the implication of climate changeon staple crops production, the implications of the climate changeon staple crops productionand

the coping strategies adopted by staple crops farmers in the study area.

The secondary data used in this paper include but not limited to the population data as generated by the National Population Commission (NPC), Esan West Local Government Council, Agricultural Development Programme (ADP) in Irrua, Esan Central Local Government Area/Benin City, and Ministry of Agriculture and Natural Resources (MANR), Ekpoma–Esan West Local Government Area/Benin City, Edo State. The data collected were collated and analysed using tables, frequencies and percentages.

7. Results and Discussion

The success or failure of any crop productionprocess including staplecrops in particular is largely dependent on the nature of the environmental factors. Some of the environmental factors include but not limited to: soil, climate, diseases and amongst others. These factors singly or in combination influence staple crops production in Ekpoma and other regions having the same or similar environmental conditions or factors.

7.1 The causes of climate change in Ekpoma

Table 7.1 shows the causes of climate change in Ekpoma. It reveals that burning fossil fuels with 120 responses representing 30.00% ranks highest among all the causes and it is followed by deforestation which has 82 responsesrepresenting 20.50% of the sample population. Also, Table 7.1reveals that agricultural activities have 40 responses representing10.00% whereas, industrial actives which ranks next to it has 36 responses and this represent9.00% of the sample population. The others which include bush burning has 35 responses representing 8.75%, the use of fluorinated gases has 24 responses which represent 6.00%, heat from concrete surfaces has 25 responses which represent 6.25% emissions from dump sites has 20 responses which represent5.00%, and finally, heat from roof tops which ranks lowest in the study area has 18 responses representing 4.50% of the sample population.

Table 7.1: The Causes of Climate Change in Ekpoma

The causes of climate change in Ekpoma	Frequency	Percentage
Burning of fossil fuels	120	30.00
Deforestation	82	20.50
Industrial activities	36	9.00
Agricultural activities	40	10.00
Use of fluorinated gases	24	6.00
Bush burning	35	8.75
Emissions from dump sites	20	5.00
Heat from roof tops	18	4.50
Heat from concrete floors	25	6.25
Total	400	100

Source: Field survey, 2024.

7.2 The Major Staple Crops Produced in Ekpoma

Table 7.2 shows the major staple crops produced in Ekpoma. From the table, it is crystal clear that cassava is the first on the list with 148 responses representing 37.00% of the sample population and it is followed by yam with 101 responses representing 25.25% of the sample population in the study area. Corn with 83 responses representing 20.25% of the sample population is next and it is followed by plantain which recorded 49 responses which represent 12.25% of the sample population. The last among the major staple crops produced in Ekpoma is coco-yam with 19 responses (4.75%) of the sample population in the study area.

Table 7.2: The Major Staple Crops Produced in Ekpoma

The major staple crops produced in Ekpoma	Frequency	Percentage
Cassava	148	**37.00**
Yam	101	25.25
Corn	83	**20.75**
Plantain	49	12.25
Coco-yam	19	**4.75**
Total	**400**	**100**

Source: Field survey, 2024

7.3 The Major Evidence of Climate Change Having Implications on Staple Crops Production in Ekpoma

Table 7.2 shows the major evidence of climate change having implications on staple crops production in Ekpoma, Edo State, Nigeria. The table further reveals that unreliable rainfall ranks highest with 116 responses representing 29% of the sample population and it is followed by rising and harmful temperature with 108 responses which represents 27% of the sample population. Extreme weather events such as increasing occurrences of floods, and drought record 72 responses which represents18% of the sample population. The 7.2 further revealed that severe thunderstorms had 60 responses representing 15% of the sample population and finally cloudless skies with 44 responses which represent 11% of the sample population were among the major evidence of climate change having implications on staple crops production in Ekpoma, Edo State, Nigeria.

Table 7.3: The Major Evidence of Climate Change Having Implications on Staple Crops Production in Ekpoma

Major evidence of climate change	Frequency	Percentage
Rising and harmful temperature	108	27
Unreliable rainfall	116	29
Extreme weather events	72	18
Severe thunderstorms	60	15
Cloudless skies	44	11
Total	400	100

Source: Field survey, 2024

7.4 The Implications of Climate Change on Staple Crops Production in Ekpoma

Table 7.3 depicts the implications of climate change on staple crops production in Ekpoma, Edo State, Nigeria. Reduced crop yield and variability with 92 responses representing 23.00% of the sample population tops the list and it is followed by skyrocketing prices of staple crops which records 64 responses which represents 16.00% of the sample population. Emergence and spread of diseases and pests records 51responses representing 12.75%also, death of seeds and seedlings has 50responses whichrepresent12.50%, more labour/loss of man hour with 35 responses representing 8.75%, while impoverishment of soil nutrient/fertility records 34 responses which represent 8.50%of the sample population in the study area. Others

are reduction in arable land available for staple crops production, it has 30 responses representing 7.50%, disrupted farming calendars has 24 responses which represent 6.00% and finally, delayed germination and maturity of staple crops with 20 which represents 5.00% of the sample population in the study area.

Table 7.4: The Implications of Climate Change on Staple Crops Production in Ekpoma

Implications of Climate Change on Staple Food Production in Ekpoma	Frequency	Percentage
Reduced Crop Yield and Variability	92	23.00
Impoverishment of Soil Nutrient/Fertility	34	8.50
Emergence and Spread of Diseases and Pests	51	12.75
Death of Seeds and Seedlings	50	12.50
Reduction in Arable Land for crop Production	30	7.50
More/Loss of Man Hour	35	8.75
Delayed Germination and Ripening of Crops	20	5.00
Skyrocketing Prices of staple Crops	64	16.00
Disrupted Farming Calendars	24	6.00
Total	400	**100.00**

Source: Field survey, 2024

7.5 The Adaptation Strategies and Policies Implemented by Staple Crops Farmers to Foreclose the Implications of Climate Change on Staple Crops Production in Ekpoma

Given the significant threat posedby climate changeto the production of staple crops from the planting to maturity period in Ekpoma, several adaptation strategies have been formulatedand implemented to mitigate its implications on staple crops production. The adaptation strategies include but not limited to;

Climate-Smart Agriculture (CSA)**:** CSA practices, which include the use of drought-resistant crops, improved water management techniques, and agro-forestry, are being promoted as key adaptation strategies to build resilience among farmers in Ekpoma.

Community-Based Adaptation: Local farmers are also adopting community-based strategies such as rainwater harvesting and local irrigation systems. These efforts have helped staple crops farmers to reduce the vulnerability of local agriculture to changing climate patterns. All these localized solutions offer practical and cost-effective ways to enhance staple crops production in Ekpoma, Edo State, Nigeria.

Government and Policy Support**:**At the national, state, local, ward and even community levels,policies aimed at addressing climate change impacts on staple crops are of vital importance. The Nigerian government has launched several programs, including the National Adaptation Programme and the Agricultural Transformation Agenda across the country (with Ekpoma included), which aim to increase climate resilience in agricultural production in general and staple crops production in particular. In Ekpoma, local agricultural extension services and farmers' training programmes are on ground and they playa very significant role in disseminating climate adaptation techniques and strategies to smallholder farmers.

Sustainable Land Management**:** Promoting sustainable land management practices is critical in improving soil fertility and enhancing water retention in Ekpoma. Such practices, along with better integrationof agro-ecological principles, are helping staple crops farmers to circumvent the effects of soil erosion, soil impoverishment, and water scarcity on staple crops productionin Ekpoma, Edo State, Nigeria.

8. Conclusion

Climate change represents a significant challenge to staple crops production in Ekpoma, Edo State, Nigeria, as it disrupts agricultural productivity in general and staple crops production in particular and affects the livelihoods of local farmers. Ekpoma(the study area) relies mainly on rain-fed agriculture. This, makes Ekpoma highly vulnerable and susceptible to fluctuations in rainfall and temperature, which could stultify the shortage of staple crops in the decades ahead. However, various adaptation strategies, including climate-smart agriculture, community-based adaptation, and government interventions, have the potentials to mitigate these challenges and improve on staple crops production outcomes in Ekpoma. It is crucial that policy frameworks at the community, ward, local, state, and national levels prioritize climate resilience and staple crops availability to safeguard the future of farming communities in Ekpoma Kingdom, Edo State, Nigeria.

9. Recommendations

This paper examined the implications of climate change on staple crops production in Ekpoma, Edo State, Nigeria. Based on the findings of this paper, the following actionable policy recommendations are made:

1. Effective and regular training and retraining of staple crops farmers on the knowledge of climate change, climate change related- hazards, the place of staple crops in our society, disease management strategies should be enforced by government at all levels;

2. Climatic conditions should be monitored to help predict potential climate change related hazards and how to circumvent them;

3. Practicing climate-smart agriculture which includes incorporating climate-hazard resistant crops and improving cultural practices, such as proper drainage and canopy management, can mitigate disease risks associated with rainfall and temperature extremes;

4. Sustainable practices to manage diseases without harming the environment such as the use of bio-pesticides and organic amendments should be encouraged.

5. Governments at all levels (federal, state and local) should as a matter of urgency promulgate laws on the granting of soft loans, climate change related-hazards and diseases resistant species of staple crops and other inputs to staple crops farmers annually to encourage them.

10 Conclusion

Climate change represents a significant challenge to staple crops production in Ekpoma, Edo State, Nigeria, as it disrupts agricultural productivity in general and staple crops production in particular and affects the livelihoods of local farmers. Ekpoma(the study area) relies mainly on rain-fed agriculture. This, makes Ekpoma highly vulnerable and susceptible to fluctuations in rainfall and temperature, which could stultify the shortage of staple crops in the decades ahead. However, various adaptation strategies, including climate-smart agriculture, community-based adaptation, and government interventions, have the potentials to mitigate these challenges and improve on staple crops production outcomes in Ekpoma. It is crucial that policy frameworks at the community, ward, local, state, and national levels prioritize climate resilience and staple crops availability to safeguard the future of farming communities in Ekpoma Kingdom, Edo State, Nigeria.

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