ENVIRONMENTAL EDUCATION PROGRAMMES AS STRATEGIESFOR CLIMATE CHANGE ADAPTATION BY FARMERS IN RIVERS STATE

By

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Abstract
This study examined environmental adult education programmes as strategies for climate change adaptation by farmers in Rivers State. The research was guided by six research questions and two null hypotheses. This study adopted the descriptive research design, the population for this study consisted of 6,370 farmers who are registered with the Agricultural Development Office in Rivers State. Multistage sampling technique was used to draw 1,274 farmers, representing 20% of the total population of the study. Environmental Adult Education Programmes and Climate Change Adaptation by Farmers in Rivers State Questionnaire (EAEPCCAQ) was the main instrument used for data collection.A reliability coefficient of 0.76 was obtained using test re-test method. Data collected for this study were analyzed using mean score. Results revealed that the impacts of climate change on crop production are low productivity in crop yields, the application of organic manure, the use of ashes on the plants to prevent direct sun light on the farmlands, amongst others are the efforts made by the farmers to adapt to the negative impact of climate change on farmlands. Environmental Adult Education such as conservation education, environmental literacy, forestry education, sustainable education are the programmes farmers engaged in to enhance their crop yield. Inadequate qualified facilitators in the field of environmental adult education, unwilling attitudes of some farmers to participate in EAE programmes, unwillingness of some farmers in practicing the knowledge gained during the EAE programmes, lack of political will are challenges facing the implementation of EAE programmes for climate change adaptation. This study concluded that environmental adult education programmes have the potential to enhance farmers adaptation strategies to climate change in Rivers State. The study recommended among others that, incentives should be given by the Government to motivate farmers to attend seminars, and workshops organized to educate them on strategies to adapt to climate change.

Keywords: Enviromental education, climate change, adaptation, farmers.

Introduction

The environmental problems of contemporary Africa and the world at large are so pervasive and worrisome because of their obvious consequences for mankind and sustainable development. Today there is a national and international understanding of the need to minimize possible negative human activities that cause environmental changes and maximize major advantages derivable through environmental conditions that can

result from a planned and sustainable use of the natural environment. This is evidenced in the Millennium Summit Declaration of 2014, in which explicit reference was made to critical environmental issues such as biodiversity-loss, deforestation, desertification, and climate change and water management.

Climate change is the most serious environmental threat to the fight against hunger, malnutrition, disease and poverty in Africa, mainly through its impact on agricultural productivity (Udulor, 2016). This global interest on climate change and the predicament of the environment, especially in the face of prevailing mass poverty, disease, malnutrition, hunger, population growth, unemployment and pollution of air, land and water has made it compelling for most countries of the world to embrace environmental education (EE) as a precondition for environmental quality. This is based on the belief that environmental education will most likely improve public awareness, engender eco-friendly attitudes and develop management skills and strategies that will minimize environmental damage. Thecrusade for environmental quality is being focused more on the environmental front, such as environmental sanitation exercises, clean-up campaigns, seminars, workshops and other mundane activities which merely attack the symptoms rather than the problems. According to Okafor (2016), rural farmers for ages have evolved various survival strategies to combat the adverse effects of climate variability on crop production. Some of these schemes are multiple cropping systems, cropping drought resistant or drought tolerant crops, use of compost manure, uses of ashes on plants to prevent direct sun shine, trimming of trees for sheds on plants, application of irrigation methods and diversification of livelihood activities.

The general feeling today is the need to focus more on the human front changing attitudes, values, perceptions, habits and inclinations through environmental education programmes which will inculcate in the citizens a sustained culture of environmental ethics and discipline capable of engendering environmental friendliness. It is believed that successful control of environmental problems depend to a great extent on the way people perceive their environment and their concomitant behaviour, because it is the human mind that masterminds human behaviour. Since environmental problems are basically human problems, they require a radical change of attitude and complete transformation in the way people behave and the way they use the earth's resources. The focus of sustainable development as a goal of EE was endorsed by the UN General Assembly in 1987 for the purpose of among other things to develop programmes that were locally relevant and culturally appropriate which took into consideration local environmental, economic, and societal conditions (UNESCO, 2005). There is now a strong global consensus that climate change presents an urgent challenge to human welfare and sustainable development (Eboh, 2009).

According to IPCC's report, climate change is caused by anthropogenic activities which alter the composition of the global atmosphere over comparable time periods, leading to changes in climate parameters such as cloud cover, precipitation, temperature and vapor pressure (Federal Ministry of Environment, 2003). Anyadike, (2009) observed, the three major causes of climate change are astronomical causes, volcanic eruptions and anthropogenic (human-related) causes. According to (Eheazu, 2011), the term global climate change refers to any significant change in world

climate over time. Such a significant change may include any of the following: unpredictable rainfall patterns, rising temperature and drought and increased likelihood of hazards such as floods, landslides and severe cycloids which may result in hurricanes and typhoons. The risks in Nigeria are particularly high due to her low lying coastline that is highly populated with heavy concentration of gross domestic product (GDP) generating industry and infrastructure, (Department for International Development, DFID). All the sectors of Nigeria's economy will be impacted by climate change but in particular agriculture. Climate change is worse for the vulnerable such as the poor, old, women, and children and for those that depends on agriculture for their livelihoods. This is because the vulnerable are less able to fend for themselves and are less able to adapt to changing circumstances. Hence, environmental education becomes relevant. Climate change has an effect on agricultural productivity in Rivers State, changing the conditions for crop and plant growth and in turn food supply, increasing the pressure on soil and water availability as well as farming methods with a reliance on fertilizers or other chemical products. Forest ecosystems are also affected. The actual and potential impacts of climate change in Nigeria, especially in Rivers State are considerable and have far-reaching effects. All sectors of our socio-economic development including agriculture are vulnerable to climate change. It presents significant threats to the achievement of the Sustainable Development Goals, especially those related to eliminating poverty and hunger and promoting environmental sustainability.

Statement of the Problem

The people of Rivers State, especially the rural dwellers who are predominantly farmers have suffered a very great loss in agricultural productivity due to climate change. This is evidenced in the poor cassava harvest which gave rise to the high price of agricultural products, flood sweeping off fishes in the fish ponds and also overrunning farmlands. The result of such climatic changes such as heavy heat, deforestation, unpredictable weather, and low soil nutrients amongst others for farmers is poor harvest of agricultural products. Rivers State like many other states in Nigeria largely lacks the infrastructure necessary to respond adequately to climate change. Etche and Emohua Local Government Areas are among the twenty-three (23) Local Government Areas of Rivers State whose dwellers are predominantly farmers. The climatic changes have affected the productivity level and agricultural harvests by the farmers in these L.G.As. Based on these, this study sought to expose environmental education programmes that are relevant strategies for climate change adaptation by farmers in the study areas.

Environmental education programmes

Environmental education program is the process whereby people are exposed to understand issues in their environment in order to develop skills for solving the problems. Roth in Okafor (2017) describe environmental education as a set of understanding skills, attitudes and habits of mind that compares individual to relate with their environment in a positive fashion and to take day-to-day and long term actions to maintain or restore sustainable relationship with other people and the biosphere. Such environmental education programmes are as follows:

Conservation Education Program

Conservation simply means the preservation and careful management of the environment and of natural resources. Therefore, Conservation Education Programme has to do with, facilitating the adults on how best farmers can carefully preserve and manage the environment and natural resources within their localities. These target group need to know how to conserve local resources such as trees, mangroves and so on. Kaushik (2003) asserted that, tree planting (afforestation and reforestation) serve as the most effective environmental conservation efforts involving local people. For instance, tree planting such as Veteva plant, bamboo, harvesting of rainwater in a sloppy and erosion prone areas helps to control erosion and in turn reduces the amount of CO_2 emission in the atmosphere.

Forestry Education Program

This program is usually organized by the Forestry Department in the Ministry of Agriculture, forestry department of higher institutions, Non-Governmental Organizations (NGOs) or even individuals, to educate people on skills of managing forest resources sustainably. This is aimed at fostering responsible environmental behaviours towards forest resources like the wild-life, economic trees and so on among members of the community. It also provides training on sustainable utilization of forest resources. Okorie, (2016).

Sustainable farming education

Majority of farmers especially in rural areas lack up to date information on how to improve productivity in their farming activities in a more economical way and also maintain sustainability of the environment. Sustainable farming education programmes are usually designed to help educate the rural farmers on how to grow their food efficiently, economically and in a sustainable way. This programme is all about using methods and technologies that do not have an overly negative effect on soil, water, and air quality. To this end, Rosegrant and Cline in (Okorie, 2016) observed that farmers education programmes will amongst others: increase local food availability, increase farmer's income and increase sustainability of agricultural practices.

Environmental Literacy programme

Environmental literacy simply is the process whereby people are exposed to understand issues in their environment in order to develop skills for solving the problems. Roth (1992) describe environmental literacy as a set of understanding skills, attitudes and habits of mind that compares individual to relate with their environment in a positive fashion and to take day-to-day and long term actions to maintain or restore sustainable relationship with other people and the biosphere. As observed by Eheazuin Korinaki (2018) that basic knowledge components is based on the idea that before an individual can act on an environmental problems, he/she must first understand the problem. Develop the right attitude and skills that will enable the individual farmers to relate with the environment in positive ways, in order to maintain and restore sustainable relationship with the biosphere.

Aim and Objectives of the Study

The aim of this study was to investigate environmental adult education programmes as strategies for climate change adaptation by farmers in Rivers State. Specifically, the objectives of this study are to:

1. determine the level to which farmers participate in such environmental

education programmes for climate change adaptation in Rivers State.
2. determine the perceived impact of farmers' participation in environmental education programmes for climate change adaptation on farming related activities in Rivers State.

Research Questions

The following research questions were used to guide this study:

1. To what level do farmers participate in environmental adult education programmes for climate change adaptation in Rivers State?
2. What are the perceived impact of farmers' participation in environmental adult education programmes for climate change adaptation on farming related activities in Rivers State?

Hypotheses

1. There is no significant relationship between environmental education programme and climate change adaptation by farmers in Rivers State.
2. There is no significant relationship between participation by farmers in environmental education program and reduction of the negative impacts of climate change on farming practices and productivity.

Scope of the Study

The scope of this study is on environmental education programmes as climate change adaptation by farmers in Rivers State. The study covers all the predominantly farming communities in Etche (Okomoko, Egwi, Afara, Chokocho) and Emohua (Rundele, Ibaa, Emohua, Rumuji), local government areas of Rivers State. The scope of this study was specifically delimited to the farmers in these communities who are registered with the Rivers State Agricultural Development Programme (ADP).

Methodology

The descriptive survey research design was used for this study. This design was selected because the researcher attempted not to manipulate any of the variables but to report them as they were met on the field. The population of this study comprised adult male and female who are predominantly farmers in the communities of Etche (Okomoko, Egwi, Afara, Chokocho) and Emohua (Rundele, Ibaa, Emohua, Rumuji), local government areas who are registered farmers with the Rivers State Agricultural Development Programme.

The multi-staged sampling technique was used for this study. **Stage 1**: Purposive sampling technique was used to sample eight (8) communities from the two local government areas with registered farmers in ADP. **Stage 2**: Proportionate sampling technique was used to draw 20% (**1274**) respondents from the population to ensure equal representation of the entire population. Using Taro Yamane formula, the minimum sample for the population of this study is 375. The main instrument for data collection was Environmental Education as Adult Education Program and Climate Change Adaptation Questionnaire (EEAEPCCAQ). The instrument (questionnaire) was divided into parts A and B. Part A is meant to obtain the personal data information of respondents while part B contains questions formed based on the research questions that guided the study. The instrument for this study was based on four-point modified Likert rating scale. The researcher ensured both face and content validity of the instrument. The reliability of the instrument was determined through test re-test method. The instrument for this study was based on four-point modified Likert rating scale. The researcher ensured both face and content validity of the instrument and also

the reliability coefficient of the instrument was 0.66.

The copies of the questionnaire were administered to the respondent with the help of two trained research assistants. The researcher monitored and co-ordinate the field activities of research assistants. The responses from the respondents were presented in tables and analyzed using mean statistics and standard deviation to answer the research questions. From a total of 1274 questionnaire administered, only 1132 (89%) were correctly filled by the respondents as such only that number was used for the analysis.

RQ1: To what level do farmers participate in environmental adult education programmes for climate change adaptation in Rivers State?

Level of farmer's participation in environmental education programmes for climate change adaptation in Rivers State

S/N	Items	VHL(4)	HL(3)	LL (2)	VLL (1)	N	$\overline{X}$	Remarks
1	Soil Conservation	134	443	435	120	1132	2.87	High level
2	Climate change education	56	458	420	198	1132	2.33	Low level
3	Forest resources management	507	330	121	174	1132	3.03	High level
4	Sustainable farming practices	339	450	239	104	1132	2.90	High level
5	Environmental literacy programme	276	499	320	37	1132	2.89	High level
	Grand Mean						**2.80**	**Accepted**

From the data analysis obtained in Table1, it can be observed that item 1 (Soil Conservation) had a mean of 2.87, item 2 (Climate change education) had a mean of 2.33, item 3 (Forest resources management) yielded a mean value of 3.03, with item 4 (Sustainable farming practices) resulting in a mean of 2.90. Also, the table showed that item 5 (Environmental literacy programme) had a mean of 2.89. This result showed that the mean values of all the items were greater than 2.50 which was the criterion mean except item 2 that had 2.33 which is below thecriterion mean, but the grand mean shows 2.90 which is greater than criterion mean. This result therefore shows that there is a high level participation of farmers in environmental Education Programmes for adaptation of climate change in Rivers State.

RQ2: What are the perceived impacts of farmers' participation in environmental education programmes for climate change adaptation on farming related activities in Rivers State?

Perceived Impacts of Farmer's Participation in Environmental Education Programmes for Climate Change Adaptation on Farming Related activities in Rivers State.

S/N	Items	SA (4)	A (3)	D (2)	SD (1)	N	$\overline{X}$	Remarks
1	The knowledge I gained from EAE programmes helped me to have a better agricultural harvest	534	243	237	118	1132	3.05	Agree
2	The education I acquired through participation in EAE programmes has helped me to farm in a more sustainable way to adapt to the effects of climate change on my farm	456	455	23	198	1132	3.03	Agree
3	The knowledge gained through participation in EAE programmes has discouraged me from unnecessary cutting down of forest resources and bush burning	432	333	318	49	1132	3.01	Agree
4	The education I gained has equipped me with more knowledge on soil management	330	458	231	113	1132	2.89	Agree
5	I am acquainted with the better methods of application of fertilizers on my crop for good harvest	348	241	429	114	1132	2.73	Agree
	Grand Mean						**2.94**	**Agree**

From the data analysis done in Table 2, it can be observed that item 1 (The knowledge I gained from EE programmes helped me to have a better agricultural harvest) had a mean of3.05, item 2 (The education I acquired through participation in EE programmes has helped me to farm in a more sustainable way to adapt to the effects of climate change on my farm) had a mean of 3.03, item 3 (The knowledge gained through participation in EE programmes has discouraged me from unnecessary cutting down of forest resources and bush burning) yielded a mean value of 3.01, with item 4 (The education I gained has equipped me with more knowledge on soil management) resulting in a mean of 2.89.00. Also, the table showed that item 5 (I am acquainted with the application of fertilizers on my crop for good harvest) had a mean of 2.73. This result showed that the mean values of all the items were greater than 2.50 which was the criterion mean. This result showed that participation of farmers in environmental education programmes for climate change adaptation on farming related activities in Rivers State has positive impact.

Hypotheses Testing

Hypothesis One: There is no significant relationship between environmental education programme and climate change adaptation by farmers in Rivers State.

Analysis of Pearson Product Moment Correlation between environmental Education Program and Climate change adaptation by farmers.

		EEP	CCAF	Decision
Environmental Education Programme (EEP)	Pearson Correlation	1	0.413	
	Sig (2 tailed)		0.000	
	N	1132	1132	
Climate Change Adaptation by Farmers (CCAF)	Pearson Correlation	0.413	1	Reject Ho_1 ($P<0.05$)
	Sig (2 tailed)	0.000		
	N	1132	1132	

From the table above, it can be seen that relationship between environmental education program and climate change adaptation among farmers in Rivers State yielded co-efficient value of 0.413. This symbolizes that there is moderate positive relationship between environmental education program and climate change adaptation among farmers in Rivers State. To ascertain if there is a significant relationship between environmental education program and climate change adaptation among farmers in Rivers State, PPMC test conducted yielded a p-value of 0.000 at 1130 degrees of freedom. From this analysis, it is clear that the obtained p-value was less than the chosen alpha of 0.05. This therefore indicates that there is a significant relationship between environmental education program and climate change adaptation among farmers in Rivers State. The null hypothesis was hence rejected while accepting alternate hypothesis.

Hypothesis Two: There is no significant relationship between participation by farmers in environmental education program and reduction of the negative impacts of climate change on farming practices and productivity.

Analysis of Pearson Product Moment Correlation between participation by farmers in environmental education Programme and reduction of the negative impacts of climate change on farming practices and productivity.

		PFEAEP	RNICCFPP	Decision
Participation by Farmers in EAEP	Pearson Correlation	1	0.322	
	Sig (2 tailed)		0.000	
	N	1132	1132	Reject Ho_2 ($P<0.05$)
Reduction of Negative Impact of CCFPP	Pearson Correlation	0.322	1	
	Sig (2 tailed)	0.000		
	N	1132	1132	

From the table above, it can be observed that relationship between participation by farmers in environmental education Program and reduction of the negative impacts of climate change on farming practices and productivity yielded co-efficient value of 0.322. This symbolizes that there is moderate positive relationship between participation by farmers in environmental education Program and reduction of the negative impacts of climate change on farming practices and

productivity. To ascertain if there is a significant relationship between participation by farmers in environmental education Program and reduction of the negative impacts of climate change on farming practices and productivity, PPMC test conducted yielded a p-value of 0.000 at 1130 degrees of freedom. From this analysis, it is clear that the obtained p-value was less than the chosen alpha of 0.05. This therefore indicates that there is a significant relationship between participation by farmers in environmental education Program and reduction of the negative impacts of climate change on farming practices and productivity. The null hypothesis was hence rejected while accepting alternate hypothesis.

Summary of Findings

1. Environmental education programmes can be used by farmers to adapt to the negative impacts of climate change on their farmlands, such programmes include amongst others: conservation education programmes, forest education programmes, sustainable education programmes.
2. The study revealed that farmers participated in the environmental education programmes organized by the ADP which the knowledge gained from the programmes has helped them to have a better agricultural harvest, farm in a more sustainable way to adapt to the effects of climate change and has discouraged them from unnecessary cutting down of forest resources and bush burning amongst others.
3. The study revealed that climate change has a very negative impact on productivity of farmers in Rivers State, such negative impacts include low outcome of agricultural yield, leads to erosion, flooding and dryness of crops

Conclusion

Based on the analysis and findings of this study, it is concluded that environmental education programme has a long way to improve and enhance the harvest of farmers in Rivers State. Adequate environmental education programme to farmers in Rivers State cannot be overemphasized as it enhances the already existing farming practices that the farmers employ to adapt to the ever occurring climate change in the State.

Recommendations

To enhance the crop yield by farmers in Rivers State, based on the findings of the study, the following recommendations are proffered:

1. Incentives should be given to farmers to motivate them to attend seminars, workshops amongst others organized to educate them on strategies to adapt to climate change.
2. Rivers State Agricultural Development Programmes Office should involve experts in the field of environmental adult education in the training of staff or extension officers who will train the farmers in the various communities.
3. Government at all levels should support the environmental adult education programmes organized by the Agricultural Development Officers for farmers to adapt to the ever changing weather.
4. Government intervention is needed in the establishment of agencies that will educate the farmers on climate change for the sustainability of these environmental adult education programmes.

References

Disinger, J.F & Roth, C.E. (1992).Environmental Literacy. Columbus, OH *ERIC/SMEAC Information Reference center ED351201*

Eheazu, B. A. (2013).Antecedents of Environmental Adult Education. In B. A. Eheazu, C. N. Barikor, & I. I. Nzeneri (eds) Readings in Adult and Non Formal Education. Port Harcourt: University of Port Harcourt Press. 19-33.

Eheazu, B. A. (2016) *Fundamentals of Environmental Adult Education.* Port Harcourt: University of Port Harcourt Press.

Eheazu, C.L. (2010). *Environmental literacy levels of Nigerian university Students: A study of selected institutions in Nigeria The South-South geopolitical Zone*. Unpublished Ph.D thesis. Faculty of education, University of Port Harcourt.

Mbalisi, O.F. (2010). *Effectiveness of environmental education in the development of responsible environmental behavior among adult learners in Rivers State.* Unpublished Ph.D thesis. University of Port Harcourt, Port Harcourt.

Okafor, C. A. (2016). Environmental adult education programmes for farmers in co-operative societies to cope with land pollution from oil spillage in Rivers State. An unpublished dissertation, University of Port Harcourt.

Okorie, C.U (2016). Environmental adult education programmes for environmental sustainability. In Adekola G and Oyebamiji M.A (Eds).Adult education and the environment. University of Port Harcourt. Pearl publishers international Ltd (1) 156-164

Roth, C.E. (2002). *A questioning framework for shaping environmental literacy*. Antioch new England Institute: Earthlore associates and the centre for environmental education.

Taro Yamane scientific formula. Retrieved on the 22nd May 2018 at 11am.www.Taroyamane formula.com.

Udulor, C (2016). Environmental literacy levels of secondary school teachers in Rivers and Imo State. an unpublished dissertation, University of Port Harcourt.

UNESCO.(2009). UNESCO International Seminar on Climate Change Education. Report. 279 July 2009 at UNESCO, Paris. Available at http://www.unesco.org/science/doc/cc/CC_seminar_report_071209.pdf.