

Environmental Literacy As Adult Education Program For Climate Change Adaptation By Farmers In Rivers State

Dr. Ezechinnah, Chukwuma Alexander

Department of Adult Education and Community Development

Faculty of Education, Ignatius Ajuru University of Education, Rumuolumeni

Rivers State, Nigeria

chukwuma.ezechinnah@iaue.edu.ng

Abstract:

This study examined environmental literacy as adult education program for climate change adaptation by farmers in Rivers State. The research was guided by three research objectives and three research questions. The population of this study consists of 6,370 registered farmers with the Agricultural Development Office in Rivers State. Proportionate-random sampling technique was used to draw 1,274 farmers representing 20% of the total population used for the study. Questionnaire on Environmental Literacy Adult Education Programmes and Climate Change Adaptation By Farmers in Rivers State (ELAEPCCAF) was used for data collection. A reliability coefficient of 0.75 was obtained using test re-test method. Only 1,132 (89%) copies of questionnaire were returned and correctly filled by the respondents, as such, only that number was used for the data analysis using mean and standard deviation scores. Results showed that climate change has negative impacts on farming activities and crop yields in Rivers State. The application of organic manure, the use of ashes on the plants to prevent much of climate change on the farmlands, amongst others are the traditional efforts made by the farmers to adapt to negative impacts of climate change. Environmental literacy adult education programmes such as conservation education, forest education, sustainable education, functional literacy amongst others are the adult education programmes farmers engaged in to adapt to climate change. This study concluded that environmental literacy programmes are better positioned to assist farmers in Rivers State adapt to the challenges of climate change. The study recommended among others that, there should be collaborative efforts by agricultural extension personnel and facilitators of environmental literacy programmes in designing climate change mitigation education programmes for farmers in Rivers State.

Keywords: Environmental literacy, Climate Change, Adaptation, Farmers.

1. 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 [1]. This is evidenced in the Millennium Summit Declaration, in which explicit reference was made to critical environmental issues such as biodiversity-loss, deforestation, desertification, and climate change.

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. This global interest on climate changes and the predicament of the environment, especially in the face of prevailing mass poverty, disease, filth, 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 literacy (EL) as a precondition for environmental quality. This is based on the belief that environmental literacy will most likely improve public awareness, engender eco-friendly attitudes and develop management skills and strategies that will minimize environmental damage [2]. Indeed most efforts made by the Nigerian government and non-governmental organizations (NGOs) have failed woefully, example is the sooth been experienced in Rivers State and its environs. This is largely so because, the crusade 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 themselves [3].

The general feeling today is the need to focus more on the human front changing attitudes, values, perceptions, habits and inclinations through environmental literacy programmes which is more likely to inculcate in the citizens a sustained culture of environmental ethic and discipline capable of engendering environmental friendliness. It is believed that successful control of environmental problems will depend to a great extent on the way people perceive their environment and their concomitant behavior, because it is the human mind that masterminds human behavior [4]. 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.

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 [5].

Environmental literacy on the issue of climate change is concerned with education for sustainable development.

It is the creation of awareness for the people on continuing causes and effects of the environmental problem, harnessing context specific knowledge and practices and molding this with viable technological advances whenever possible, all in the hope of finding the most effective solutions to the global problem of climate change.

The term Environmental Literacy (EL) has been in use for more than four decades. Similar to the concept of Environmental Education (EE), EL has no generally accepted definition. The concept of EL is evolving and has drawn scholastic attention in researches and discussions that have produced divergent views [6]. Scholars, researchers and other stake holders defined EL based on their perceptions, contexts and research findings.

In all, however, environmental literacy comprises an awareness of and concern about the environment and its associated problems, as well as the knowledge, skills and motivations to work towards solution of current problems and the prevention of new ones. Roth in Ehezue, (2016:74) described Environmental Literacy (EL) as:

a set of understandings, skills, attitude and habits of mind that empowers individuals to relate to 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 ...

Levels of Environmental Literacy

The levels of environmental literacy are:

Nominal environmental literacy level (ELL₁): This implies fundamental knowledge, awareness and understanding.

Functional environmental literacy level (ELL₂): This means appliance of knowledge and skills to problems; and

Operational environmental literacy level (ELL₃): This involves broader application of knowledge and skills on a daily basis [7].

Characteristics of Environmentally Literate Persons

Individuals who have undergone any form of training in various aspects of environmental literacy programmes are expected to exhibit certain characteristics. According to Mbalisi, the characteristics of an environmentally literate person suggest that the person should be able to:

1. Have a sound knowledge about the environment
2. Understand, appreciate and enjoy the world, to make personal choices, contribute to his local environment and to effectively care for the planet and work to improve it
3. Be aware of the environment and its resources, have some understanding of renewable resources and have feelings for the interrelationship in nature
4. Be sensitive to environmental problems and have positive attitudes, values towards the environment

Qualities of an Effective Environmental Literacy Program

Environmental literacy plan is the first hold on having effective environmental literacy program. NAAEE expresses the importance of environmental literacy plan in the achievement of the objective specifics of environmental literacy [8]. The focus of environmental literacy program include to:

- i. Ensure that activities required for learners are aligned with and will help achieve stated environmental literacy goals.
- ii. Ensure adequate and proper integration of environmental education into formal education systems.

- iii. Ensure opportunities for teacher professional development that enhances achievement of environmental literacy [9].

Environmental Literacy Adult Education Programmes for Farmers

Environmental literacy programme is the process whereby people are exposed to understand issues in their environment in order to develop skills for solving the problems. Such environmental literacy programmes are:

Conservation Education Programme

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 [10]. These target group need to know how to conserve local resources such as trees, mangroves and so on. Kaushik 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 CO₂ emission in the atmosphere.

Climate Change Education Programme

This is a programme which enables farmers to understand the essential principles of earth climate system communicate about climate and climate change in a meaningful way and is able to make informed and responsible decision with regard to actions that may affect the climate. Therefore, farmers in River State need this programme in order to understand the impacts of their unhealthy agricultural practices that affect the climate system such as bush burning, clean clearing, and use of dynamite for fishing, and so on [11].

Forestry Education Programme

This programme 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 farmers and members of the community in general . It also provides training on sustainable utilization of forest resources. Okorie [12].

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 observed that farmers education programmes will amongst others: increase local food availability, increase farmer's income and increase sustainability of agricultural practices.

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 [13]. This is evidenced in the poor cassava harvest which gave rise to the high price of garri and its products, flood sweeping off fishes in the fish ponds and also overrunning farmlands. The result of such climatic

changes include heavy heat, deforestation, unpredictable weather, low soil nutrient etc and subsequent low productivity of agricultural crops. While some crops may increase in their yield or range, climate change increases existing risks of extinction of many threatened crops and lead to reduction in productivity of others. In the same manner, pest and crop diseases increased; affecting quantity and quality of crops.

The result of unchecked environmental challenges as a result of climate change is that the farmers in this study area cannot farm successfully. Since the Rio Conference of 1992, scholars and environmental experts have identified education as one of the ways to handle environmental challenges. Climate change being a major environmental challenge confronting farmers in Rivers State, this study therefore investigate the relevance of environmental literacy as adult education programme to climate change adaptation by farmer in Rivers State [14].

Aim and Objectives of the Study

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

1. ascertain the impacts of climate change on agricultural practices and productivity of farmers in Rivers State.
2. determine existing practices through which farmers adapt to negative impact of climate change on farming practices in Rivers State.
3. identify environmental literacy programmes designed for farmers to adapt to the impact of climate change in Rivers State.

Research Questions

The following research questions were used to guide this study:

1. What are the impacts of climate change on agricultural practices and productivity of farmers in Rivers State?
2. What are the existing practices through which farmers adapt to negative impacts of climate change in Rivers State?
3. What are the available environmental literacy programmes designed for farmers to adapt to the impact of climate change in Rivers State?

Scope of the Study

The scope of this study is on environmental adult 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).

2. 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 6,370 adult male and female who are registered farmers with the Rivers State Agricultural Development Programme in the communities of Etche (Okomoko, Egwi, Afara, Chokocho) and Emohua (Rundele, Ibaa, Emohua, Rumuji), local government areas. The proportionate-random sampling technique was used for this study. A sample of 1274 farmers was drawn from the population. Using Taro Yamane formula, the minimum sample

for the population of this study is 375. This shows that the sample size of 1,274 selected is far above the minimum and highly representative of the population. The figure represents 20% of the total population.

The main instrument for data collection was Questionnaire on Environmental literacy as Adult Education Programme and Climate Change Adaptation by Farmers in Rivers State (QELAEPCCAF). 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 recorded a correlation coefficient of 0.76.

The copies of the questionnaire were administered with the help of two trained research assistants. The researcher monitored and co-ordinated the field activities of research assistants. From a total of 1,274 questionnaire administered, only 1132 (89%) were returned and correctly filled by the respondents as such only that number was used for the data analysis. The responses from the respondents were presented in tables and analyzed using mean statistics and standard deviation to answer the research questions.

3. Results

RQ1: What are the impacts of climate change on agricultural practices and productivity of farmers in Rivers State?

Table 1: Mean and Standard Deviation Scores of Response on the Impact of Climate Change on Agricultural Practices and Productivity of Farmers in Rivers State.

S/N	Items	SA (4)	A (3)	D (2)	SD (1)	N	$\bar{X}$	SD	Remarks
1	There is low outcome of agricultural yield	334	443	234	121	1132	2.87	0.50	Accepted
2	Leads to erosion	356	455	123	198	1132	2.86	0.52	Accepted
3	Leads to flooding	432	333	321	46	1132	3.02	0.30	Accepted
4	Crops failure as a result of climate change	334	455	234	109	1132	2.89	0.48	Accepted
5	Leads to dryness of crops	348	342	323	119	1132	2.81	0.57	Accepted
	Grand Mean / Standard Deviation						2.89	0.48	Accepted

From the data analysis done in table 1, it can be observed that item 1 (There is low outcome of agricultural yield) had a mean of 2.87 (SD = 0.50), item 2 (Leads to erosion) had a mean of 2.86 (SD = 0.52), item 3 (Leads to flooding) yielded a mean value of 3.02 (SD = 0.30), with item 4 (Crops failure as a result of climate change) resulting in a mean of 2.89 (SD = 0.48). Also, the table

showed that item 5 (Leads to dryness of crops) had a mean of 2.81 (SD = 0.57). This result showed that the mean values of all the items were greater than 2.50 which was the criterion mean. From this result, it can be observed that climate change has negative impact (low agricultural yield, erosion, flooding, crops failure and dryness of crop) on agricultural practices and productivity of farmers in Rivers State.

RQ2: What are the existing practices through which farmers adapt to negative impacts of climate change in Rivers State?

Table 2: Mean and Standard Deviation Scores of Response on the Existing Practices through which Farmers adapts to Negative Impacts of Climate Change in Rivers State.

S/N	Items	SA (4)	A (3)	D (2)	SD (1)	N	$\bar{X}$	SD	Remarks
1	Farmers boost the soil nutrients by locally made manure	443	307	234	148	1132	2.92	0.42	Accepted
2	The use of compost manure from animals and plants helps farmers to adapt climate change	503	414	174	41	1132	3.22	0.22	Accepted
3	Farmers uses ashes on their plants to prevent much of climate change on the plants	432	333	321	46	1132	3.02	0.30	Accepted
4	Farmers trim trees and use some for sheds to prevent direct sun light	452	337	234	109	1132	3.00	0.32	Accepted
5	Farmer apply irrigation methods	232	234	540	126	1132	2.51	0.78	Accepted
	Grand Mean / Standard Deviation						2.93	0.41	Accepted

From the data analysis obtained in table 2, it can be observed that item 1 (Farmers boost the soil nutrients by locally made manure) had a mean of 2.92 (SD = 0.42), item 2 (The use of compost manure from animals and plants helps farmers to adapt climate change) had a mean of 3.22 (SD = 0.22), item 3 (Farmers uses ashes on their plants to prevent much of climate change on the plants)

yielded a mean value of 3.02 (SD = 0.30), with item 4 (Farmers trim trees and use some for sheds to prevent direct sun light) resulting in a mean of 3.00 (SD = 0.32). Also, the table showed that item 5 (Farmer apply irrigation methods) had a mean of 2.51 (SD = 0.78). This result showed that the mean values of all the items were greater than 2.50 which was the criterion mean. This result implies that farmers are using some existing practices listed in table 2 to adapt to negative impacts of climate change in Rivers State.

RQ3: What are the available environmental literacy programmes designed for farmers to adapt to the impact of climate change in Rivers State?

Table 3: Mean and Standard Deviation Scores of Response on the Environmental Literacy Programmes Designed for Farmers to Adapt to the Impact of Climate Change in Rivers State.

S/N	Items	SA (4)	A (3)	D (2)	SD (1)	N	$\bar{X}$	SD	Remarks
1	Conservation education Programmes	434	343	334	21	1132	3.05	0.28	Available
2	Climate change education programmes	256	255	323	298	1132	2.41	0.88	Not Available
3	Forest education programmes	262	303	321	246	1132	2.51	0.78	Available
4	Sustainable education programmes	434	355	334	9	1132	3.07	0.26	Available
5	Functional literacy programme	448	242	323	119	1132	2.90	0.46	Available
	Grand Mean / Standard Deviation						2.79	0.60	

From the data analysis done in table 3, it can be observed that item 1 (Conservation education Programmes) had a mean of 3.05 (SD = 0.28), item 2 (Climate change education programmes) had a mean of 2.41 (SD = 0.88), item 3 (Forest education programmes) yielded a mean value of 2.51 (SD = 0.78), with item 4 (Sustainable education programmes) resulting in a mean of 3.07 (SD = 0.26). Also, the table showed that item 5 (Functional literacy programme) had a mean of 2.90 (SD = 0.46). 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 2.41 which is below the criterion mean, but the grand mean shows 2.79 which is greater than criterion mean, It therefore implies that some environmental literacy Programmes have been specifically designed to assist farmers adapt to impact of climate change in Rivers State.

4. Discussion of Findings

Impact of Climate Change on Agricultural Practices and Productivity in Rivers State

The finding of study revealed that low outcome of agricultural yields, erosion, flooding, dryness of crops are major impacts of climate change on agricultural productivity in Rivers State. Data analysis in Table 4.1 revealed that Items 1,2,3,4, and 5 were accepted, this finding is in line with Udulor, who revealed that 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. In line with this, stated that Nigeria is one of the countries expected to be

most affected by the impacts of climate change through sea level rise along her coast line, intensified desertification, erosion and flooding disasters and general land degradation [15].

Existing Practices through which Farmers Adapt to Negative Impacts of Climate Change in Rivers State

Findings of the study confirmed that farmers boost the soil nutrients by locally made manure, the use of compost manure from animals and plants help farmers to adapt to climate change, use of ashes on their plants to prevent direct sun shine and application of irrigation methods are the existing practices farmers use to adapt to climate change in Rivers State. In Table 4.2 Items 1-5 were accepted because the mean scores were above the criterion mean of 2.5. This is in line with who revealed that it becomes imperative to focus more on the human rather than on the physical front, for the solutions to environmental problems considering that education as a vital instrument of systematic change is fundamental if we are to successfully change people's attitudes towards the environment.

Available Environmental Literacy Programmes Designed for Effective Climate Change Adaptation in Rivers State

The finding of the study showed that there are already existing or available environmental adult education programmes that are designed for farmers for effective adaptation of climate change, such programmes are conservation education programmes, forest education programmes, sustainable education programmes and environmental literacy programmes. The mean values for items 1,2,3,4, and 5 indicates that all programmes all available except climate change education programmes are designed for effective adaptation of climate change. This is in line with Okorie, who observed that farmers education programmes will amongst others: increase local food availability, increase farmer's income and increase sustainability of agricultural practices. As observed by Ocanor in Ehezuru 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.

5. Conclusion

Based on the findings of this study, it is concluded that farmers in Rivers State are challenged by the negative impacts of climate change and that despite the efforts to cushion these effects through traditional means, much still need to be done. The study further concluded therefore that environmental literacy programmes are better positioned to assist farmers in Rivers State adapt to the challenges of climate change.

Based on the findings of the study, the following recommendations are proffered: There should be collaborative efforts by agricultural extension personnel and facilitators of environmental literacy programmes in designing climate change mitigation education programmes for farmers in Rivers State. Incentives should be made available by the government to farmers to motivate them to attend environmental literacy related seminars and workshops to educate them on how to adapt to climate change. Rivers State Agricultural Development Programme Office should involve experts in the field of environmental adult education in the training of staff or extension officers who interact with the farmers in the various communities.

References

- [1] J. F. Disinger and C. E. Roth, *Environmental Literacy*. Columbus, OH, USA: ERIC/SMEAC Information Reference Center, 1992, ED351201.
- [2] B. A. Eheazu, “Antecedents of environmental adult education,” in *Readings in Adult and Non-Formal Education*, B. A. Eheazu, C. N. Barikor, and I. I. Nzeneri, Eds. Port Harcourt, Nigeria: University of Port Harcourt Press, 2013, pp. 19–33.
- [3] B. A. Eheazu, *Fundamentals of Environmental Adult Education*. Port Harcourt, Nigeria: University of Port Harcourt Press, 2016.
- [4] C. L. Eheazu, *Environmental Literacy Levels of Nigerian University Students: A Study of Selected Institutions in Nigeria in the South-South Geopolitical Zone*. Port Harcourt, Nigeria: University of Port Harcourt, 2010. Unpublished Ph.D. dissertation.
- [5] O. F. Mbalisi, *Effectiveness of Environmental Education in the Development of Responsible Environmental Behavior Among Adult Learners in Rivers State*. Port Harcourt, Nigeria: University of Port Harcourt, 2010. Unpublished Ph.D. dissertation.
- [6] C. A. Okafor, *Environmental Adult Education Programmes for Farmers in Co-operative Societies to Cope With Land Pollution From Oil Spillage in Rivers State*. Port Harcourt, Nigeria: University of Port Harcourt, 2016. Unpublished dissertation.
- [7] C. U. Okorie, “Environmental adult education programmes for environmental sustainability,” in *Adult Education and the Environment*, G. Adekola and M. A. Oyebamiji, Eds. Port Harcourt, Nigeria: Pearl Publishers International Ltd., 2016, vol. 1, pp. 156–164.
- [8] C. E. Roth, *A Questioning Framework for Shaping Environmental Literacy*. Antioch, NH, USA: Antioch New England Institute, Earthlore Associates, and the Centre for Environmental Education, 2002.
- [9] Taro Yamane Scientific Formula, 2018. Accessed: May 22, 2018, 11:00 a.m. [Online]. Available: <http://www.taroyamaneformula.com>
- [10] C. Udulor, *Environmental Literacy Levels of Secondary School Teachers in Rivers and Imo States*. Port Harcourt, Nigeria: University of Port Harcourt, 2016. Unpublished dissertation.
- [11] UNESCO, *UNESCO International Seminar on Climate Change Education: Report*. Paris, France, Jul. 27–29, 2009. [Online]. Available: http://www.unesco.org/science/doc/cc/CC_seminar_report_071209.pdf
- [12] H.-E. Edsand and T. Broich, “The impact of environmental education on environmental and renewable energy technology awareness: Empirical evidence from Colombia,” *International Journal of Science and Mathematics Education*, vol. 18, pp. 611–634, 2020, doi: 10.1007/s10763-019-09988-x.
- [13] E. Okur-Berberoglu, “The effect of ecopedagogy-based outdoor environment education on environmental awareness,” *HAYEF: Journal of Education*, vol. 12, no. 1, pp. 67–81, 2019.
- [14] D. O. Dada, C. Eames, and N. Calder, “Impact of environmental education on beginning preservice teachers’ environmental literacy,” *Australian Journal of Environmental Education*, 2018.
- [15] M. J. D. Hooykaas *et al.*, “Environmental education outcomes for conservation: A systematic review,” *Biological Conservation*, vol. 241, Art. no. 108224, 2020, doi: 10.1016/j.biocon.2019.108224.