

**CLIMATE CHANGE ADAPTATION STRATEGIES IN UPPER BASIC SCHOOLS AMONG
SOCIAL STUDIES TEACHERS IN EBONYI STATE**

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ABSTRACT

This paper investigated climate change adaptation strategies in Upper Basic Schools among social studies teachers in Ebonyi State. Descriptive survey research design and structured questionnaire titled: Questionnaire on climate change adaptation strategies in Upper Basic Schools among social studies teachers in Ebonyi State (QCCASUBSASSTES) were adopted. The population of the study comprised of two hundred and seventy seven (277) Social Studies teachers while the sample size was one hundred and eleven (111) Social Studies Teachers drawn using sample random sampling techniques from one hundred and ninety eight (198) Upper Basic Schools in Ebonyi State, the one hundred and eleven Social Studies Teachers represent forty percent of the entire population and it is in line with Nwana (1981) who stated that in terms of the population of four hundred, 40% of it will be used to ensure affective representation of the population. The reliability of the instrument used was determined using cronbach alpha which gave the coefficient index of 0.59. Data collected were analyzed using percentages while hypotheses were tested with Pearson product moment of correlation at 0.05 level of significance. The instrument were validated by three relevant expert in the field, one is from measurement and evaluation while two are from Art and Social Science Education all are from Ebonyi State University, Abakaliki. The findings of the study showed that: flood control strategies adapted in Upper Basic Schools among social studies teachers in Ebonyi State were use of floodwalls dikes and leaves, use of dams and reservoirs, channels of alternatives, evacuation/relocation among others; and the reforestation strategies adapted in Upper Basic Schools were planting of bamboo

trees, landscaping, planting of palm trees around the school environment, provision of water supply needed for plant growth and among others.. One of the implications of this study is that occurrence and flood in most schools will not be common or endemic. Another educational implication is that there would adequate forest to contain problems likely to be caused by climate change. Recommendations made were that climate change adaptation strategies identified should be incorporated in the schools curriculum, the school authorities should organize symposium, workshop, seminars and on the job training to educate both teachers and students on various flood control and reforestation strategies.

INTRODUCTION

Background to the Study

Climate change is a global phenomenon that has in recent years attracted the attention of both the developing and developed alike. it involves the alteration of the ecosystem, as a result of the condition, some gases in the atmosphere trap energy due to increase in temperature (Anup, 2013). Anupe (2013) equally noted that the increase in temperature resulted to global warming or the green house gases which leads to a change in the climate known as climate change. Olaniyi, Funmilayo and Olutimelun (2014), reported that the resultants effect of global warming is called climate change. The earth's atmosphere is vital to terrestrial life. Offorma, (2010), maintained that climate change is a continuous, rapid and prolonged alteration of climate in one direction which reflects changes in the variability or average state of the atmosphere overtime scales, ranging from decades to million of years.

Climate change appears as abnormal rise in global temperature, weather, wind and cloud, which leads to alteration in the natural phenomenon and man's activities. Santiago, (2015), noted that climate change is no longer some far-off problems, because it is happening everywhere in the world, National Aeronautics and Space Administration (NASA, 2011), stressed that earth's climate has continued to change. The rate at which the weather temperature is changing is obvious to the environmental experts and people concerned in the society. The level of increased, awareness and exposure of teachers to the climate change over the past 25 years is becoming one of the outstanding scientific themes of modern times (Filho, 2016). Filho (2016) further described climate change as a threat considering, the huge amount of money spent on climate change adaptation. Osei (2016), also reported that climate change is already threatening the habits and biological ecosystem in Africa. Moreover, Osei opined that the newly launched sustainable development goals (SDGS) and more importantly, the goal number thirteen (13) which deals on climate change, gives an ample opportunity to Africa governments to make a relevant law facilitating environmental education to protect the environment and as well tackle the problems of climate change.

Climate change education (CCE) is part of environmental education. It has to do with educating people on the impacts, consequences and challenges of climate change. (Onyali, Ezeugbor and Okoye, 2015), climate change is a centrally vital issue not just for people in the field of politics but also the field of education. Climate change is such a problem that brings the attention of the public which includes the stakeholders, teachers, politicians, lawyers among others in the society (Flannery, 2005). The role of teachers in achieving the objective which are of creating awareness to adaption strategies firmly provide an important link in the delivery of climate change education including, its associated problems and solution, (Ekpoh and Ekpoh, 2011). Dal, Ozturk, Alper, Sonmez and Cokelez (2015), opined that teachers strategies of climate change will equip them with more knowledge about the subject matter on climate change. It may be that teachers who impact knowledge in the class-room, hinges to educating students on the consequences and dangers of climate change, adaptation strategies based on the previous knowledge acquired by the teachers. Similarly, adaptation is one of the major strategies for responding to the challenges of climate change in the society today. Stern, (2008), noted that they are ways of harmonizing strategies that can respond to each other. Adaptation is the process of adjustment to actual or expected climate and its effects (National Oceanic Atmospheric Administration, (NOAA, 2016). Onoja (2014), saw adaptation as an adjustment in response to actual or expected climate stimuli or their affects on human in urban and rural areas. It is an action that may be preventive and spontaneous or automatic.

Strategies are particular ways of organizing the different techniques for use in the classroom. Strategies involve a number of students values, procedure, designs, common mistake areas in application and evaluation of students performance to be effective (Idah, 2004). The World Metrological Organization, (2018), outlined six key climate change adaptation strategies. These are summarized thus: flood control management strategies, developing drought tolerant crops, reforestation, forestry management strategies. Flooding usually occurs mostly when there is heavy rainfall in an area and all the water refuse to sink into the soil but flows on the earth's surfaces flood when such flood occurred in the town or cities. Iwena (2018), stated that flooding is the occurrence of excessive waterlogged. He further explained that flood is the accumulation of an abnormal large, volume of water in an area which has refused to percolate or flow away. Flood caused by sustained rainfall or dam breakage among others could damage school buildings and properties that render some teachers, students and pupils in the society baseless if the proper knowledge of adaptation strategy is not inculcated in them. Iwena (2018), opined that flood can damage any type of structures such as bridges, cars, school buildings, sewage system, rail-ways and canals. Flood could be controlled by using leaves, bunds, reservoirs, weir and sand bags State Emergency Management Agency (SEMA, 2018) reported that school buildings and public structures have been either wasted or submerged by the devastating flood, rendered several thousands of public schools useless, at least about 150 schools were displaced by the flood in Ebonyi State; the flood victims took refuge either within under school trees shade to enable teaching and learning take place. Teachers and students were exposed to a pathetic situation and have no means of school activities taking place anymore.

Flooding in the school environment can avoided by refraining from dumping of refuse indiscriminately so that water ways will not be looked but can freely flow out. Classrooms and library should be locked when lessons are not going on, to avoid the destruction of the instructional facilities by rain flood or dust. Teachers should make sure that they cover school library and other facilities used in the school to avoid rain destroying sensitive party of the books and teachers should ensure that these school facilities are properly covered before locking up the library, (Aja, 2015). Reforestation is the process of planting of trees on land that has previously had trees, but where this was cut down recently (National Geographic, 2016). According to Jekayinfa and Yusuf, (2012), it consist planting trees or entire forest on terrain that used to contain them. Jekayinfa and Yusuf, (2012) opined that reforestation is the replacing trees on areas of land where forest have been cleared by felling or burning. Social studies teachers may use this adaptation strategy for teaching the concept of climate change into the lesson and also help to prepare the teachers for disaster ahead. For example the adaptation strategy of climate change and disaster risk reduction into Social Studies lesson will enable the teacher to explain to the students about replanting of trees around the schools and student's home surrounding will assist to reduce global warming. Planting of trees in schools and homes gives the teachers in that environment shade, fruits as well as to help to mitigate warming of the climate, teachers should make sure that trees are planted within the school promises which will bring good lighting and ventilation to the classrooms and also gives the students in the environment shade, fruits and at the same time help to mitigate warming climate change.

The school location is seen in terms of city (Urban) and less city (Rural) (Modupe, 2012) Urban environment can be conceptualized as that which has high variety of beautiful common places with good roads, pipe-borne water, electricity, good hospital and large markets whereas rural environment is characterized with low and isolated place views with or without electricity, good roads, good hospitals (McGill & Aarin in Modupe, 2012). These characteristics may negatively or positively influence the adaptive nature of social studies climate change in schools. For instance, Oghurhu, (2008), observed that distribution of teachers in rural schools is usually low because teachers do not readily accept posting to rural areas due to lack of good roads network, electricity and pipe-borne water. Similarly, Isiugo-Abanihe and Labo-Popoola, (2004), found that the availability of Social Studies books and teaching materials are affected by location of schools. Modupe, (2012) even noted that school location had a significant effect on students' cognitive attainment in schools. The aforementioned views show that location significantly influences gender distribution of teachers among other things. This situation, may also affect the climate change adaptation strategies in Upper Basic Social Studies teachers.

Gender has always been an important and controversial issue in the teaching and learning of climate change adaptation strategies, Novak (2001) opined that gender bias from the society has permeated the school environment, curriculum, instructional strategies and materials to influence the attitudes of teachers in favour of boys. Supporting the above observation, Oleabhie (2011) noted that boys and girls have similar abilities and capacities to learn in the same school, taught by same teachers using the same syllabus and strategies, girls may at the end still perform very low in the classroom activities. Perhaps they tend to shy away from participating alongside with their male counterparts or wrong presentation of adaptation strategies by incompetent teacher.

Observation and experiences of by the researcher have shown that most teachers of upper basic Social Studies are not and specialist of social studies. That they teach students in dilapidated class-rooms in order to adapt in the climatic nature of the environment. This situation may affect the adaptation strategies teaching climate change in schools. It also appears that teachers who live in a fluctuating environment will change their behavior and strategies as response to the environmental conditions they depend on. If the adapting strategies are not integrated into the life of the teachers, the school system must be assumed not be adapted to the conditions confronting it. In a situation in which change appears to be more in long term, extreme event occur more frequently and strategy options will often prove inefficient or have the potential to cause harm. However, the present study seeks to find out the climate change adaptation strategies in Upper basic schools among Social Studies Teachers in Ebonyi State.

Statement of the Problem

Over flooding leads to loss of property and lives of those situated within the affected area. It also appears that teachers who work in fluctuating environment will change their behavior and strategies as response to the environmental conditions they depend on. Ebonyi State is susceptible to flooding, changes in temperature extremes (such as heat waves) and an increase in the frequency and intensity of storms, forestry, late and early cessation of rain, frequent drought and increased water stress due to climate change. There is a high risk of reforestation, forestry, and diseases, as a result of climate change conditions, social unrest and dislocation, epidemics, and poor rate of economic development. These risks are strengthened due to lack of adaptation strategies and high vulnerabilities as necessitated by climate change adaptation strategies, inequitable distribution of resources, cultural practices, violent conflicts, lack of access to credit facilities, poor health facilities and low educational background. Thus, poor adaptation strategies increases vulnerability to these climate risks and exposure to same. Climate change, adaptation strategies, are viable correlates teaching and learning of Social Studies in Upper Basic Schools which teachers and students are expected to have mastery, in order to engage in lifestyle modification to reduce vulnerability. Sadly, lack of climate change among teachers and students which has been largely reported depicts increasing susceptibility to the impacts of climate change. This scenario may be blamed on the low adaptations strategies among teachers of Social Studies in the Upper Basic schools. Most teachers of Upper Basic schools are often challenged by hazards due to lack of adaptation strategies. It is the view of the researcher that considering the rate of dynamism in the climatic conditions of our societies where schools are located; if adequate adaptation strategies are not put in place, effective teaching and learning of Social Studies may not be actualized as this may hinder instructional free flow among the performance of Social Studies Teachers. Hence the need for this study. The problem of this study therefore is what are climate change adaptation strategies in Upper Basic schools among Social Studies Teachers in Ebonyi State?

Purpose of the Study

The main purpose of this study is to examine climate change adaptation strategies in Upper Basic schools among Social Studies Teachers in Ebonyi State. Specifically, the study will determine the;

1. Flood control strategies adapted in Upper Basic schools among Social Studies Teachers in Ebonyi State.
2. Reforestation strategies adapted in Upper Basic schools among Social Studies Teachers in Ebonyi State.

Research Questions

The following research questions would guide the study:

1. What are the flood control strategies adapted in Upper Basic schools among Social Studies teachers in Ebonyi State?
2. What are the reforestation strategies adapted in Upper Basic schools among Social Studies teachers in Ebonyi State?

Hypotheses

Two (2) null hypotheses would be tested at 0.05 levels of significant to guide this study.

1. H₀₁: There is no significant relationship in the response of teachers in urban and rural areas on climate change adaptation strategies in Upper Basic schools among Social Studies teachers.
2. H₀₂: There is no significant relationship in the response of male and female teachers on climate change adaptation strategies in Upper Basic schools among Social Studies teachers.

Methodology

The study adopted descriptive survey research design and used questionnaire structured by the researcher for data collection. A sample of one hundred and eleven (111) Social Studies Teachers was selected from the population of two hundred and seventy seven (277) Social Studies teachers from the one hundred and ninety eight (198) Upper Basic schools in Ebonyi State, (Ebonyi State Universal Basic Education Board, EBSUBEB 2019) using multistage sampling technique. The instrument with 45 structured checklist items titled climate change adaptation strategies in Upper Basic Schools among Social Studies Teachers in Ebonyi State questionnaire (CCASUBSASSTES) was used for collection of data. The instrument was face validated by three experts, two are from Art and Social Science Education and one in Measurement and Evaluation in Ebonyi State University, Abakaliki. who vetted it in terms of the coverage and adequacy of the contents of the questions. The reliability of the instrument was determined by subjecting it to a test of reliability in a trial testing using 20 respondents from Enugu State which is not part of the study area. The data collected was used to determine the reliability coefficient using the Cronbach alpha approach in statistical package for social science (SPSS). The analysis gave the coefficient index of 0.59. Data collected were analyzed using Percentage and Pearson product moment correlation the choice of using percentage and Pearson product moment correlation is to ensure appropriate presentation of data. Any item with 50% and above was seen as a strategy while item with less than 50% was not a strategy adopted as managing climate change in Upper Basic schools in Ebonyi State.

Results

Research Question One

This chapter deals with data presentation and results. The results of the study were presented in tables based on the four research questions and two null hypotheses developed for the study.

Research Question One

What are the flood control strategies adapted in Upper Basic Schools among Social Studies teachers in Ebonyi State?

Items 1 to 15 in the questionnaire were used to elicit responses that answered the question.

Table 4.3: Flood control management strategies

S/N	Items	Frequent	Percentage (%)	Decision
1	Use of flood walls, dikes and leaves	13	12	
2	Use of seawalls	6	5	
3	Use of clams, reservoirs	9	8	
4	Use of channels of alteration	10	9	
5	Use of seepage control	7	6	
6	Use of evacuation/relocation	10	9	
7	Flood emergency measures	3	3	
8	Use of post flood recovery	8	7	
9	Use of land treatment	12	11	
10	Use of shoreline protection measures	3	3	
11	Use of development and redevelopment policies	5	4	
12	Use of proper channelization of the rout of the water bodies	11	10	
13	Use of construction standards and building codes	2	2	
14	Use of levee atmosting	8	7	
15	Use of jacket	4	4	

Table 4.3 shows that the flood control management strategies as indicated by the respondents in their responses, that are use of flood walls, dikes and leaves, 13 (12%), use of seawalls, 6 (5%); use of dams, reservoirs, 9(8%); use of seepage control, 7 (6%), use of evacuation/relocation, 10 (9%); flood emergency measures, 3(3%), use of post-flood recovery, 8 (7%); use of shoreline protection measure, 3 (3%); use of development and redevelopment policies, 5 (4%); use of proper channelization of the rout of the water bodies, 11 (10%); use of construction standard and building codes, 2 (2%), use of levee amoring, 8 (7%) and use of jacket, 4 (4%). Any one that is not up to 50% is not the flood control strategies adapted in Upper Basic Schools among Social Studies teachers in Ebonyi State.

Research Question Two

What are the reforestation strategies adapted in Upper Basic Schools among social studies teachers in Ebonyi State.

Items 16 to 28 in the questionnaire were used to answer that question above.

Table 4.4: Reforestation strategies

S/N	Items	Frequent	Percentage (%)
16	Use of bamboo trees	16	14
17	Use of landscaping	3	3
18	Planting of palm trees around the school environment	18	16
19	Bush burning	-	0
20	Use of deforestation	-	0
21	Provision of water supply needed for plant growth	14	13
22	Good reforestation education to teachers	10	9
23	Village campaigns using radio and village announcers to create more awareness on reforestation	7	6
24	Seminars, workshops and conferences on reforestation	8	7
25	Equipped with the appropriate knowledge of reforestation	12	11
26	Equipping teachers with reforestation tools to be able to handle reforestation at all level	9	8
27	Motivation to put in their best in the reforestation practices	6	6
28	Proper funding of teachers on teaching of reforestation	8	7

Table 4.4 shows that the respondents accepted that the reforestation strategies adopted in Upper Basic schools were: the use of bamboo trees 16 (14%), use of landscaping 3 (3%), planting of palm trees around the school environment 18 (16%), provision of water supply needed for plant growth 14 (13%), good reforestation education to teachers 10 (9%), village campaigns using radio and village announcers to create more awareness on reforestation 7 (6), seminars, workshops and conferences on reforestation, equipped with the appropriate knowledge of reforestation 12 (11), equipping teachers with reforestation tools to be able to

handle reforestation at all level 9 (8%) motivation to put in their best in the reforestation practices 6 (6%) and proper funding of teachers on teaching of reforestation 8 (7%). On the other hand, the respondents rejected that reforestation strategies that could be adopted in the Upper Basic include bush burning and use of deforestation.

Hypotheses Testing

H0₁: There is no significant relationship in the response of teachers in urban and rural areas on climate change adaptation strategies in Upper Basic schools among social studies teachers.

The null hypothesis was tested using pearson product moment of correlation at 0.05 level of significance and presented in table 4.7 below.

Table 4.7: Summary of the pearson product moment of correlation analysis on climate change adaptation strategies in Upper Basic schools among social studies teachers.

Variable	R	Tr	t-crit	Df	Decision
X					
Y	0.79	13.6	1.64	100	Sig.

Sig = significant.

Decision

Since the value of the transformed correlation coefficient (tr), is greater than the critical value 1.64 at 0.05 level of significance, we reject the null hypothesis and conclude that there is significant relationship in the response of teachers in urban and rural areas on climate change adaptation strategies in Upper Basic schools among social studies teachers.

H0₂: There is no significant relationship in the response of male and female teachers on climate change adaptation strategies in Upper Basic schools among social studies teachers. The null hypothesis was tested using pearson product moment of correlation at 0.05 level of significant and in table 4.8.

Table 4.8: Summary of the pearson product moment of correlation analysis on climate change adaptation strategies in Upper Basic schools as perceived by social studies teachers.

Variable	R	Tr	t-crit	Df	Decision
X					
Y	0.85	20.1	1.64	109	Sig

Sig = significant.

Decision

Since the value of the transformed correlation coefficient (tr) is greater than the critical value 1.64 at 0.05 level of significant, we reject the null hypothesis and conclude that there is significant relationship in the response of male and female teachers on climate change adaptation strategies in Upper Basic schools as perceived by social studies teachers.

Summary of Findings

Following the analysis the data collected, the findings of the study were summarized as follows:

1. Flood control strategies adapted in Upper Basic schools among social studies teachers in Ebonyi State were: use of floodwall, dikes and leaves, use of dams and reservoirs, channels of alternatives, evacuation/relocation, flood emergency measures, post flood recovery, land treatment shoreline protection measures, development and redevelopment policies, proper channelization of rout of the water bodies, construction of standard and building codes, levee armoring and jacket.
2. The reforestation strategies adapted in Upper Basic schools among social studies teachers in Ebonyi State were: use of bamboo trees, landscaping, planting of palm trees around the school environment, provision of water supply needed for plant growth, good reforestation education, village campaigns using radio and village announcer t create more awareness on reforestation, seminar, workshop and

conferences, knowledge of reforestation, tools of reforestation, motivation of teachers and proper funding of the teachers on the teaching of reforestation.

DISCUSSION

This study has explored information on the extent of climate change adaptation strategies in Upper Basic Schools among social studies teachers in Ebonyi State. The discussions of the findings were made based on the four research questions and two null hypotheses.

Flood Control Strategies Adapted in Upper Basic Schools among Social Studies Teachers in Ebonyi State.

The first finding of the study indicated that the flood control strategies adapted in Upper Basic schools among social studies teachers in Ebonyi State were floodwalls, dikes and levees, dams and reservoirs, channels of alternatives, evacuation/relocation, flood emergency measures, post flood recovery, land treatment, shoreline protection measures, development and redevelopment policies, proper channelization of route of water bodies, construction of standard and building codes, levee armoring and jacket. The analysis of the responses of the respondents in table 4.30 revealed that the most flood control strategies adapted in Upper Basic school as perceived by social studies teachers were: use of floodwalls, dikes and levees, 13 (12%); land treatment, 12 (11%); proper channelization of the route of the water bodies, 11 (10%); use of channels of alternatives, 10 (9%); use of evacuation/relocation 10 (9%), dams and reservoirs, 9 (8%); post flood recovery, 8 (7%); levee armoring, 8 (7%); seepage, control 7 (6%). However, flood control strategies rarely adapted were: development and redevelopment policies, 5 (4%); jacket 4 (4%), shoreline protection measures 3 (3%), flood emergency measures, 3 (3%), construction of standards and building codes and so on. This finding agrees with Nduanya (2003) with who noted that strategies for controlling flood include proper channelization of the water as done in Ibadan along Ogunpa stream, enactment of laws that would forbid people from erecting structures along river banks, by preventing people from dumping refuse into the streams to enhance easy flow of water and building strong dams with the help of modern equipment.

The Reforestation Strategies Adapted in Upper Basic Schools among Social Studies teachers in Ebonyi State

The second finding of this study is that the reforestation strategies adapted in Upper Basic schools among social studies teachers in Ebonyi State were: use of bamboo trees, landscaping, planting of palm trees around schools environment, provision of water supply needed for plant growth, good reforestation education, village campaigns using radio and village announcers to create more awareness on reforestation, seminar, workshop and conferences to equip people with knowledge of reforestation, tools of reforestation, motivation of teachers and proper funding of teachers on the teaching of reforestation. The data analyzed as presented on table 4.4 revealed that reforestation strategies adapted most were planting of palm trees 18 (16%), bamboo trees, 16 (14%), provision of water supply needed for plant growth 14 (13%), equipping teachers with appropriate knowledge of reforestation, 12 (11%), good reforestation education to teachers, 10 (9%), equipping teachers with reforestation tools to be able to handle reforestation at all level, 9 (8%), seminars, workshops and conferences on reforestation, 8 (7%), proper funding of teachers on teaching of reforestation practices, 8 (7%). Reforestation strategies rarely adapted were: landscaping, 3 (3%), village campaigns using radio and village announcers to create awareness on reforestation 7 (6%). Some reforestation strategies that were not adopted at all in Upper Basic schools were burning of bush and use of deforestation. This finding is in line with Gray (2011) who opined that equipping of people with the knowledge and encouraging to plant trees such as palm trees, bamboo, mahogany, gmelina, opete among other with adequate water supply is a good practice to promotes reforestation or afforestation in our society.

Conclusion

From the foregoing, the conclusion made for the study are:

Flood control strategies adapted in Upper Basic schools among Social Studies teachers in Ebonyi State were use of floodwalls, dikes and levees; use of dams and reservoirs, channels of alternatives, evacuation/relocation, flood emergency measures, post flood recovery, land treatment, shoreline protection measures, development and redevelopment policies, proper channelization of rout of water bodies, construction of standard and building codes, levee armoring and jacket.

The reforestation strategies adapted in Upper Basic schools among Social Studies Teachers in Ebonyi State were use of bamboo trees, landscaping, planting of palm trees around the school environment, provision of water supply needed for plant growth, good reforestation education, village campaigns using radio and village announcer to create more awareness on reforestation, seminar, workshop and conferences, knowledge of reforestation, tools of reforestation, motivation of teachers and proper funding of the teachers on the teaching reforestation.

Recommendations

The following recommendations were made for the study:

1. Climate change adaptation strategies should be incorporated in the school curriculum.
2. The school authorities should organize symposium, workshop, seminars and on the job training to educate both teachers and students on other flood control strategies, reforestation strategies

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