

Education and Community Engagement as Strategies for Climate Change Mitigation in Nigeria

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Abstract

Climate change is one of the topical issues across the globe, given its negative impact on the environment and the socio-economic life of the people. It is referred to as some observable variation in the climate system that is attributed to human activities. Factors such as variation in earth's orbit, variation in ocean circulation, deforestation, air pollution and poor agricultural practices such as bush burning, excess and wrong application of inorganic fertilizer, burning of fossil fuels, urbanization, industrialization among others have been identified as the major causes of climate change. This has rising global temperature, extreme weather events, sea level rise, water scarcity, food insecurity farmers-herders clashes and other life-threatening challenges. Governments all over the world are making concerted efforts to combat this menace but these efforts have not yielded desired results. The paper underscores the relevance of education and community engagement strategies as having the capacity to address the climate change issue. This paper therefore suggests the need for the inclusion of climate change education in the school curriculum, climate literacy programmes and continuous engagement of critical stakeholders in the community to facilitate the effort at combating the impact of climate change globally.

Keywords: Climate change, education, environment, community engagement
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Introduction

Climate change has been identified as one of the environmental issues affecting the global community. The phenomenon which seemed like myth and merely existed in the minds of some scientists has become a widely acknowledged due to its impact on the global socio-economic development. Climate change has affected virtually every human life in contemporary society and has brought daunting challenges to virtually

all facets of human life (Fatile, 2013). It is manifesting globally with rise in sea levels, unpredictable rainfall, drought, desertification and continuous increase in temperature. Experts have projected that the global temperature will increase by 1.4°C by the year 2030, 2.8°C by 2060 and 4.7°C by 2090 (Thakur & Bajagain, 2019). Intergovernmental Panel on Climate Change (IPCC, 2007), define climate change as a statistical variation in either the mean state of the climate or in the variability of the mean state of the climate, occurring for long period. Climate change usually exposes the environment to several challenges thereby, affecting the economy, health and agriculture as well as food and human security (Nyong, et al., 2007; Suleiman and Kasimu, 2022).

Climate Change is caused by two basic factors, which include natural processes (biogeographical) and human activities (anthropogenic). The natural processes on one hand are the astronomical and the extra-terrestrial factors. The astronomical factors include the changes in the eccentricity of the earth's orbit, changes in the obliquity of the plane of ecliptic and changes in orbital procession while the extra-terrestrial factors are solar radiation quantity and quality among others. On the other hand, the anthropogenic factor in climate change involves human activities that either emit large number of green-house gasses into the atmosphere that depletes the ozone layer or activities that reduce the number of carbons absorbed from the atmosphere. The human factors that emit large amounts of green-house gasses include industrialization, burning of fossil fuel, gas flaring, urbanization and agriculture (IPCC, 2007).

Both developed and developing countries have been negatively impacted by climate change due to its threat on both human and the natural eco-system. For the developed countries, the impact of climate change has been perceived to be less severe due to natural advantage, high adaptation techniques, high technology, mechanized agricultural system and wealth status. These factors have enabled the developed economies to curtail the adverse effects of climate change. For developing countries

like Nigeria, the impact of climate change is of great importance given the high temperature level, poor adaptation capacity, and lack of early warning system (Ogbuabor and Egwuchukwu, 2017). Nigeria's agricultural sector, like many other African countries, is under severe threat from the devastating effects of climate change. The country's primary economic activities, crop and animal production are declining, compromising the nation's food security and economic stability. It is quite unfortunate that, as stakeholders struggle to overcome high poverty and enhance economic growth, climate change has continued to increase the number of vulnerable people, thereby undermining the prospects of development in the country (Idowu, et al., 2011).

Its impact on agricultural activities can be viewed from various aspects. Climate change affects the distribution of rainfall and temperature during a year and this determines crop yields especially those crops cultivated under rain-fed conditions (Thurlow et al., 2009). Excessive rainfall leads to destruction of arable land, impairment of cultivated crops, increased growth of weeds and greater post-harvest loss while a significant reduction in rainfall may culminate in drier land, reduction in water level in streams and rivers, increase in farmers' search for water for irrigation and consequently resulting in invaluable man hour losses and reductions in crop yield (Ozor, 2009). Climate change also affects livestock production due to reduction in the available pasture land, reduction in surface water resources for animals, increase in salinity of water resources for animals, increase in salinity at watering points due to increased temperature and evaporation in the face of reduced rainfall. This implies that there would be a decline in the production of livestock, resulting in a reduction in the supply and availability of animal protein including meat, egg, milk and other animal produce such as hides and skins (Ozor, 2009).

In Nigeria, climate change also affects forestry due to erosion and excessive wind thereby resulting in decline in forest produce such as wood and cane. Consequently, it leads to reduction in forestry produce and low income, as well as an increase in the

costs of building and furniture materials. Climate change has significantly contributed to the farmer-herder crisis in Nigeria. The crisis is rooted in the increasing competition for scarce resources, such as land and water, which are becoming even more limited due to climate change (Ojeremi, 2021). The climate change induced conflicts between farmers and herders have resulted to several deaths, displacements, loss of properties such as livestock, settlements, among others. These conflicts have lingered for many years and it has since metamorphosed into full blown banditry where herdsmen are classified as notorious terrorists disturbing many parts of the region (Lebari, et al., 2022).

While there are numerous policy instruments and technical solutions such as the Nationally Determined Contribution (NDCs) and some flagship projects such as the Great Green Wall, and the Nigeria Erosion and Watershed Management Project (NEWMAP) to address climate change, most climate change activities and initiatives have focused at the federal level, with very limited attention paid to the state of climate change policy, plans, and investment at the state level. This is a big gap considering that the impacts of climate change are mostly borne by states and that policies and actions at the subnational level are critical to addressing climate change and attaining Nigeria's net-zero target (Society for Planet and Prosperity, 2023).

Global concerns about the bugging issue have brought about concerted efforts and strategies not only to address the issue but also create awareness among the world populace so that together we can address its effects and prevent it from increasing in magnitude and devastation. It has started to devastate various countries of the world with marked climatic variations: increased rainfall, drought, hurricanes, floods, landslides. Nigeria, with its low literacy level, poor technological development and poverty is one of the most vulnerable countries in Africa (Salmi, 2012). It has started experiencing the effects of climate change with increased rainfall in the South and increased drought in the North.

Education and community engagement have been identified as verifiable strategies that can help mitigate the threat of climate change. While education plays the vital role in engendering awareness and changing the way people view issues, engaging and involving citizens and communities in decisions process and actions that affect them has been shown to have a range of practical benefits leading to improved policy and programme design and implementation (Langworthy and Brunt, 2008; DSE, 2005; Cuthill, 2003; OECD, 2001). These benefits include broadening and deepening local input; securing and sustaining local ownership and support; improving effective communication of key policy issues and directions; heightening the trust, transparency and credibility of decision-making processes and improving social networks and connectedness (McKinney and Harmon, 2007). It is against this background that the paper explores education and community engagement strategies in combating climate change in Nigeria.

Conceptual Clarification

Climate Change

Climate change has been conceptualized in different ways by different scholars and International Organizations. For instance, according to the United Nations Framework Convention on Climate Change (UNFCCC, 1992) cited in (Ali, 2011), climate change is “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.” Pravat, (2019) refers to Climate change as the change of overall weather occurrences and increase in global temperatures. Generally, it is understood as, the long-term change in average weather patterns across the world. In nineteen centuries, humans felt about excessive release of greenhouse gases: carbon dioxide, CFC, HFC, SF₆, water vapour, methane, N₂O, NF₃ and Ozone into the air, causing rise of global temperatures consequently in persistent changes of the climate. Changes in the earth’s climate, due to human activities include increasing air and sea surface temperatures,

changing rainfall patterns, ocean acidification, sea-level rise and changes in frequency and intensity of extreme events like acid rain, floods, droughts and tropical cyclones. The Nigerian Climate Reports 490 described climate change as any long-term change in the statistics of weather over durations ranging from decades to millions of years. It can be manifested in changes to averages extremes, or other statistical measures, and may occur in a specific region or the earth as a whole (Ali, 2011). Climate change refers to a change in climate that is attributable directly or indirectly to human activities, that alters the atmospheric composition of the earth which leads to global warming. Climate change has the potential of affecting all natural and human systems and may be a threat to human development and survival socially, politically and economically.

According to the National Oceanic and Atmospheric Administration (NOAA) of Europe, there are seven indicators that would be expected to increase in a warming world as a result of climate change, they are: tropospheric temperature, humidity, temperature over oceans, sea surface temperatures, sea level, ocean heat content, temperature over land; and three indicators would be expected to decrease, they are: glaciers, snow cover and sea ices (Anzaki, 2019). It also refers to seasonal changes over a long period with respect to growing accumulation of greenhouse gases in the atmosphere. Climate plays vital role in the formation of natural ecosystems and the human economies and civilizations. Recent studies have shown that human activities since the beginning of industrial revolution manifested in fossil fuel consumption for power generation, land deforestation for agriculture and urban expansion-have contributed to have increased in concentration of CO₂ in the atmosphere by as much as 40%, from about 280 parts per million in the pre-industrial period, to 402 parts per million in 2016, which in turn has led to global warming (Pravat, 2019).

Causes of Climate Change

The Intergovernmental Panel on Climate Change (IPCC) and major scientific organizations of industrialized countries have concluded that the increase in global

temperature since the middle of twentieth century has been due mainly to human induced (anthropogenic) greenhouse gases concentration via the greenhouse effect; while the warming effect of natural phenomenon such as solar variation contributed a small warming effect from preindustrial times to 1950, and from then a reverse cooling effect. The United Nations Framework on Climate Change (UNFCCC) uses the term “Climate Change” for human induced change while the term “Climate Variability” is used for changes due to External Forces. Climate change is caused by both natural occurrences, and mainly by human actions on the environment. The natural cause of climate change is as a result of variation in earth’s orbit, variation in ocean circulation and atmospheric composition (Olaniyi, Olutimehin and Funmilayo, 2019).

The human causes are however, results of deforestation, air pollution and poor agricultural practices such as bush burning, excess and wrong application of inorganic fertilizer, burning of fossil fuels, urbanization, industrialization, inefficient transport system, among others (Tribune, 2018). Climate change is a complex phenomenon occasioned by both natural and human induced factors, there is therefore the need for collective action to mitigate its impact on the global and regional socio-economic activities.

Effects of Climate Change

Climate change is a global issue calling for urgent attention to nip it in the bud. Its emergence has led to the sudden change in rainfall patterns, wind patterns, and also increase in temperature which result inevitably to natural disasters like flood, drought, and desertification among other far-reaching effects. Nigeria witnessed series of climate related disaster in 2017 ranging from the increased health risk, declining agricultural productivity, biodiversity loss, drying lakes, famine, conflicts poverty, worsening food insecurity situation, heat stress, declining soil capacity for agricultural production extreme weather events among others (Tribune, 2018). The Agricultural sector is one of the worst hits with the impact of climate change, due to

the irregularities in weather conditions, farmers find it hard to predict the perfect season for planting. Farmers now plant in the midst of great uncertainties, thus resulting in untold losses as their investment waste away from lack of rainfall at the right time. Consequently, this results in decline in productivity and the income of Nigerian farmers, as well as likely fall in the agriculture contribution to the country's GDP and employment (Tribune, 2018).

Another indirect effect of climate change is the issue of farmers-herders conflict which is a serious and prevailing social problem in the country. Due to the problem of rainfall variability, caused by climate change, herdsmen in the core North, now push down south more frequently, in order to feed their cattle on farmers cultivation. This has mutated over time in the destruction of investments and effort. The herdsmen have also been responsible for attacks on outspoken farmers, a situation for which hundreds of lives have been brutally lost in Benue, Taraba, Nasarawa, Ogun and several other states according to statistics corroborated by the National Emergency Management Agency (NEMA) (Tribune, 2018). This conflict has impacted negatively the four main pillars of food security, which are food availability, food accessibility, food utilization and food stabilization (FAO, 2006; Adaja, Olugbeko and Olajide, 2024)

Another area Climate change is raising havoc is in the health sector. According to the World Health Organization (WHO, 2024), climate is impacting human lives and health in a variety of ways, it threatens the essential ingredients of good health, clean water, safe drinking water, nutritious food supply and safe shelter and has the potential to undermine decades of progress made in global health. It estimated that, between 2030 and 2050, climate change is expected to cause approximately 250,000 additional deaths per year from malnutrition, malaria, diarrhea and heat stress alike. The direct damage costs to health are estimated to be between USD 2-4billion per year by 2030. Areas with weak health infrastructural mostly in developing countries will be the least to cope without assistance to prepare and respond.

Climate change has also significantly affected vulnerable groups because of a variety of factors such as low adaptive capacity, limited resources, and poverty. The most vulnerable groups to climate change in Nigeria are predominantly children below the age of 18, women, the elderly, people living with disabilities, and the poor. Due to climate hazards, about 70,000 Nigerian children under age 5 die of diarrhea, 10 million children are out of school and face unstable economic prospects for the future, 14 million children aged 5–14 years are engaged in child labour and 23 million girls and women are child brides, the highest of such incidences in Africa (Federal Republic of Nigeria, 2022). Climate change hazards such as flooding, droughts, heat waves and many others have multidimensional impacts on the lives and well beings of children in Nigeria ranging from dehydration to heat stress as well as malnutrition following crop damage and loss of farmlands.

Also, in Nigerian women are more vulnerable to the effects of climate change than men because they constitute the majority of the country's poor, and their livelihoods are more dependent on natural resources that are threatened by climate change. For example, rainfall can increase women's vulnerability when it cuts roads and increases distances that they have to walk to get water, firewood, or travel to market. Flooding also reduces women's economic activity and increases household labour demand. Heat stress can have an increased impact on women due to socio-cultural confinement, which may limit their ability to seek relief from heat. The impact of heat stress is even greater on pregnant and menopausal women who are already prone to heat flashes (Federal Republic of Nigeria, 2012). The elderly and people living with disabilities have less mobility to cope with heat stress and are vulnerable to dehydration. Hence, death rates are higher in these groups. Another indirect impact of climate change events on the elderly is that high intensity rains and flooding may exacerbate already reduced economic activity, thus exposing them to additional financial distress. For persons with special needs, fragile housing can be destroyed by flooding, especially where dwellings are on vulnerable land. From a geographical perspective, the inhabitants of the Northern parts of the country are exposed to

increased aridity, hydrological drought, and extreme heat. These, in turn, have resulted in declines in the flora and fauna of Northern ecosystems, which the inhabitants depend on for their livelihoods (Ebele, & Emodi, 2016). To the south of the country, sea-level rise and increased precipitation have severely impacted rural communities, resulting in reduced access to fresh water due to salt-water intrusion, increased physical impacts of storm surge on the community, and loss of coastal fishery resources. Thus, both groups require keen attention in the development of Nigeria's adaptation plans.

Nigeria Strategic Adaptation Policy Documents

Nigeria has developed several strategic documents to address climate change adaptation. These documents outline the country's approach to addressing climate related challenges and vulnerabilities and provide a framework for implementation. Below are some of the key adaptation strategies:

- a. **The Climate Change Act 2021:** In late 2021, President Muhammadu Buhari signed the long-awaited Climate Change Bill into law. The Climate Change Act 2021 stipulates among other things, the creation of the National Council on Climate Change, the establishment of the Climate Change Fund and mandates the preparation of 5-yearly National Climate Change Action Plans.
- b. **National Adaptation Plan (NAP):** Nigeria began the process of drafting its NAP in November 2022. The preparation of the document will likely remain ongoing by the end of 2023.
- c. **Updated Nationally Determined Contribution 2021:** Nigeria's updated NDC pledged an unconditional contribution of 20% below business-as-usual by 2030 and a 47% contribution, conditional on international support. This updated version of the intended NDC also highlights Nigeria's commitment to reducing methane emissions by 60% and achieving a net-zero target as early as possible in the second half of the century.

d. **National Adaptation Communication 2021:** Nigeria's Adaptation Communication to the UNFCCC captures the country's adaptation options and strategies as presently being deployed by the Ministries, Departments, and Agencies. It also identifies gaps, adaptation priorities, needs, and financial mechanisms to deploy climate change actions.

e. **National Adaptation Plan Framework 2020:** The NAP framework is a step towards the adoption of the Cancun Adaptation Framework in Nigeria and provides a broad-based framework for Nigeria to effectively address its National Adaptation Plan.

Others include; National Climate Change Policy (NCCP) for 2021 to 2030, First and Second Biennial Update Report 2018, 2022, The Nigeria Climate Change Policy Response and Strategy (NCCP - RS) 2013, First, Second and Third National Communication 2003, 2014, 2020, National Adaptation Strategy and Plan of Action for Climate Change for Nigeria (NASPA CCN) 2011.

In its adaptation documents, Nigeria has identified its adaptation priorities, which include sustainable land use and water resource management that results in food security, appropriate urban development, preservation of its biodiversity and ecosystem services, social protection mechanisms, infrastructure resilience, improved health, and disaster risk reduction for reduced vulnerability across the country.¹⁹ The country is currently implementing the Green Climate Fund Readiness Support Project to advance the NAP process. All the above documents aim to advance adaptation planning in Nigeria (Federal Republic of Nigeria, 2024).

Education and Climate Change

Education has been described as an essential process in human development. It is different from schooling. Schooling is just one aspect of the ways in which education is provided, whereas education deals with the total process of human learning by which knowledge is impacted, faculties are trained and different skills are developed. Education is also defined as the act or process of educating or applying discipline on

the mind or a process of character training. It is a dynamic instrument of change. Education is expected to affect or condition the social behavior of the person being educated (Adesemowo and Sotonade, 2022). Education is a life-long process which is always used to imply a positive state of mind. According to Bamisaye (1989), Education is a cumulative process of development of intellectual abilities, skills and attitudes, all of which form our various outlooks and dispositions to action in life generally.

Education has been described as a vital element to resolve the climate change issues. It helps people to understand the impact of global warming, increase climate awareness among people, encourages change in their attitudes and behavior. It helps them adopt to climate change related trends. Education encourages them in decision making. Education plays a vital role in adaptation and mitigation in climate change of communities, and empowers human being for sustainable life. Climate change education is part of UNESCO's Education for Sustainable Development (ESD) programme. In 2014, UNESCO launched the global action programme. It aims to make climate change education a more central and visible part of the international level in climate change issues (Pravat, 2019). UNESCO enhances climate change education, training and public awareness at in larger scale such as UNFCCC-COPs in collaboration with 13 other UN agencies. In particular UNESCO supports and guides countries to meet commitments under the Paris agreement and UNFCCC Article 6 on education. Education will prepare all of societies to combat the challenges of climate change and make people and growth of economies with the knowledge and competencies as conscious citizens in shaping green environment, low GHGs emission and climate-resilient societies (Pravat, 2019).

Community Engagement and Climate Change

Community engagement is critical for any systemic change, as people remain at the heart of societal transformation. While social mandates and political action from the top down are also required, people's behaviours at the grassroot level give impetus to

transformative movements. Engagement of diverse community groups is important because it allows for equity by giving everyone a voice (McNiel, 2019). Without community, we risk perpetuating isolated lifestyles that hinder collective action and fall short in addressing pressing global issues like climate change. According to Johnston (2018), community engagement is the dynamic relational process that facilitates communication, interaction, involvement and exchange between an organisation and a community for a range of social and organizational outcomes. It ensures a more contextualized understanding of community members' opinions on issues and contexts and facilitate stronger relationship among and between community members.

Community engagement entails that the community is encouraged and allowed to take part in the decision-making, deliberation, discussion, and the implementation of the projects or programme affecting them (Bassler et al., 2008). Isolated action by governments can lead to poorly planned policies that may encounter resistance. Engagement leads to a strong social mandate which then opens the potential for transformative climate policies, thus leading to corporations, organizations, and institutions to make right choices easier as they become more compelled to transform their behaviors for the sake of the community (Corner, 2020).

Community engagement can essentially shift social norms to more sustainable behaviors for supportive policies. Deep-rooted beliefs and politics underlie every decision made by a person, and these must be understood for people to be engaged effectively (Corner, 2020). When dealing with a crisis, social cues provide valuable and trusted information, so pertaining to individuals' emotions and values is crucial for effective engagement (Geiger et al., 2021). Community engagement involves collaboration among all stakeholders in a community towards achievement of a goal that will be beneficial to all. The stakeholders in the community may not just be indigenes and residents of the community but they include all those who are directly or indirectly affected by activities going on in that community. These are the key

actors that must be considered in any community engagement process (Adaja and Olajide, 2022).

Education and Community Engagement as Strategies for Climate Change Mitigation

Fighting the menace of climate change has become imperative as it has become a serious threat to people's capacity to provide for their own livelihoods. The challenge posed by climate change has set back progress in human developments with negative implications for political, social and economic arrangements. There is therefore the need to come up with strategies aimed at nipping the menace in the bud. Education and community engagement strategies can play vital role in mitigating climate change by

1. Developing service-learning programme that engage students in community-based climate change projects in their various communities;
2. Collaborating with various communities on research projects that investigate climate change negative impacts and possible solutions;
3. Establishing programme that train community members to voluntarily become climate change ambassador and promoting education and action in their communities;
4. Develop a strategic programme that bring together people of different age to share knowledge, experience and perspective on climate change;
5. Support community-based action that promote climate change education in their communities;
6. Incorporating climate change education into school curriculum at various levels so as for students to become conscious of it causes and effects;

Conclusion and Suggestions

Climate change has become a global pressing issue that requires immediate and collective efforts of all critical stakeholders and various strategies to mitigate its

impacts. Education and community engagement are very critical and crucial for mitigating climate change as they empower stakeholders and communities to take action against the menace and advocate for climate policies. Countries around the world are leveraging these strategies to mitigate the impacts of climate change. For instance, UNESCO, (2019) reports that, Rwanda government is investing and promoting climate change education in schools, focusing on sustainable agriculture and conservation practices Similarly, some cities in Germany are engaging critical stakeholders in planning and designing nature-based initiatives to mitigate climate change effects in their cities (European Environment Agency, 2020).

Also, the CTS project in Italy is promoting community engagement and participation in climate change adaptation efforts (Italy Ministry of Environment, 2020). The efforts of these countries have demonstrated the effectiveness of education and community engagement in combating climate change, hence, the need for Nigerian government to adopt these strategies. Education and community engagement strategies provide a foundation for mitigating climate change. However, their success is dependent on the efforts of collective institutions, community -based organization and individuals. The paper therefore suggests that:

- 1 There is the need for Nigerian government and curriculum developer to incorporate climate change education into school curricular at various levels so as for students to become conscious of it's causes and effects.
- 2 There is also the need for the government to constantly engage and educate stakeholders on the impact of climate change in the society.
- 3 The government should encourage and promote community-based initiatives on climate change mitigation.
- 4 There is the need for climate change awareness campaigns, involving all critical stakeholders in the society
- 5 Finally, the government should also promote climate literacy programmes to educate the public on climate change and its impacts.

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