
COMMUNITY BASED ENVIRONMENTAL EDUCATION A STRATEGY FOR MITIGATING IMPACTS OF CLIMATE CHANGE ON LIVELIHOOD OF RIVERINE COMMUNITIES IN RIVERS STATE

Okorie Christiana Uzoaru (Ph.D)

Department of Adult and Non-Formal Education
University of Port Harcourt

Ijah, Christiana Ntente (Ph.D)

Department of Adult and Non-Formal Education
Faculty of Education
University of Port Harcourt

ABSTRACT: *This article offers a community participatory education strategy for mitigating impacts of climate change on livelihood activities of Riverine communities' dwellers in Rivers State. Climate change impact is partly anthropogenic (human) factor, it is pertinent for human to participate in activities that will possibly mitigate the impact of the human action on the environment and regain their sources of livelihood. In order for riverine communities to actively participate in climate change mitigation, they need to be properly guided through community-based environmental education which is based on community participatory model which encompasses elements of community based, collaboration, information based, and action oriented*

KEYWORDS: Community Based Environmental Education, Climate Change, Livelihood, Climate Mitigation,

INTRODUCTION

Riverine communities are usually known for their dependents on aquatic lives for means of livelihood, they are mostly fisher folks, hunters and gatherers of other edible aquatic lives such as crabs, water snail, crayfish, prawns, clupeids, prawns, oysters, periwinkles and so on for food and livelihood. Some of the inhabitants of riverine areas also practice tuber crops and vegetable farming. Due to impacts of climate change on the environment in which they source their livelihood, many of these riverine community members no longer have source of food and income. Poverty, hunger and diseases of different kinds are been experienced by most riverine community dwellers in Nigeria.

In Rivers State, the freshwater and saltwater swamps are predominantly dominated by rural communities, whose community members solely depend on the aquatic lives (such as fishes, shrimps, oysters, periwinkles, and so on.); and terrestrial biodiversity (animals, plants, micro-organisms that live on land, forests, wetlands, and so on.) as main sources of livelihood and for sustenance. These different means of livelihood of Riverine community dwellers are adversely

affected by the variation in climate which can be attributed to both man-made and natural occurrence. For example, many riverine community dwellers are sent on temporary exile yearly due to river flooding, the fisherfolks find it difficult to catch fishes in the ocean, the variation in climate also affected the timing of the fishing local time. Fisherfolks find it difficult to calculate their water pattern based on their local technical know-how of when to go for fishing. Women and youths who depend on shrimps, crayfish, oyster, periwinkles gathering for livelihood are suffering on daily basis due to change in the water pattern which have affected their livelihood activities. The farmers have been suffering losses due to river over flowing and submerging their `crops and launching them to hunger and poverty due to climate change impact.

Sumaila and William (2010) observed that climate change has affected fisheries and other aquatic lives that rural riverine community depended on for livelihood. It had altered the potential fish catch due to shifts in species' range and decline in primary prey available due to acidification of the oceans from higher carbondioxide (CO₂) levels, loss of coral reefs as a result of ocean warming, and variations in ocean biogeochemistry, such as oxygen levels. In same vein, Elenwo and Ankakali (2014) observed that the impact of climate change on aquatic resources within the Niger Delta region which Rivers State inclusive include absence of nursery for young fish, migration of fish, local extinctions of fish species, reduced primary production, dominance and harmful algal bloom, and decreased ph and increased ocean acidification.

In recent time, the excessive rainfall led to increase in sea level and thus contributed to flood in many parts of the rivers state, thereby displacing both the aquatic lives, the forest wildlife such as different large snakes crawling seen around the living areas and also displacement of people from their living homes and destructions of their properties by the flood. According to Wokocha and Jamabo (2015), climate change is had major impacts on biodiversity in Rivers state due to imbalance it creates in the ecosystem. Thus, is in line with Blommestein, Boland, Harker, Lestrade, and Towle (1996) observation that saltwater intrusion puts stress on plants and tree species that are very important to life and culture. In many parts of rural communities in Rivers state, trees used for house construction, local medicine, food and traditional crafts are going into extinction due to saltwater intrusion as the seawater slowly seeps into the ground due to flood been experienced yearly. Those of the riverine community members who solely depend on gathering of periwinkle, shrimps, oysters, crayfish, and so on find it difficult to fend for their living due to climate change impact on the means of livelihood because ocean acidity due to climate change causes difficult for marine organisms such as shrimps, oysters, or corals to form their shells (calcification). The fisherfolks are also counting their losses on daily basis due to the changing rainfall patterns which affects habitats of the fishes and as a result affect distribution, productivity, and species composition of fish production. Local farmers are also been affected by impact of climate change. Crops yield drop yearly due to climate change impact on the growth of crops and vegetables due to changes in the moisture of soil, transpiration, excessive rainfall and so on.

From the forgoing, it is pertinent to note that the inhabitants of the riverine communities are contributor to the climate change impact that is gradually denying them of their means of

livelihood and need to be educated on how to mitigate the impacts of climate change for their survival and continuity.

Concept of Climate Change

Climate is the type of weather that is expected in a place or region. The expected weather can be altered due to some climatic enforcers that affect the actual expected weather condition. The state of change in the actual expected weather condition is called climate change. According to Idowu, Ayoola, Opele, & Ikenweiwe (2011) climate change is some observable variations in the climate system that are attributable to human (anthropogenic) activities, especially those that alter the atmospheric composition of the earth and ultimately lead to global warming. Climate change is caused by natural (biogeographical or astronomical and extraterrestrial factors); and mostly human activities (anthropogenic). Okorie and Dokubo (2018:42) observed that:

“climate change is mainly induced by human activities on the environment, though the contributions of natural phenomena cannot be over-emphasized, That Human activities greatly contribute to increase in greenhouse gases (GHGs) emissions into the atmosphere leading to unusual increase in global temperature”.

Naturally over a long period of time, variation in weather pattern is bound to be visibly experienced but this have been pushed closer due to human activities. Human in quest of their developmental activities causes alteration in the natural environment and these contribute to speeding the natural climatic change. Odjugo (2010) observed that the anthropogenic factors to climate change involve human activities which include:

1. emission of large amount of greenhouse gases into the atmosphere through industrialization, burning of fossil fuel, gas flaring, urbanization and agriculture. These activities deplete the ozone layer.
2. human activities that reduce the amount of carbons absorbed from the atmosphere (carbon sinks) such as are deforestation, alterations in land use, water pollution and agricultural practices. These anthropogenic factors (human) according to Intergovernmental Panel on Climate Change, IPCC in Odjugo (2010) been proven to be responsible for the ongoing unequivocal climate change or global warming. Onu and Ikechi (2016) asserted that climate change is one of the major global problems threatening the survival of humans, animals, crops and the entire ecosystems. This is in support of Emeka in Okorie and Dokubo (2018) assertion that climate change is one of the global threats with serious impact on agriculture, natural ecosystem, water supply, health, soil and atmosphere, which are all elements that constitute the support for long term sustainability of most production processes on earth.

Climate change is considered as the key threat to sustainability in Intergovernmental Panel on Climate Change (IPCC, 2007). In the convention it was concluded that the warming of the climate is unequivocal as long-term increases in average global air and ocean temperatures, widespread melting of snow and ice and rising average global sea level have been observed. Consequently, in IPCC (2007: 53), it was stated that:

“anthropogenic warming could lead to some impacts that are abrupt or irreversible, depending upon the rate and magnitude of the climate change”. Drawing from scientific research on climate change, the scenarios for the future include varied and numerous substantial impacts on both human and natural systems throughout the world”.

Again, the international collectivity of scientists comprising the Physical Science Working Group of the UN Intergovernmental Panel on Climate Change (IPCC, 2013) also confirmed that:

“the warming of the global climate system is ‘unequivocal’ with ‘many of the observed changes unprecedented over decades to millennia,’ that it is 95 percent certain that largely through voracious use of fossil fuels, ‘human influence has been the dominant cause of the observed warming since the mid-20th century,’ and that ‘limiting climate change will require substantial and sustained reductions of greenhouse gas emissions”.

Accordingly, Klein (2014) also observed that unchecked climate change poses a self-inflicted existential risk to humanity. Thus climate change is regarded by many as an issue of particular concern because it exacerbates existing environmental and social threats

Climate Change and Riverine Communities in Rivers State

Rivers state is known for its crude oil reserve and the process of exploration and processing of the crude have been the major contributor to climate variability in the state. The most devastating aspect is the oil bunkering business that looms in most riverine communities in Rivers state. The perpetrators of this act carry out different local distillation processes that emit large quantities of carbon into the atmosphere, leading to formation of greenhouse gases (GHGs). Carbon dioxide and other substances are referred to as climate forcers because they force or push the climate towards being warmer or cooler. They do this by affecting the flow of energy coming into and leaving the earth’s climate system. Local distillation process exposes the human to soot inhalation which result to different health problems. The oil companies through oil exploration and gas flaring activities also do lots of damage to the environment, which falls back on the variation of weather pattern and thereby causing different climatic change that affects the livelihood of the riverine dwellers.

Rising temperatures due to carbon emission by oil company and oil bunkers can directly affect the metabolism, life cycle, and behaviour of marine species because temperature serve as a cue for fish reproduction and changes in temperature will affect the breeding process of fishes in the river. Also rising sea level and antecedent flood alter the amount of light reaching offshore plants that depend on photosynthesis for survival. The mangrove ecosystem is rapidly disappearing due to rising sea level, forest resources such as medicinal plants, mushrooms, are going to extinction due to climate change impact, fishes, fish beels that are community fisheries resources often become inundated with the intrusions of seawater with drastic salinity changes and the loss of biodiversity. Other aquatic lives in the waters are finding it difficult to breathe due acidification of sea caused by sea absorption of carbon dioxide release by human through their developmental activities. Shellfish, crabs, lobsters, and corals may find it more difficult to build their calcium carbonate shells and causing low catch by the riverine dwellers that depend on them for food and livelihood.

Dredging is another human activity that contribute to climate change and which equally affect the riverine communities' livelihood, dredging involves cutting away large swathes of seafloor, lifting or sucking it up and dumping it somewhere else usually into deeper water or for usage in reclamation areas, where sea is turned into land. Dredging contribute to loss of biodiversity, affect fishing activities, causes coastal erosion and soil contamination due to leakages of chemicals into the soil. Many aquatic organism that live on the sea floor of the dredged sea which serve as food and means of livelihood to the riverine community dwellers are gradually going into extinction due to dredging activities.

The riverine community dwellers suffering from the impact of climate change on their means of livelihood need to be involved in activities that will reposition and ameliorate their suffering status. Since the major contributor to climate change impact is anthropogenic (human) factor, it is pertinent for them to participate in activities that will possibly mitigate the impact of the human action on the environment and regain their sources of livelihood.

Climate Change Mitigation

Climate change impacts pose risks to human and natural systems, people living around the riverine areas are the people suffering the impact most, and they experience coastal inundation due to sea level rise, disruptions to rainfall patterns, and so on. Since climate change impact cannot be stopped entirely because it is sometimes caused by nature itself, the possible option to ameliorate the frequent occurrence and impact is mitigation. Monreo (2012) observed that mitigation focuses on interventions to reduce greenhouse gas (GHG) concentrations through measures that cut GHG emissions or move carbon out of the atmosphere. Mitigation measures aim to stabilise and reduce the amount of GHGs in the atmosphere, thereby stopping many of the negative impacts of climate change. Climate mitigation according to Verbruggen (2007) involves actions that are geared towards reducing the emissions of greenhouse gases, thereby reducing future climate change by slowing the rate of increase in greenhouse gas concentrations in the atmosphere. Intergovernmental pane for climate change (IPCC, 2007) defined climate change mitigation as change and substitution that reduce resource inputs and emissions per unit of output. Also in IPCC (2007:53), it was observed that 'anthropogenic warming could lead to some impacts that are abrupt or irreversible, depending upon the rate and magnitude of the climate change'. Thus IPCC (2007) considers climate change as the biggest threat to sustainability.

Community members need to be acquainted with measures to combat the continual climate change impact on their livelihood through education process. Education offers untapped opportunity to combat climate change. The human actions that contribute to climate change can be modified through proper education processes. According to Wals (2010:10):

"education and learning, alongside innovation, legislation and policies, 'have always played a role in responding to the loss of nature, environmental degradation, natural resource depletion and, indeed, the current sustainability crisis'. It can therefore be argued that education and learning have a crucial role to play in addressing climate change issues and facilitating societal changes".

Mitigation of climate change impact through education required learning how to change lifestyles, economies and social structures that are based on excessive greenhouse gases production. Riverine community members can regain a conscious way to manage the environmental resources without causing more harm to environment through community-based environmental education for climate change.

Community Based Environmental Education as Strategy for Mitigating Climate Change

Community-based environmental education is education processes that not only inculcate environmental cognitive capacities but transmit social and emotional aspects of environmental learning. Community-based environmental education (CBEE) involves learning activities that relate to environmental problems in a community setting. This type of education programme focuses on raising awareness, disseminating information on climate change and related topics, and also promoting responsible environmental behavioural change toward the environment. Thus Community based-education for climate change mitigation recognised the fact that to effectively mitigate and adapt to climate change, individuals, communities, institutions and societies need to change their behaviour toward the environment but also that the broader community and society need to change too for it to the effective way to actually mitigate climate change.

Clover and Hall (2010), and Gonzalez-Guadiano and MeiraCartea (2010) asserted that raising community awareness about climate change is the main focus of many community-based education programmes through large-scale education campaigns and community-based behaviour change programmes which are based on information transfer and also aimed at individual behaviour change. Although the community members are aware of climate change impacts, they are not capable of translating the awareness to significant action. In order to translate climate change awareness to action for environmental sustainability, community members need education. In view of this Gaillard (2012) asserted that there is an urgent need for alternative educational and learning approaches, beyond transmission of information (i.e. providing more information), to facilitate action (in both private and public spheres) and social change. This is also supported with Kagawa and Selby (2010) view that there is a call for education and learning approaches that embed climate change learning and action within community contexts, and that this call begs the question about what kinds of learning models and practices can help individuals and communities to actively engage in climate change and move towards a more sustainable world.

Community based environmental education according to Aguilar, Price and Krasny (2015) uses learning in and about the environment as a means towards community wellness and healing. It draws from place-based, youth and community development, participatory, and resilience approaches in environmental education. Price, Simmons and Krasny, (2014) defined ‘community environmental education aimed at enhancing community’s wellness through thoughtful environmental action. Community based environmental education fosters collaborative learning and action and takes account of social, cultural, economic, and environmental conditions of a community.’”

Community based environmental education for climate change goes beyond the cognitive capacity of reading writing and arithmetic, include the learner's ability to gain understanding about the environment, use the environmental knowledge gained to solve climate change related problems, while developing a sense of self. More than the meaning of "education based in the community", with activities based on four key qualities such as community based, collaborative, information based, and action oriented, community-based environmental education are expected to achieve these goals as below:

1. Broaden the community's capacity to improve environmental quality.
2. Combine environmental management goals with other community development activities.
3. Lead to actual environmental improvement.
4. Increase involvement of more community interests (both groups and points of view) in community environmental management activities. (Andrews, Stevens, & Wise, 2004).

Clover (1996) describes an environmental adult education as non-formal education that draws on the existing knowledge and experiences of community members as they work together to address common environmental problems to bring about necessary needed changes for sustainable ways of living. Clover (2002) argued transformation concerning interwoven social and environmental issues can be achievable when adults are provided with educational opportunity to come together, and develop collective solutions.

Need for Community Based Environmental Education for mitigating climate change

In order to promote sustainability of the environment in which the community dwellers depends on for livelihood, it is imperative that the community members to be actively involved because most of the factors that result to climate change are anthropogenic factors. This is in support of Andrews, Stevens, & Wise (2004) assertion that managing the environment requires investment (education) in the local community for two powerful reasons which are:

1. local activities affect the quality of the local environment; and
2. community members have a common interest in protecting and improving their community's quality of life.

In view of the above assertion, Andrews, Stevens, & Wise (2004) explained that community-based education means more than "education based in the community." That it is education that is plan created as a result of community involvement and designed to match community interests. However, Community-based environmental education for mitigating climate change impact among riverine community dwellers is expected to achieve community-based education goal as outlined by Andrews, Stevens, & Wise (2004)

Community based environmental education according to Dietz and Paul in National Research Council (2002) is a process of changing the community's idea of acceptable environmental management behavior, as a result of direct involvement of citizens in the management process. Engaging riverine community dwellers on actions to mitigate climate change impact requires

careful consideration of the content and processes of interaction. Thus community based environmental education for climate change mitigation should be based on the following principles:

1. content of the educational programme must have connection to the community environmental needs;
2. the process must be linked to local activity and quality of the environment; and
3. the actions must be relevant to community members' livelihood. Based on the

In view of this, Dietz and Paul in National Research Council (2002) pointed out that community based environmental education have four key elements which are integrated as a linked chain, these elements are:

1. community based
2. collaborative
3. information based
4. action oriented.

Mitigating climate change impact on riverine community dwellers livelihood activities through community based environmental education can be achievable through adoption of Dietz and Paul in National Research Council (2002) elements of community-based education as follows:

Community based: Addressing the locally identified climate change impacts (for instance, flooding, sooth, low fish catch, low shrimps, crayfish, periwinkle gathering, low agricultural productivity, and so on).

Collaboration: Working with community youths, women and men in groups, paying attention to different techniques that support group effectiveness in the community education process.

Information based: Actions to be taken based on information gathered from the different groups on the climate change impacts on their livelihood activities.

Information based: Based on information gathered from the different groups, collective actions (community participation) on how to tackles the identified climate change impacts will be established.

Effective adoption of the above elements of community-based education for mitigating the impacts of climate change on the riverine community dweller's livelihood activities require a community-based model of communication such as development communication. Development communication according to

CONCLUSION

Climate change impact on riverine community dweller means of livelihood is an endemic plague that is gradually contributing to rural poverty in many parts of Nigeria and also threat to continuity and sustainability of the environment and its resources. In view of this community members need to be properly educated on different ways they can participate in mitigating the continual

occurrence of climate change impacts through community based environmental education that encompasses community participation strategy.

References

- Aguilar, O., Price, A., and Krasny, M.E. (2015). Perspectives on community environmental education. in M. Monroe and M.E. Krasny, editors. *Across the spectrum: Resources for environmental educators*. Washington, DC: NAAEE
- Aguilar, O.M. and Krasny, M.E. (2011). Using the community of practice framework to examine an after-school environmental education program for Hispanic youth. *Environmental education research*. 17(2), 217-233.
- An EPA/USDA (1998) Partnership to Support Community-Based Education: Discussion Paper, EPA 910-R-98-008, US Environmental Protection Agency, Region 10, 31
- Blommestein, E., B. Boland, T. Harker, S. Lestrade, and J. Towle. (1996). Sustainable development and small island states of the Caribbean. In: Small Islands: Marine Science and Sustainable Development in Maul, G.A. (ed.)]. *American Geophysical Union*, Washington, DC, USA: 385–419.
- Clover, DE & Hall, BL 2010, 'Environmental Adult and Social Movement learning in an Era of Climate Change', in F Kagawa & D Selby (eds), *Education and Climate Change: Living and Learning in interesting times*. New York, NY: Routledge.
- Clover, DE 1996, 'Developing international and environmental education: the challenge, theory and practice', in L Filho, Z Murphy & K O'Loan (eds), *A Sourcebook for Environmental Education: A practical Review based on the Belgrade Charter*. London: The Parthenon publishing group.
- Clover, DE 2003, 'Environmental Adult Education: Critique and Creativity In a Globalizing World', in DE Clover & LH Hill (eds), *Environmental adult education: ecological learning, theory, and practice for socio environmental change*. San Francisco: Jossey Bass.
- Gonzalez-Guadiano, E & Meira-Cartea, P 2010, 'Climate Change Education and Communication: A Critical Perspective on Obstacles and Resistances', in F Kagawa & D Selby (eds), *Education and Climate Change: Living and learning in interesting times*, New York, NY: Routledge
- Idowu, A. A., Ayoola, S.O., Opele, A.I. and Ikenweiwe, N.B. (2011). Impact of climate change in Nigeria. *Iranica journal of energy and environment* 2 (2): 145-152.
- Intergovernmental Panel on Climate Change (IPCC, 2013). Summary for Policymakers' in Climate Change 2013: The Physical Science Basis. Contribution of Working Group 1 to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge: Cambridge University Press, Accessed online from https://www.ipcc.ch/pdf/assessmentreport/ar5/wg1/WG1AR5_SPM_FINAL.pdf.
- Intergovernmental Panel on Climate Change (IPCC, 2014) 'Summary for Policymakers' in Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the IPCC, Cambridge: Cambridge University Press. Accessed online from https://ipccwg2.gov/AR5/images/uploads/WG2AR5_SPM_FINAL.pdf.

- Kagawa, F & Selby, D (ed.) 2010, *Education and Climate Change: Living and Learning in Interesting Times*. New York, NY: Routledge.
- Klein, N (2014) *This changes everything: Capitalism vs. The Climate*, London: Allen Lane
- National Research Council (2002). *New Tools for Environmental Protection: Education, Information, and Voluntary Measures*. Washington, DC: The National Academies Press.
<https://doi.org/10.17226/10401>
- Odjugo, P.A.O. (2010). General overview of climate change impacts in Nigeria. *Journal of human ecology*, 29(1): 47-55
- Okorie, C.U. and Dokubo, C. (2018). Economic opportunities of climate change to rural communities in Nigeria. *International journal of education, learning and development*. 6 (7),42-53.
- Onu, F.M and Ikechi, M.E. (2016). Mitigation and adaptation strategies to the effects of climate change on the environment and agriculture in Nigeria. *IOSR Journal of agriculture and veterinary science (iosr-javs)*, 9(4), 42319-2380.
- Price, A., Simmons. B., and Krasny, M.E. (2014). Principles of excellence in community environmental education. (unpublished document)
- Wals, A.E.J. (2010). 'Message in a Bottle: Learning our way out of unsustainability', in Inaugural lecture upon taking up the posts of Professor of Social Learning and Sustainable Development, and the UNESCO Chair, Wageningen University.