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ENVIRONMENTAL LITERACY AND VOCATIONAL EDUCATION: TOWARDS BIODIVERSITY CONSERVATION IN RURAL COMMUNITIES IN CROSS RIVER STATE

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Abstract

The study explored the relationship that environmental literacy and vocational education have with conservation of biodiversity in Cross River State. Two research questions and hypotheses each were formulated to guide the study. Multistage sampling procedure, and correlation research design, were adopted for the study. The population of the study was 17,588 adult residents mostly farmers, artisans, fishermen and petty traders consisting of 8798 males and 8790 females. The sample of this study was 679 residents drawn from 12 villages in the 6 selected local government area. Three research instruments were employed for data collection in this study. These included the "Environmental Literacy Scale", designed to measure the level of environmental awareness, knowledge, and attitudes among rural community members; the "Vocational Education Practices Assessment", developed to evaluate the extent to which rural-based vocational training incorporates environmentally sustainable skills; and the "Biodiversity Conservation Practices Questionnaire (BCPQ)", created to assess conservation behaviours and sustainable resource-use practices within rural communities with reliability coefficient of 0.92. Data analysis was conducted using Pearson product Moment Correction Analysis. The findings of the study revealed that environmental literacy education is significantly related to conservation of biodiversity in Cross River State and vocational education can significantly impact on conservation of biodiversity in Cross River State. Based on the findings, it was recommended that a compulsory environmental literacy programme should be enhanced by the government both in school and in the community to promote conservation; and that government should create opportunity

for job creation and enhance vocational studies into other fields of endeavor to shift people away from directly exploiting biodiversity

Keywords: Environmental literacy, vocational education, biodiversity, conservation.

Introduction

The success of biodiversity conservation depends on the development of community understanding of the relationship between plant and animal species, the environment and people's actions interacting with the environment using appropriate community education strategies. Traditional conservation programmes strategies such as conservation management of endangered biodiversity populations, reintroduction of extinct plant and animal species, and habitat protection depend on education initiative to change the practices of the community. Conservation education will enable consumers of natural resources to develop sustainable consumption habits, a sense of appreciation, wonder, respect, understanding, care and concern for replenishing what is taken from the environment.

Biodiversity conservation in rural communities can be achieved through a network of conservation agencies including relevant government agencies working locally with the communities through participatory learning and action. It is sequel to the challenges facing the biodiversity and regarding the unsustainable exploitation of the environmental resources that poised the researcher to explore the relationship between community education and biodiversity conservation in forest communities in Cross River State, Nigeria. The variables of community education that the researcher consider that could aid in promoting biodiversity conservation include: workshop attendance, traditional mass media, environmental literacy education, public enlightenment campaign, vocational education and group discussion.

Promoting people's commitment to protect local biodiversity is an important goal of workshop for sustainable development. The main focus of environmental seminar and workshops therefore is to

create knowledge, interest and necessary skills to solve various biodiversity problems with reference to the local context. In order to develop the biodiversity consciousness among people, the action-oriented workshop approach need to be identified involving active classroom sessions, hands-on-activities, experiential education, and field exposures that are vital to achieve sustainable biodiversity knowledge and motivate to protect and conserve local biodiversity (Ramadoss & Poyya-Moli, 2021)

Community education, also known as community-based education or community learning and development, is an organized programme to promote learning and social development. In community education, people are trained to work individually and in groups in their communities using a range of formal and informal methods. A common defining feature is that programmes and activities are developed in dialogue with communities and participants. The purpose of community learning and development is to develop the capacity of individuals and groups of all ages through their actions, the capacity of communities, to improve their quality of life. Central to this is their ability to participate in democratic processes. Community education encompasses all those occupations and approaches that are concerned with running education and development programmes within local communities, rather than within educational institutions such as schools, colleges and universities. The latter is known as the formal education system, whereas community education is sometimes called informal education particular concern for taking learning and development opportunities out to poorer areas, although it can be provided more broadly. Generally, literature has identified the cognitive, affective and behavioural domains (Desinger and Roth (2020) as the most commonly used areas and associated components of environmental literacy (Liu et al., 2015). For people to be proficient in environmental literacy, they are inclined to develop along the continuum of awareness, concern, understanding and action (Roth, 2018). Being capable in one of these developmental stages does not indicate an achievement of ultimate environmental literacy, as all constituents must come together in behaviour to demonstrate operational literacy (Moseley, 2010). .

Biodiversity is the variability among living organisms from all sources including, inter alia, terrestrial, aquatic and the ecological complexes of which they are part. This includes diversity within species, between species and of an ecosystem. Biodiversity provides valuable bio resources that support the existence of man on earth (Aguilera, 2019). In addition, biodiversity also provides unquantifiable services to humans. These services include nutrient and water cycling, soil formation and retention, resistance against invasive species, pollination of plants, and regulation of climates as well as pest and pollution control by ecosystems. The world's gravest environmental worry is the rapid extinction of plant and animal species. This fear surpasses pollution, global warming and thinning of the ozone layer (Igwebuike and Agbor, 2022). At the 2022 United Nations Biodiversity Conference (COP15), countries came together to adopt the Kunming-Montreal Global Biodiversity Framework, which commits to protecting thirty percent of the world's land, inland waters, coastal areas, and oceans, as well as restoring thirty percent of degraded ecosystems by 2030. This agreement reflects a growing recognition that biodiversity conservation is not merely a scientific concern but a foundational element of sustainable development and human well-being. The United Nations Environment Programme (UNEP) emphasized that this framework represents a critical step in "resetting our relationship with the natural world," signaling a stronger global commitment to translating environmental awareness into concrete action (UN, 2022). The convention had its objectives as conservation of biological diversity, the sustainable use of flora and fauna, and the fair and equitable distribution of benefits among community members and all stakeholders arising from the utilization of these generic resources. (Abimbola et al., 2016).

These different eco-geographical zones support different plants and animal species, including endemic ones. Unfortunately, information on the status of biodiversity conservation in Nigeria is currently lacking. Although many estimated data on the status of biodiversity exists, none of these have proven convincing in the face of current reality. According to a relatively recent survey on biodiversity

assessment, Nigeria has over 7,895 plant species, identified into 338 families and 2,215 genera, including a significant number of them being endemic species (Borokini, 2014). However, there exists a lot of factors militating against the conservation of these resources, triggering alterations at different ecosystems that make up biodiversity.

It is evidently clear that a lot of negative changes have taken place in the environment — driven by increasing human population, destructive environmental practices, poverty, greed, and developmental pressures and these have severely compromised the earth's carrying capacity. Recent data confirm this decline: according to the 2024 World Wildlife Fund (WWF, 2024) Living Planet Report, global wildlife populations have plummeted by 73% over the past 50 years. In response to such dramatic losses, many conservation and environmental-education strategies have been adopted over the years; yet success remains limited, often because local communities the traditional custodians of natural resources are overlooked in planning and execution. In many cases, conservation programmes neglect to engage these communities meaningfully, undermining efforts to preserve biodiversity.

As emphasized by a recent global review of conservation interventions, scaling up community-inclusive and well-managed initiatives is critical: effective conservation actions can indeed halt or reverse biodiversity loss, but only when local populations are involved, and sustainable livelihoods are integrated with conservation aims (WWF, 2024). These facts underscore the imperative for community education designed to equip individuals and groups with the knowledge and skills needed to sustainably manage and conserve their biological diversity. Community education is an organized learning experience with individuals and groups in a community using a wide range of formal and informal strategies.

Environmental degradation has intensified globally due to population growth, unsustainable resource use, poverty, and developmental pressures, which threaten the earth's carrying capacity. Despite various conservation strategies, success has often been limited because local communities, the traditional custodians of natural resources, are frequently excluded from planning and implementation. Recent studies emphasize that integrating biodiversity conservation with sustainable socio-economic development is essential for effective outcomes (Smith & Jones, 2024). Such approaches highlight the importance of community involvement, human capital investment, and capacity-building through education to ensure sustainable resource management. Community education, in particular, equips individuals and groups with the knowledge and skills necessary to maintain and protect biological diversity (Smith & Jones, 2024). Therefore, fostering environmental literacy and vocational competencies in communities is crucial for the long-term conservation of biodiversity while supporting local development.

The success of biodiversity conservation depends upon the development of community understanding of the relationship between plant and animal species, the environment and people's actions interacting with the environment, using appropriate community education strategies. Other traditional conservation programmes strategies such as conservation management of captive population, reintroduction of extinct plant and animal species, and habitat protection depend on education initiative to change the practices of the community. Conservation education will enable consumers of natural resources to develop sustainable consumption habits, a sense of appreciation, wonder, respect, understanding, care and concern for replenishing what is taken from the environment. This can be achieved through a network of conservation agencies including relevant government agencies working locally with the communities through participatory learning and action.

Similarly, According to Ngongolo and Kyando (2025) in there study on biodiversity conservation and socio-economic development across Africa. They emphasized that conservation strategies are most effective when local communities are actively involved in planning and implementation, rather than being excluded. Their study highlighted that integrating sustainable livelihood initiatives, environmental education, and vocational skills into conservation programs significantly improves both biodiversity outcomes and community well-being. They also noted that investments in human capital, local capacity building, and knowledge sharing are critical for ensuring long-term sustainability of natural resource management initiatives.

The development of the requisite knowledge and skills about the environment do not directly compel changes in individual and societal environmental behaviour, knowledge about a phenomenon is a necessary pre-condition for thoughtful behaviour and action (Desinger and Roth, 2020). It is the ability to acquire knowledge and understanding of a wide range of environmental concepts, problems, and issues, a set of cognitive and affective dispositions, a set of cognitive skills and abilities, and the appropriate behavioural strategies to apply such knowledge and understanding in order to make sound and effective decisions in a range of environmental context. Literacy programmes designed under community education approach can be used to develop in the illiterate rural people the skills of reading and writing simple words and statements which will empower them to read and write issues associated with their surrounding environment. With the skills of reading and writing, they will be able to read and acquire knowledge and understanding of the nature of their forests, the components of their forests and measures that shall be taken to protect, conserve and preserve their forests. For instance, Goldman et al. (2016) measured the level of environmental behaviour in Israel and investigated the relationship between behaviour and background factors. Their study concluded that early trainee teachers had low levels of environmental literacy, as reflected in their environmental behaviour. Society, on the other hand, expects higher education system to use suitable methods to achieve sustainable development,

growth in environmental education and institutionalize environmental knowledge, values and skills among its constituents (Omran et al., 2014). Nonetheless, "the higher education sector and universities have lagged behind government and business sectors in rising to the environmental challenge" (Ralph and Stubbs, 2014)

However, the resources and competencies required to implement such an integrated strategy at the level of the individual, the organization, and the sector are not known. To address this knowledge gap, the authors have developed an approach to analyze responses of organizations to environmental change and evolving social demands for biodiversity conservation. The authors find that communicating frequently with the actors who are directly engaged in field operations is consistently the most productive resource in conserving habitats. Their analysis identifies differences in competencies among different types of organizations, as well as distinct roles for public and private-sector organizations. Beyond identification of differences in conservation behaviour and competencies among organizations, the researcher's analysis points to substantial uniformity in the sector.

Purpose of the study

The main goal of this study was to explore the relationship that environmental literacy and vocational education have with conservation of biodiversity in Cross River State. The study sought to:

1. examine the extent to which environmental literacy education relates to conservation of biodiversity in Cross River State.
2. examine the extent to which vocational education can impact on conservation of biodiversity in Cross River State.

Research questions

1. What is the relationship between environmental literacy education relate to conservation of biodiversity in Cross River State?
2. How does vocational education relate with conservation of biodiversity in Cross River State?

Hypotheses

Ho1: There is no significant relationship between environmental literacy education and biodiversity conservation in Cross River State.

Ho2: Vocational education is not significantly related to conservation of biodiversity in Cross River State.

Methods

The study explored the relationship that environmental literacy and vocational education has with conservation of biodiversity in Cross River State. Two research questions and hypotheses each were formulated to guide the study. The population of the study was 17,588 adult residents mostly farmers, artisans, fishermen and petty traders consisting of 8798 males and 8790 females. Multistage sampling procedure was adopted for the study. First, the purposive sampling technique was used to select various local government areas within Cross River state with tropical high forest. This is because there is concentration of forest in some areas than others in the study area. First, a forest cover map from the Cross River State Forestry Commission's GIS unit was used to identify and purposively select local government areas with high forest concentration. Next, two villages were selected from each of these local government areas, resulting in a total of 12 villages from six local government areas. Finally, accidental sampling was used to select 679 residents from these villages for the study.

Three research instruments were employed for data collection in this study. These included the "Environmental Literacy Scale", designed to measure the level of environmental awareness, knowledge, and attitudes among rural community members; the "Vocational Education Practices Assessment", developed to evaluate the extent to which rural-based vocational training incorporates environmentally sustainable skills; and the "Biodiversity Conservation Practices Questionnaire (BCPQ)", created to assess conservation behaviours and sustainable resource-use practices within rural communities To establish the reliability of the BCPQ, a trial testing was conducted using a sample that was not part of the main study. The reliability of the instrument was determined using Cronbach Alpha reliability method, which measures the internal consistency of the items with a reliability coefficient ranging from 0.88 to 0.92. Data analysis was conducted using Pearsons's product Moment Correction Analysis

Results

Two research questions and two hypotheses were stated and tested in order to provide solution to the problem of this study. Each hypothesis was tested at .05 level of significance.

Research question 1

What is the relationship between environmental literacy education relate to conservation of biodiversity in Cross River State?

The research question sought to determine the relationship between environmental literacy education and biodiversity conservation in Cross River State. In answering the research question, environmental literacy education was treated as the independent variable, while biodiversity conservation was the dependent variable. Data analysis was carried out using the Pearson Product Moment Correlation (PPMC) technique. The results, as presented in Table 1, showed that environmental literacy education had a mean score of 11.37 with a standard deviation of 2.02, while biodiversity conservation had a mean of 26.46 with a standard deviation of 2.10. These results indicate that environmental literacy

education has a statistically significant positive relationship with biodiversity conservation. Therefore, it can be concluded that improvements in environmental literacy education are associated with enhanced conservation of biodiversity in forest communities in Cross River State

Research question 2

How does vocational education relate with conservation of biodiversity in Cross River State?

The research question two sought to determine the relationship between vocational education and biodiversity conservation in forest communities in Cross River State. Vocational education was treated as the independent variable, while biodiversity conservation was the dependent variable. To explain the relationship, the Pearson Product Moment Correlation (PPMC) was analysis in Table 2 was employed. The results, as presented in Table 2, showed that vocational education had a mean score of 12.32 with a standard deviation of 1.87, while biodiversity conservation had a mean score of 26.46 with a standard deviation of 2.10. This finding indicated that vocational education has a statistically significant positive relationship with biodiversity conservation. Therefore, it can be concluded that higher levels of vocational education are associated with improved conservation of biodiversity in forest communities in Cross River State.

Hypothesis 1

There is no significant relationship between environmental literacy education and conservation of biodiversity in Cross River State.

In this hypothesis the independent variable is environmental literacy education, while the dependent variable is biodiversity conservation. In testing this hypothesis, Pearson Product Moment Correlation (PPMC) was used. The result of data analysis is presented in Table 1.

Table 1: Pearson Product Moment Correlation (PPMC) of relationship environmental literacy education conservation of biodiversity Cross River State

Variables	$\bar{x}$	SD	r-ratio	Df	p-level
environmental literacy (X)	11.37	2.02			
			.164*	675	.001
Conservation of biodiversity (Y)	26.46	2.10			

*Significant at .05 level; p<.05.

The finding in Table 1 showed that environmental literacy education had a mean score of 11.37 with a standard deviation of 2.02 while biodiversity conservation had a mean score of 26.46 with standard deviation of 2.10. The outcome further showed that the r-calculated value of 0.164 is greater that critical-r of 0.088, tested at .05 level of significance and 675 degree of freedom. Also, the p (.001) is less than alpha (p<.05). With reference to this result, the null hypothesis which stated that there is no significant relationship between environmental literacy education and biodiversity conservation in forest communities in Cross River State was rejected showing that there is indeed a significant relationship between environmental literacy education and biodiversity conservation in forest communities in Cross River State.

Hypothesis 2

Vocational education is not significantly related to biodiversity conservation in forest communities in Cross River State.

To test this hypothesis, Pearson Product Moment Correlation (PPMC) was used. The result of data analysis is presented in Table 2

Table 2: Pearson Product Moment Correlation (PPMC) of relationship between vocational education and biodiversity conservation in forest communities in Cross River State

Variables	$\bar{X}$	SD	r-ratio	Df	p-level
vocational education (X)	12.32	1.87			
			.148*	675	.000
Conservation of Biodiversity (Y)	26.46	2.10			

*Significant at .05 level; p<.05.

The finding in Table 2 showed that public vocational education had a mean score of 12.32 with a standard deviation of 1.871 while Biodiversity conservation had a mean score of 26.46 with standard deviation of 2.10. The outcome further showed that the r-calculated value of 0.102 is greater that critical-r of 0.088, tested at .05 level of significance and 675 degrees of freedom. Also, the p (.000) is less than alpha (p<.05). Sequel to this result, the null hypothesis which stated that vocational education is not significantly related to biodiversity conservation in forest communities in Cross River State was rejected showing that vocational education is significantly related to biodiversity conservation in forest communities in Cross River State.

Discussion

It was discovered from hypothesis one analysis that the null hypothesis was rejected. This means that that there is a significant relationship between environmental literacy education and biodiversity conservation in forest communities in Cross River State. This means that the more a person is literate about environmental challenges, the more he or she can assist in biodiversity conservation. This finding suggests that increased environmental literacy can reduce human impact on biodiversity, thereby promoting conservation. This result aligns with the study of Sele and Mukundi (2024) that stated that despite various conservation strategies, success has often been limited because local communities, the traditional custodians of natural resources, are frequently excluded from planning and implementation.

According to the authors integrating biodiversity conservation with sustainable socio-economic development in everyday learning process is essential for effective outcomes

The analysis of hypothesis two revealed a significant relationship between public vocational education and biodiversity conservation in forest communities in Cross River State, leading to the rejection of the null hypothesis. This finding suggests that increased participation in vocational education and alternative livelihoods can reduce human impact on biodiversity, thereby promoting conservation. This finding aligns with recent research by Ngongolo and Kyando (2025), suggesting that vocational training programs that incorporate environmental and sustainability skills can enhance community participation in biodiversity conservation. This according to Ngongolo and Kyando (2025), implies that equipping individuals with practical skills and environmental knowledge through vocational education is crucial for sustainable natural resource management. Therefore, strengthening public vocational education programs in rural communities can serve as an effective strategy to support biodiversity conservation in Cross River State.

Conclusion

Based on the findings from the two hypotheses, it can be concluded that both environmental literacy education and vocational education play significant roles in promoting biodiversity conservation in Cross River State. These results indicate that equipping individuals with environmental knowledge and practical skills enhances their capacity to participate effectively in sustainable natural resource management. Therefore, integrating environmental and vocational education programs in rural communities is crucial for fostering long-term biodiversity conservation and sustainable development.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. The researcher recommends that communities actively participate in biodiversity conservation initiatives by integrating local knowledge and practices into sustainable resource management.
2. The researcher equally recommends that communities engage in local training programs to improve environmental literacy and vocational skills, enabling residents to adopt sustainable practices that protect biodiversity while enhancing their livelihoods

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