Perception of Secondary School Biology Teachers towards Environmental Sustainability Practices in Minna, Niger State, Nigeria

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Abstract

This study investigated the perceptions of secondary school biology teachers towards environmental sustainability practices in Minna, Niger State, Nigeria. This study adopted a descriptive survey research design using quantitative methods to collect and analyse. The population of the study comprised secondary school teachers in Minna, metropolis, Minna, Niger State. from both urban and rural secondary schools within Bosso and Chanchaga Local Government Areas (LGAs) which is about 1,740 biology teachers in these LGAs, distributed across urban/rural secondary schools. Stratified random sampling technique was used to select 169 biology teachers for this study. The study employed a structured questionnaire titled "Questionnaire on biology teachers' perception, attitude and readiness towards environmental sustainability practices (QOBITPARTESP)" to gather information. In determining the reliability of the instrument, the QOBITPARTESP was pilot tested involving 30 biology teachers from schools that are not part of the main study. The scores obtained were analyzed using the Cronbach Alpha statistics and a reliability coefficient of 0.89 was obtained. Descriptive statistics was used to analyse data using mean and standard deviation to answer the research questions. The results indicated that secondary school biology teachers in Niger State Nigeria showed positive favourable perception towards environmental sustainability practices even though there is lack of integration and implementation capabilities like infrastructural developments. Therefore, it was recommended that there should be termly capacity building workshops and seminars with hands-on activities included for effective environmental sustainability practices among secondary school teachers in Niger State, Nigeria.

Keywords: Environmental sustainability practices, secondary school biology teachers, perception, attitude and readiness.

Introduction

The environment encompasses all living and non-living elements are constantly with one to another. The ecosystem is a community of living organisms (plants, animals and microorganism) subsisting in the physical space with air, water and the soil. The environment plays a critical role in sustaining all manner of activities such as agriculture, oil and gas production, mining, fisheries and forestry. Furthermore, rapid population growth, urbanization, industrial expansion, and unsustainable resource use have intensified pressure on environmental systems, resulting in widespread ecological degradation and declining environmental quality (Eyisi *et al.*, 2025; Nwankwo & Okoli, 2023).

Environmental sustainability refers to those responsible management practices and use of natural resources in a way that meets present needs without compromising the ability of the future generations to meet theirs. Environmental sustainability involves conserving biodiversity, minimizing pollution, and ensuring that ecosystems continue to provide essential services such as clean air, water, fertile soils, and climate regulation. It is inherently linked with economic and social dimensions through which sustainable societies must balance ecological protection with

human development needs (Tennakoon *et al.*, 2024). Environmental sustainability practices within Nigerian organizations are gaining traction, especially in corporate reporting and operational strategies. Examples include tracking emissions, resource use efficiency, and biodiversity impacts among non-financial firms listed in Nigeria, with a focus on enhancing transparency and accountability (Journal of Global Accounting, 2025). Within manufacturing sectors, sustainable material management and waste reduction strategies have shown positive links with innovation and operational performance (Ogunmola *et al.*, 2025).

Secondary school biology teachers play a strategic role in shaping learners' acceptable attitudes, and behaviours patterns toward environmental sustainability. Biology as a subject, deals directly with living systems, ecosystems, biodiversity, and human-environment interactions, making biology educators key agents in promoting education for sustainability (Olalekan *et al.*, 2025). These teachers influence not just knowledge transmission but also students' competencies in addressing complex environmental challenges. Secondary school biology teachers are expected to integrate sustainability practices in climate change, biodiversity conservation, and ecosystem health into their classroom instructional practices. This integration will help students understand environmental practices and develop skills required for environmental management.

In Nigeria, research indicates that biology teachers are moderately engaged in incorporating sustainable development concepts into biology lessons, often using varied pedagogical approaches such as collaborative projects and contextualized discussions (Olalekan *et al.*, 2025). However, external and institutional challenges such as lack of resources, limited time, and resistance to curricular innovation hinder full integration of sustainability education.

Teachers' perceptions are critically important in education because they shape how curricula are interpreted, delivered, and valued in the classroom. For environmental sustainability, biology teachers are particularly pivotal, given that biology education naturally intersects with ecosystems, biodiversity, human impacts, and sustainability concepts (Olalekan *et al.*, 2025). Their perceptions influence not only what gets taught but how sustainability is understood, contextualized, and practiced by students. Research conducted in parts of Nigeria suggests that many biology teachers acknowledge the importance of environmental education within their subject domain and recognize its role in fostering student awareness about sustainability. Furthermore, resources have shown that Nigerian biology teachers have demonstrated a relatively high level of awareness of environmental education content and its relevance to nature protection and sustainability (Kola-Olusanya, 2025).

Despite this positive orientation, other findings also point to gaps in depth and application. One study in Lagos State revealed that biology educators reported only moderate engagement with sustainable development concepts in their teaching practices, highlighting constraints such as inadequate time, limited instructional materials, and insufficient targeted training (Olalekan *et al.*, 2025). These factors suggest that positive perceptions do not always translate into full classroom integration of sustainability education. Perceptions vary by cultural and educational background because systematic research shows that teachers' perceptions of environmental citizenship and sustainability vary significantly based on their personal identities and cultural contexts, shaping both how they conceptualize sustainability and how they approach teaching it. This indicates that perception is multidimensional, encompassing knowledge, values, civic responsibility and self-efficacy.

Studies reveal that biology teachers demonstrate moderate engagement when integrating sustainable development concepts into their lessons, while many recognize the importance of

sustainability education and show motivation to incorporate relevant themes, the level of readiness varies with respect to curriculum integration, pedagogical innovation, and resource use (Olalekan *et al.*, 2025). Biology teachers in Nigeria often express enthusiasm and acknowledge the relevance of sustainability in education, yet practical readiness such as access to teaching materials, time allocation, and institutional support is often limited and hinders full integration.

Environmental sustainability practices encompass strategies that conserve natural resources, protect ecosystems, and promote long-term ecological balance. In education, especially biology teaching, such practices include integrating environmental issues into curricula, fostering pro-environmental behaviours, and guiding students in sustainability actions (Kola-Olusanya, 2025). In Nigeria, rural and urban areas present contrasting environmental challenges and opportunities that shape how sustainability is understood and enacted by communities and educators.

Sustainability practices influences both community engagement and educational approaches to sustainability. Urban areas typically have more formal structures for sustainability initiatives but also face higher environmental degradation challenges, while rural areas may lack formal programs but benefit from close interactions with natural environments, making localized sustainability practices such as land management, water conservation salient (Scientific Reports, 2025). One major driver of variability is unequal access to resources and infrastructure. Research on educational disparities in Nigeria shows that urban schools are better equipped with facilities, educational materials, and professional development opportunities and as well are more likely to have access to capacity-building workshops, environmental education networks, and collaborative platforms that reinforce their capacity to teach sustainability content.

In contrast, rural schools often suffer from lack of instructional materials, overcrowded classrooms, and limited supports while their teachers may have fewer opportunities for systematic training and support, which limits their preparedness to implement environmental sustainability teaching practices as required (Ajayi *et al.*, 2022). Biology teachers in rural schools often draw on local ecosystems, agricultural practices, and community environmental concerns to make sustainability lessons relevant. For example, rural teachers might leverage local knowledge about land and water management to contextualize sustainability concepts, whereas urban teachers may emphasize issues such as pollution control and urban waste management. These disparities affect teachers' ability to implement sustainability practices and engage students in active environmental learning.

Statement of the Research Problem

Nigeria faces severe pollution challenges, especially in highly industrialized and densely populated areas. Air pollution in cities such as Lagos, Kano, and Port Harcourt results from vehicular emissions, industrial discharges, and the burning of fossil fuels and waste. The Niger Delta region experiences chronic oil spills, gas flaring, and contamination of water bodies and farmlands, which have destroyed biodiversity and endangered human health (Aroh *et al.*, 2020; Ibaba and Okolo, 2021). Solid waste mismanagement, including plastic pollution, further undermines environmental health due to limited recycling infrastructure and weak regulatory enforcement (Ojedokun and Balogun, 2022).

Nigeria has one of the highest deforestation rates in Africa, driven by agricultural expansion, fuelwood harvesting, logging, and urbanization. Loss of vegetation cover accelerates soil erosion, biodiversity loss, and carbon emissions (Adekunle and Olorunfemi, 2023). In northern Nigeria, desertification largely caused by overgrazing, deforestation, and climate change reduces agricultural productivity and increases the vulnerability of rural communities (Olagunju, 2019).

Gully erosion, particularly in southeastern states, remains a major ecological disaster, destroying land resources, infrastructure, and human settlements (Anikwe *et al.*, 2022).

Water pollution from industrial waste, agricultural runoff, untreated sewage, and oil contamination affects rivers, groundwater, and coastal ecosystems. Limited access to clean water persists in many rural and peri-urban communities due to pollution and inadequate water infrastructure (Ekanem and Ite, 2021). Nigeria's forests, wetlands, and coastal ecosystems are under threat from habitat conversion, illegal logging, overfishing, and pollution. Endangered species including primates, elephants, and marine species face increasing risks as natural habitats shrink and environmental laws are poorly enforced (Ogbonna and Udoh, 2024).

Despite the challenges, Nigeria has initiated numerous environmental sustainability efforts through government policies, community actions, and private-sector interventions. Nigeria has developed policies such as the National Environmental Policy, National Policy on Climate Change, and the Environmental Impact Assessment (EIA) Act to improve environmental protection. The establishment of the National Environmental Standards and Regulations Enforcement Agency (NESREA) aims to strengthen compliance and environmental monitoring. However, weak enforcement, inadequate funding, and overlapping institutional responsibilities limit their effectiveness (Eyisi *et al.*, 2025; Olamide, 2023).

Non-governmental organizations and community groups increasingly participate in tree planting, clean-up campaigns, conservation awareness, and plastic recycling initiatives. Youth-led environmental activism has also expanded, promoting climate education and sustainable practices (Adewuyi, 2024). Recent efforts to reduce gas flaring, promote renewable energy adoption, expand recycling, banning of single plastic use and encourage sustainable agriculture show gradual progress toward a circular economy in Nigeria. Innovations such as waste-to-wealth projects and eco-friendly farming practices are also gaining popularity (Aina and Oladipo, 2023). Therefore, this study seeks to determine the perception, of secondary school biology teachers towards environmental sustainability practices in Minna, Niger State.

Objectives of the Study

The specific objectives of this study are to:

i. assess the perception of secondary school biology teachers towards environmental sustainability practices in Minna, Niger State and
ii. compare the perception between rural and urban secondary school biology teachers towards environmental sustainability practices in Minna, Niger State;

Research Questions

The following research questions were raised to guide the study.

i. What is the perception of secondary schools' biology teachers towards environmental sustainability practices in Minna, Niger State?
ii. What is the difference between the perception of rural and urban secondary school biology teachers towards environmental sustainability practices in Minna, Niger State?

Research Hypothesis

The null hypothesis raised formulated and tested at 0.05 alpha of significance level:

> H_{O1}: There is no significant difference between the perceptions rural and urban secondary school biology teachers towards environmental sustainability practices in Minna, Niger State.

Methodology

This study adopted a descriptive survey research design to assess the perception of secondary school biology teachers towards environmental sustainability practices in Minna, Niger State. The study employed quantitative data which collect was and analysed using means (X) and Mann Whittney. The population of the study comprised of all biology teachers in the U-test secondary school in Minna, Niger State. It included teachers from both urban and rural secondary schools within the Chanchaga (326 male and 622 female teachers, total 948 teachers) and Bosso (408 male and 384 female teachers, total 792 teachers) totaling 1,740 teachers across the Local Government Areas (LGAs). According to the Niger State Ministry of Basic and Secondary Education (2024), there are approximately 302 biology teachers in these LGAs, distributed across public/private and urban/rural secondary schools.

The study employed a structured questionnaire titled "Questionnaire on biology teachers' perception, attitude and readiness towards environmental sustainability practices (QOBITPARTESP)" to gather data. The QOBITPARTESP was subjected to face and content validation by four senior lecturers in Federal University of Technology, Minna. In determining the reliability of the instrument, the QOBITPARTESP was pilot tested involving 30 biology teachers from schools that are not part of the main study. The scores obtained were analysed using the Cronbach Alpha statistics and a reliability coefficient of 0.89 was obtained and was considered to be high enough for the instrument to be reliable and suitable for the study. The collected data was analysed using both descriptive and inferential statistics. Descriptive statistics, including mean and standard deviation was used to answer the research questions. A non-parametric statistical tool of Mann-Whitney U-test was employed to test the hypotheses at 0.05 level of significance, comparing the perception, attitude and readiness level of biology teachers in urban and rural areas. The Statistical Package for Social Sciences (SPSS) version 27 was used for all data analyses.

Results and Discussion

Research Question One: What is the perception of secondary school biology teachers towards environmental sustainability practices in Minna, Niger State? To answer this research question, mean and standard were used.

Table 1: Mean and Standard Deviation score for the perception of secondary school biology teachers

S/N	Items	N	Mean	SD	Decision
1.	Environmental sustainability involves responsible use of natural resources	169	4.50	0.44	High percentage
2.	Maintaining biodiversity is essential for a healthy environment	169	4.15	0.32	High percentage
3.	Natural ecosystem plays a significant role in regulating climate	169	4.79	0.41	High percentage

4.	Pollution has a significant negative impact on ecological life	169	4.25	0.52	High percentage
5.	Human activities like mining, chemical farming, bush burning are the main causes of environmental degradation	169	4.66	0.56	High percentage
6.	Deforestation seriously threatens ecological balance and causes soil erosion	169	4.27	0.71	High percentage
7.	Afforestation helps in recovering environmental status and prevents erosion	169	4.59	0.46	High percentage
8.	Waste management and recycling contribute positively to ecosystem preservation.	169	4.43	0.47	High percentage
9.	Waste exposition causes environmental degradation	169	4.20	0.58	High percentage
10.	Energy efficiency and conservation contribute positively to environmental sustainability	169	4.35	0.59	High percentage
	Grand Mean & SD	**169**	**4.42**	**0.51**	**Favourable perception**

The result presented in table 3 above shows that secondary school biology teachers accepted all the 10 items with a grand mean (X) score of 4.42 and SD of 0.51 which indicated that the secondary school biology teachers possess high positive perception towards environmental sustainability practices in Minna, Niger State.

Research Question Two: What is the perception between rural and urban secondary school biology teachers towards environmental sustainability practices in Minna, Niger State?

This research question was answered using mean rank and sum of ranks as presented in table 4.

Table 2: Mean Rank Score for the perception between rural and urban secondary school biology teachers

Gender	N	Mean Rank	Sum of Ranks	Mean Rank difference
Urban	105	91.08	7252.50	
Rural	64	57.24	2622.50	33.84
Total	**169**			

The result presented in the table 4 above shows that mean rank of urban teachers is 91.08 and the mean rank of rural teachers is 57.24 which that of urban teachers is higher with mean rank difference of 33.84 which implied that there is mean rank difference between urban and rural secondary school biology teachers towards environmental sustainability practices in Minna, Niger State.

Hypothesis One (H_{O1}): There is no significant difference in the perception between rural and urban secondary school biology teachers towards environmental sustainability practices in Minna, Niger State.

This null hypothesis was tested using Mann-Whitney U-test as presented in table 4

Summary of Mann-Whitney U-test for the perception between rural and urban secondary school biology teachers

Variable	N	Mean Rank	Sum of Ranks	U-value	p-value	Remark
Urban	105	91.08	7252.50			
Rural	64	57.24	2622.50	1431.00	0.37	Not significant
Total	**169**					

Table 4.9 above present the result of Mann-Whitney U-test between the perception between rural and urban secondary school biology teachers towards environmental sustainability practices in Minna, Niger State. The result shows that urban teachers had a mean rank of 91.08 with the sum of rank of 7252.59, while the rural teachers had a mean rank of 57.24 with the sum of rank of 2622.50, also the analysis shows that U=1431.00 and p (0.37) > 0.05 level of significance. Therefore, the null hypothesis which states that 'there is no significant difference in the perception between rural and urban secondary school biology teachers towards environmental sustainability practices in Minna, Niger State' is hereby retained/accepted. This implies that school location of the teachers has no significant effects on their perception towards environmental sustainability.

Discussion of Findings

The study assessed secondary school biology teachers' perception towards environmental sustainability practices in Minna, Niger State, Nigeria. The findings revealed that biology teachers generally possess positive favourable perception of environmental sustainability practices. This suggests that teachers of environmental issues and understand the importance of sustainable environmental practices in school and society. This finding aligns with earlier studies of Ahmad *et al*., (2021); Yiannis *et al*., (2021); and Georgiou *et al*., (2021) which reported that teachers often demonstrate high levels of awareness and understanding of environmental issues and sustainability concepts. For instance, research on Nigerian secondary school teachers indicated that many teachers have adequate of environmental sustainability and can explain environmental issues affecting society. The high perception level among biology teachers could be attributed to the nature of biology as a subject, which emphasizes ecological relationships, conservation of biodiversity, pollution control and sustainable use of natural resources. Consequently, biology teachers are more exposed to environmental topics during their professional training and classroom teaching. Similarly, previous studies have reported that science teachers generally show strong environmental knowledge and awareness because environmental concepts are embedded in science curricula.

Another finding of this study showed that urban teachers recorded higher mean rank on perception compared to their counterparts, although the difference was not statistically significant. This result suggests that although urban teachers appear slightly more exposed to environmental sustainability information and practices, the gap between urban and rural teachers. The higher mean rank score among urban teachers may be attributed to greater access to professional development programmes, environmental campaigns, technological resources and information sources that are commonly available in urban areas. However, the absence of a statistically significant difference indicates that environmental perception among teachers may not be strongly influenced by school location. Similar findings of Shien-Ping (2018); Elvan and Oğuz (2018); and Uzun *et al*., (2019) were reported in studies where location differences existed in mean scores but did not reach statistical significance.

Conclusion

Based on the findings of this study, it can be concluded that secondary school biology teachers in Minna, Niger State possess higher/greater perception towards environmental sustainability practices. This indicates that biology teachers are well positioned to promote environmental awareness and sustainability education among students. The study also concludes that although urban teachers recorded slightly higher mean scores in perception compared to rural teachers, the differences was not statistically significant. This implies that environmental sustainability orientation among biology teachers is relatively consistent across school locations. Therefore, the success of environmental sustainability practices in secondary schools may depend more on institutional support, professional development opportunities and availability of teaching resources than on teachers' personal perceptions or attitudes.

Recommendations

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

1. Government and educational authorities should organise regular workshops, seminars and training programmes on environmental sustainability to further strengthen teachers' knowledge and instructional skills. Schools should encourage biology teachers to integrate environmental sustainability practices into classroom teaching and extracurricular activities.

2. Special attention should be given to rural schools in the provision of environmental education resources and training opportunities to ensure equitable access.

References

Adekunle, T. O., & Olorunfemi, O. D. (2023). Deforestation and environmental degradation in Nigeria: Implications for sustainable development. *Journal of Environmental Studies, 15(2), 44–58.*

Adewuyi, O. J. (2024). Youth participation in environmental sustainability initiatives in Nigeria. *African Journal of Sustainable Development, 9(1), 22–35.*

Aina, F. K., & Oladipo, J. O. (2023). Circular economy practices and environmental sustainability in developing countries: *Evidence from Nigeria. Journal of Cleaner Environments, 18(3), 55–70.*

Ajayi, A., Magaji, M., & Ahmad, A. (2022). Analysis of rural and urban universal basic educational divide in FCT Abuja, Nigeria. *International Journal of Research and Scientific Innovation, 34 (2) 155-171*

Anikwe, M. A. N., Eze, E. B., & Ude, N. (2022). Gully erosion in southeastern Nigeria: Causes, impacts, and management strategies. *Environmental Erosion Research Review, 12(1), 1–14.*

Aroh, K. N., Ubong, U. U., Eze, C. L., & Awara, C. I. (2020). Oil spill incidents and environmental degradation in the Niger Delta. *Journal of Environmental Protection, 11(4), 256–270.*

Ekanem, A. M., & Ite, U. E. (2021). Water pollution and human health risks in Nigeria: *A review. Environmental Health Insights, 15, 1–12.*

Eyisi, E. C., Agha, E. O., & Uzor, D. C. (2025). Environmental Management and Sustainable Development in Nigeria: Challenges, Policies and Prospects. *African Journal of Social and Behavioural Sciences. No. 3(745), p. 11.*

Ibaba, I. S., & Okolo, J. (2021). Oil pollution, health hazards, and socio-economic consequences in the Niger Delta. *Journal of African Environmental Studies, 6(2), 76–89.*

Kola-Olusanya, A. (2025). Environmental education for nurturing nature: Assessment of biology teachers' awareness in Osun State, Nigeria. *Social Sciences & Humanities Open. Pp 153-166.*

Nwankwo, B. C., & Okoli, R. O. (2023). Environmental challenges in Nigeria and policy implications for sustainable development. *Nigerian Journal of Environmental Research, 4(1), 14–29.*

Ogbonna, F. U., & Udoh, P. O. (2024). Biodiversity loss and conservation challenges in Nigeria. *Journal of Wildlife and Forestry, 20(1), 60–73.*

Ojedokun, O., & Balogun, A. (2022). Municipal solid waste management in Nigeria: Problems and prospects. *Waste and Society, 7(2), 30–47.*

Olagunju, T. (2019). Drought, desertification and the Nigerian environment: *A review. Journal of Ecology and Natural Environment, 11(2), 45–57.*

Olalekan, A. B., Ayooola, E. A., & Ogundeji, R. O. (2025). Assessment of challenges and practices in integrating sustainable development into biology education in Lagos State, Nigeria. *International Journal of Research and Scientific Innovation, 12(1), 767–774.*

Olamide, F. (2023). Assessment of Nigeria's environmental policies and the implementation gap. *Journal of Public Policy and Administration, 13(2), 112–127.*

Tennakoon, W. D. N. S. M., & Janadari, M. P. N. (2021). "Doing good or being good": The choice between corporate social responsibility and social sustainability by SMEs: A review and research agenda. In Proceedings of the 21st Conference on Postgraduate Research International Postgraduate Research Conference 2021. http://repository.kln.ac.lk/handle/123456789/24892.

Wikipedia Contributors. (2025). Lekki Conservation Centre. Wikipedia.