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April 09-10, 2026 / Gaziantep, TÜRKİYE

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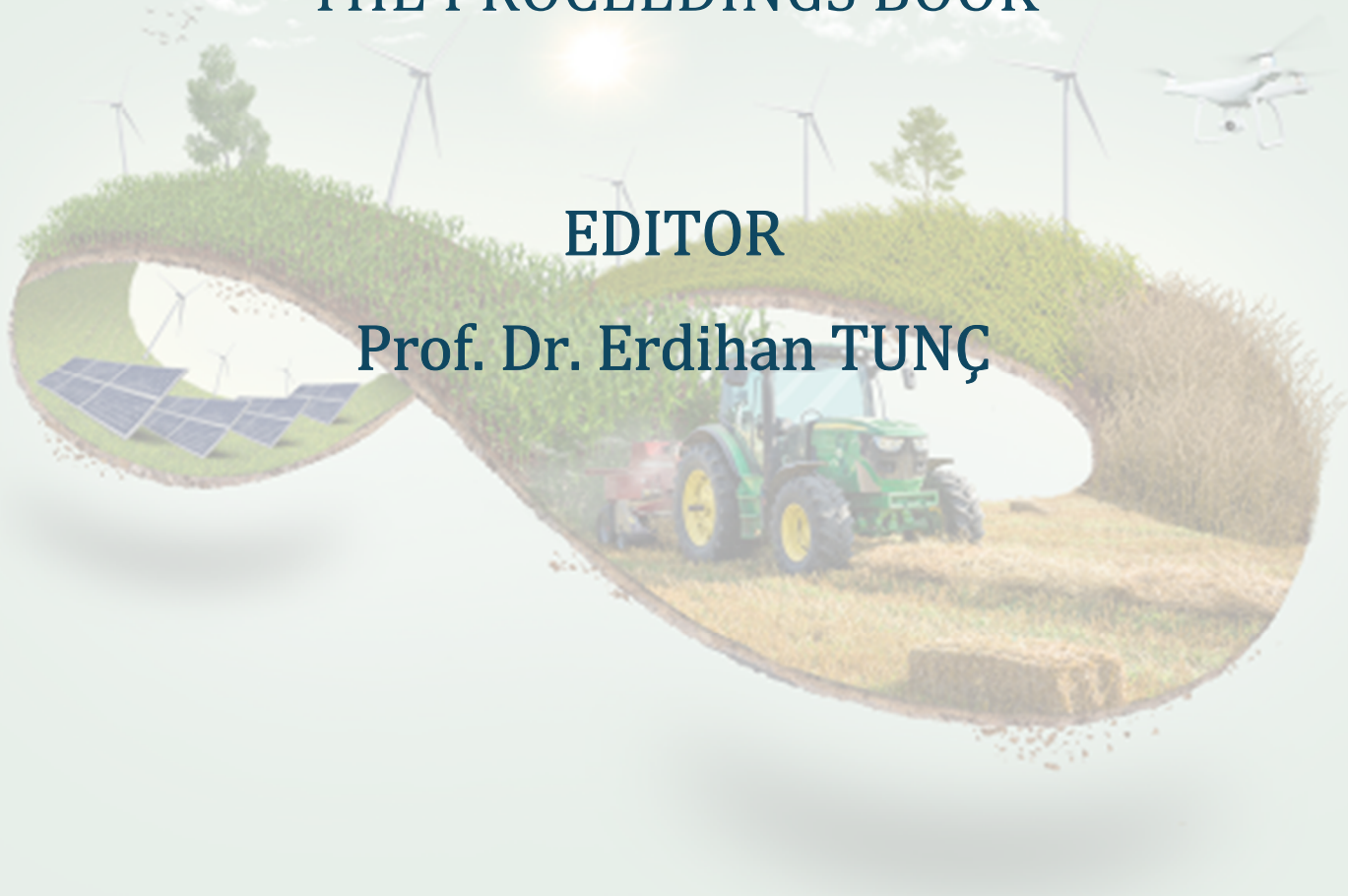

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Prof. Dr. Erdihan TUNÇ

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CONTENTS

ASSESSMENT OF SECONDARY SCHOOL BIOLOGY TEACHERS' PERCEPTION, ATTITUDE AND READINESS TOWARDS ENVIRONMENTAL SUSTAINABILITY PRACTICES IN MINNA, NIGER STATE, NIGERIA

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ABSTRACT
This study investigates the perception, attitude and readiness 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 data, ensuring objectivity and reliability in the findings. The population of the study comprised all biology secondary school teachers in Minna, Niger State from both urban and rural secondary schools within Bosso and Chanchaga Local Government Areas (LGAs) which is about 300 biology teachers in these LGAs, distributed across public/private and 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 highly positive perception, positive attitude and high level of readiness 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, Environmental sustainability practices, sustainable development goals, secondary school biology teachers, perception, attitude and readiness.

INTRODUCTION
The environment encompasses all living and non-living elements that interact to support life, including air, water, soil, flora, fauna, and the ecosystems they form. In Nigeria, the environment plays a critical role in sustaining economic activities such as agriculture, oil and gas production, mining, fisheries and forestry.

However, 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 and Okoli, 2023).

Environmental sustainability refers to the responsible management and use of natural resources in a way that meets present needs without compromising the ability of 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 occupy a strategic position in shaping learners' environmental awareness, attitudes, and behaviours toward 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 concepts such as climate change, biodiversity conservation, and ecosystem health into their instructional practices. This integration helps students understand environmental problems and develop skills to engage in sustainable actions.

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. For example, descriptive studies report that Nigerian biology teachers demonstrate a relatively high level of awareness of environmental education content and its relevance to nature protection and sustainability (Kola-Olusanya, 2025).

Attitude refers to an individual's predisposition to respond favourably or unfavourably toward an idea, behaviour, or object. In educational research, teachers' attitudes toward environmental sustainability influence how and how well they enact sustainability education, integrate environmental topics into teaching and model sustainability practices for students (Cini and Mifsud, 2018).

Teachers' positive attitudes toward environmental sustainability have been linked to stronger pro-environmental behaviours and deeper integration of sustainability concepts in classroom instruction (Cini and Mifsud, 2018; Preprints.org, 2025).

Teachers' readiness for environmental sustainability education refers to their capacity, confidence, knowledge, skills, and preparedness to integrate sustainability concepts such as climate change, biodiversity, ecological stewardship into teaching practice. In the context of sustainable development and global sustainability agendas including the United Nations Sustainable Development Goals (SDGs), teacher readiness is a key determinant of how effectively schools can contribute to environmental sustainability outcomes (Sulisworo *et al.*, 2025).

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 assess the perception, attitude and readiness 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.
ii. assess the attitude of secondary school biology teachers towards environmental sustainability practices in Minna, Niger State.
iii. assess the readiness level of 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 school biology teachers towards environmental sustainability practices in Minna, Niger State?
ii. What is the attitude of secondary school biology teachers towards environmental sustainability practices in Minna, Niger State?
iii. What is the readiness level of 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 methods to collect and analyse data, ensuring objectivity and reliability in the findings. The population of the study comprised all biology secondary school teachers in Minna, Niger State. This includes 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 stratified random sampling technique was used to select 169 biology teachers for this study which was drawn from a total population of biology teachers in public secondary schools within Minna, Niger State. 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 analyzed 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. The Statistical Package for Social Sciences (SPSS) version 27 was used for all data analyses.

RESULTS AND DISCUSION

Analysis of Demographic Data

Demographic distribution of respondents based on School Location

Location	Frequency	Percent (%)	Valid Percent	Cumulative Percent
Urban	105	62.1	62.1	62.1
Rural	64	37.9	37.9	100.0
Total	169	100.0	100.0	

Table 4.1 above shows that 105 secondary school biology teachers responded from urban schools representing 62.1% of the total sample, while 64 responded from rural schools representing 37.9% of the total sample.

Demographic distribution of respondents based on gender

Gender	Frequency	Percent (%)	Valid Percent	Cumulative Percent
Male	137	81.0	81.0	81.0
Female	32	19.0	19.0	100.0
Total	169	100.0	100.0	

Table 4.2 above shows the distribution of secondary school biology teachers on the basis of gender which 137 male teachers were sampled representing 81.0% of the total sample, while 32 female teachers were sampled representing 19.0% of the total sample.

Analysis of Research Questions

Research Question One: What is the perception of secondary school biology teachers towards environmental sustainability practices in Minna, Niger State?

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	Accepted
2.	Maintaining biodiversity is essential for a healthy environment	169	4.15	0.32	Accepted
3.	Natural ecosystem plays a significant role in regulating climate	169	4.79	0.41	Accepted
4.	Pollution has a significant negative impact on ecological life	169	4.25	0.52	Accepted
5.	Human activities like mining, chemical farming, bush burning are the main causes of environmental degradation	169	4.66	0.56	Accepted
6.	Deforestation seriously threatens ecological balance and causes soil erosion	169	4.27	0.71	Accepted
7.	Afforestation helps in recovering environmental status and prevents erosion	169	4.59	0.46	Accepted
8.	Waste management and recycling contribute positively to ecosystem preservation.	169	4.43	0.47	Accepted
9.	Waste exposition causes environmental degradation	169	4.20	0.58	Accepted
10.	Energy efficiency and conservation contribute positively to environmental sustainability	169	4.35	0.59	Accepted
	Grand Mean & SD	**169**	**4.42**	**0.51**	**Favorable perception**

The result presented in table 4.3 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 attitude of secondary school biology teachers towards environmental sustainability practices in Minna, Niger State?

Mean and Standard Deviation score for the attitude of secondary school biology teachers

S/N	Items	N	Mean	SD	Decision
1.	Environmental issues should be taken seriously by everyone; therefore, I feel confident discussing environmental issues with students	169	4.74	0.53	Accepted
2.	I feel responsible for protecting the environment thereby engaging in sustainable practices	169	4.46	0.61	Accepted
3.	I feel environmental sustainability should be a priority in schools	169	4.63	0.58	Accepted
4.	I feel motivated to teach sustainability topics	169	4.80	0.69	Accepted
5.	I feel students should participate in environmental sustainability activities	169	4.31	0.46	Accepted
6.	I feel demotivated to integrate sustainability activities into my lessons	169	4.75	0.55	Accepted
7.	I support school-wide environmental awareness campaigns	169	4.36	0.44	Accepted
8.	I value recycling and waste management practices	169	4.68	0.49	Accepted
9.	I am concerned about the effects of climate change in the environment	169	4.57	0.36	Accepted
10.	I enjoy engaging students in environmental sustainability activities/projects	169	4.69	0.47	Accepted
	Grand Mean & SD	**169**	**4.60**	**0.52**	**High positive attitude**

The result presented in table above shows that secondary school biology teachers accepted all the 10 items with a grand mean (X) score of 4.60 and SD of 0.52 which indicated that the secondary school biology teachers possess high positive attitude towards environmental sustainability practices in Minna, Niger State.

Research Question Three: What is the readiness level of secondary school biology teachers towards environmental sustainability practices in Minna, Niger State?

Mean and Standard Deviation score for the readiness level of secondary school biology teachers

S/N	Items	N	Mean	SD	Decision
1.	I am prepared to integrate environmental sustainability concepts into my teaching	169	4.31	0.65	Accepted
2.	I have the necessary skills to teach sustainability-related topics	169	4.43	0.68	Accepted
3.	I am ready to conduct environmental sustainability projects in my school	169	4.35	0.58	Accepted
4.	I can guide students on waste management and recycling practices	169	4.59	0.51	Accepted
5.	I can identify environmental problems in the school community and take action	169	4.30	0.65	Accepted
6.	I am capable of organizing tree-planting or conservation activities in my school	169	4.39	0.49	Accepted
7.	I am willing to collaborate with colleagues on sustainability initiatives in the school community	169	4.34	0.66	Accepted
8.	I am willing to use local resources to teach sustainability concepts	169	4.41	0.56	Accepted
9.	I am ready to participate in environmental awareness campaigns, training and workshops	169	4.28	0.69	Accepted
10.	I am prepared to integrate ICT tools to enhance environmental sustainability teaching in the classroom	169	4.33	0.62	Accepted
	Grand Mean & SD	**169**	**4.37**	**0.61**	**High level of readiness**

The result presented in table above shows that secondary school biology teachers accepted all the 10 items with a grand mean (X) score of 4.37 and SD of 0.61 which indicated that the secondary school biology teachers possess high level of readiness towards environmental sustainability practices in Minna, Niger State.

Summary of Findings

Based on the data and results analysed from this study, the findings were recorded and summarized as follow:

1. that the secondary school biology teachers possess high positive perception towards environmental sustainability practices in Minna, Niger State.
2. that the secondary school biology teachers possess high positive attitude towards environmental sustainability practices in Minna, Niger State.
3. that the secondary school biology teachers possess high level of readiness towards environmental sustainability practices in Minna, Niger State.

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 are aware 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 awareness 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.

The study also revealed that biology teachers exhibited high positive attitudes towards environmental sustainability practices. This implies that teachers not only understand environmental issues but also demonstrate favourable dispositions towards environmental protection and sustainability practices. Positive teacher attitudes are crucial because they influence the extent to which environmental education is integrated into classroom instruction and school activities. Earlier studies have also reported that teachers display positive attitudes towards environmental education and conservation of natural resources. Positive attitudes among teachers are essential in promoting environmentally responsible behaviour among students. When teachers value environmental sustainability, they are more likely to engage students in activities such as recycling programmes, environmental clubs, tree planting campaigns and community environmental awareness initiatives. Environmental education scholars argue that teachers' attitudes significantly influence students' environmental values and behaviour, making teachers key agents of environmental change in schools and communities.

The results also revealed that biology teachers demonstrated high readiness to implement environmental sustainability practices. This finding indicates that teachers are willing and prepared to integrate sustainability concepts and activities into their teaching practices. Teacher readiness is an important factor in the successful implementation of environmental education programmes because readiness reflects the teacher's willingness, confidence and preparedness to engage in sustainability initiatives within the school environment. The finding that teachers show high readiness supports the argument that teachers are key actors in achieving sustainable development through education. Educational researchers like Kervinen *et al*., (2018); Aarnio-Linnanvuori (2019); and Türkoğlu (2019) emphasize that teachers' competence and readiness determine the effectiveness of environmental education initiatives in schools and their contribution to sustainable national development.

Conclusion

Based on the findings of this study, it can be concluded that secondary school biology teachers in Minna, Niger State possess high positive perception, favourable attitudes, and strong readiness towards environmental sustainability practices. This indicates that biology teachers are well positioned to promote environmental awareness and sustainability education among students. So also, 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 organize regular workshops, seminars and training programmes on environmental sustainability to further strengthen teachers' knowledge and instructional skills.
2. Schools should encourage biology teachers to integrate environmental sustainability practices into classroom teaching and extracurricular activities.
3. Special attention should be given to rural schools in the provision of environmental education resources and training opportunities to ensure equitable access.

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