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ENHANCING CLIMATE LITERACY THROUGH EDUCATION FOR EFFECTIVE CLIMATE CHANGE MITIGATION IN NIGERIA: ADVANCING THE GOALS OF SUSTAINABLE DEVELOPMENT

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Abstract

Climate change poses a serious threat to global sustainability, with African nations, particularly Nigeria - experiencing severe impacts due to limited adaptive capacities. This study examines the interplay between climate change and education, focusing on how climate change awareness and knowledge among teachers and students can shape effective mitigation strategies. Using a mixed-methods approach, the research was conducted across all the 18 Local Government Areas of Ondo State, Nigeria, involving 1,500 participants (1,000 students and 500 teachers). Data were collected using a structured questionnaire and analyzed through both descriptive and inferential statistics. Findings revealed a stark disparity in climate change awareness between teachers and students, with teachers exhibiting significantly higher levels of understanding. Despite Nigeria's policy strides such as the Climate Change Act and its Energy Transition Plan - gaps remain in translating these frameworks into educational practice. The study underscores the urgent need to integrate climate education into Nigeria's primary, secondary, and tertiary curricula. It calls for teacher training, curriculum reform, and increased access to instructional materials to foster environmental literacy. Ultimately, the paper argues that education is not just a complementary measure but a foundational pillar in building societal resilience to climate change. Through informed pedagogy and inclusive policies, Nigeria can cultivate a generation well equipped to navigate and mitigate the multifaceted challenges of a changing climate.

Keywords: Climate Change, Climate Literacy, Mitigation, Sustainable Development.

Introduction

The global discourse on climate change continues to highlight the significant impact of climatic shifts on human populations. One of the central challenges in addressing this issue lies in evaluating the public's knowledge and awareness regarding the underlying mechanisms of climate change, as well as the interconnectedness between human activities and mitigation strategies. Although the levels of understanding may vary, there is a general consensus that economically disadvantaged and climate-vulnerable nations are at greater risk due to their limited adaptive capacities. Among these, African countries are projected to bear the brunt of both current climate variability and anticipated future changes.

According to the United Nations Climate Change News (2020), rising temperatures and sea levels, altered precipitation patterns, and more frequent extreme weather events pose severe threats to human health, food and water security, and socio-economic progress across the African continent. A multi-agency report coordinated by the World Meteorological Organization (WMO, 2019) provides a comprehensive overview of existing and future climate trends, with a particular focus on sensitive sectors such as agriculture. This report also identifies strategic lessons and pathways for effective climate action in Africa, drawing attention to significant challenges and gaps that must be addressed. The region's vulnerability is exacerbated by widespread underdevelopment, high poverty rates, and rapid population growth. These factors severely limit the ability of many African nations to adapt to increasingly frequent and intense climate-related disasters such as floods and droughts.

In this context, education emerges as an important tool for enhancing climate change awareness and resilience. Education, both formal and informal, across all levels, plays an instrumental role in fostering a comprehensive understanding of climate change processes from an early age. This is essential, as the knowledge and values acquired by today's students will shape future responses to climate challenges.

This perspective aligns with the position of the International Alliance of Leading Education Institutes (IALEI) (2009), which asserts that climate change is the most critical public policy issue of our time. The alliance emphasizes that education is the most effective avenue for addressing this global concern. Beyond simply disseminating information, education serves as a transformative process, one that develops individuals and society, fosters critical thinking, and supports the making of informed, responsible decisions. For education to fulfill this role effectively, it must be integrated into a broader societal framework in which schools are actively engaged in promoting sustainable practices and reorienting communities toward environmentally responsible behaviors.



Figure 1



Credit: WMO/Cornel Vermaak

Given the interconnectedness of various systems with the climate, any alteration in climatic patterns inevitably impacts multiple aspects of human life, including agriculture, water resources, and public health. Climate change presents a multifaceted global challenge, closely linked to broader concerns such as economic development, sustainability, and poverty alleviation. Ironically, while developing nations - particularly those in Africa - contribute the least to global greenhouse gas emissions; they remain the most vulnerable to the adverse effects of climate change.

Despite growing international awareness and an expanding body of research on the urgency and significance of climate change, its integration into educational curricula remains limited. There exist a noticeable gap between global concern and localized educational response, especially within the school systems of many developing countries, including Nigeria.

To tackle its socio-economic challenges, Nigeria has committed itself to the United Nations' Sustainable Development Goals (SDGs)—which follow on from the MDGs—and aims to eliminate poverty and hunger, reduce child mortality, control disease, and promote sustainable development. After the National Economic Empowerment and Development Strategy (2004) and Vision 20:2020 (2007), the current administration under President Bola Tinubu has introduced the Renewed Hope Agenda, a framework geared toward economic transformation with targets including attaining a trillion-dollar economy within the next decade and achieving 7% annual economic growth by 2027 (BusinessDay, July 25, 2023). However, these initiatives have frequently been undermined by both natural and anthropogenic disasters. Nigeria continues to face serious developmental setbacks due to climate-driven environmental degradation, including recurrent flooding (especially in downstream and southern areas), advancing desertification in northern states, and severe erosion in the east (United Nations, 2023). A significant part of the problem is the widespread public ignorance regarding climate change. Even among those who are aware, there is often a lack of concern or proactive engagement with the issue. In an attempt to tackle these challenges, the Federal Government of Nigeria has taken some institutional steps. These include the creation of a Climate Change Unit within the Federal Ministry of Environment, Housing, and Urban Development, and the establishment of the National Environmental Standards and Regulations Enforcement Agency (NESREA) in 2007 to ensure environmental safety and resilience.

Nevertheless, the escalating climate-related events globally and within Nigeria suggest that current mitigation and adaptation measures are insufficient. Considering that education has been identified by the Nigerian government as a cornerstone for national development, it is logical to assert that the education sector must play a more active role in raising awareness and equipping citizens with knowledge about the causes, consequences, and solutions to climate change.

Therefore, there is an urgent need to integrate climate change education into all levels of Nigeria's educational system, primary, secondary, and tertiary. Such integration must be carefully managed in terms of planning, execution, and monitoring to avoid repeating the pattern of ineffective implementation that has plagued past educational reforms in Nigeria.

Table 1: A Framework for Integrating Climate Change into the Nigerian Educational System (Updated 2024)

Level	Subjects for Integration	Implications for Educational Managers
Lower Basic (primaries 1-3)	Basic Science and Technology, Social Studies, Religious Studies, Agriculture, Home Economics, etc.	Organise workshop for existing teachers, provide instructional materials, and prepare modules.
Middle Basic (primaries 4-6)	Basic Science and Technology, Social Studies, Religious Studies, Agriculture, Home Economics, etc.	Organise workshop for existing teachers, provide instructional materials, and prepare modules.
Upper Basic (Junior Secondary Classes 1-3)	Basic Science and Technology, Social Studies, Religious Studies, Agriculture, Home Economics, etc.	Organise workshop for existing teachers, provide instructional materials, and employ specialist teachers.
Senior Secondary School Classes 1-3	Physics, Chemistry, Biology, Agricultural Science, Geography, Government, Economics, Commerce, etc.	Organise workshop for existing teachers, provide instructional materials, and employ specialist teachers.
Tertiary Institutions	Teacher Education Sciences, Social Sciences, Arts, Technology, etc.	Train and employ specialists, provide instructional materials.

Source: Adapted from Federal Ministry of Education (2008) and updated with insights from the National Policy on Climate Change (2021), the UNESCO-UNFCCC Getting Every School Climate-Ready (2021) initiative, and contemporary best practices in Climate Change Education (CCE).

Objectives of the Study

The study was set to achieve the following objectives:

- i. to identify causes and consequences of climate change;
- ii. to examine teachers and students' awareness of climate change
- iii. to evaluate the difference in the teachers and students' awareness of climate change;

Methodology

The Study Area

Ondo State was created on 3 February 1976. It is located in the South-Western geopolitical zone of Nigeria and is divided into 18 Local Government Areas. The state lies roughly between longitudes 4°30'E and 6°E of the Greenwich Meridian, and latitudes 5°45'N and 8°15'N of the Equator (Ondo State Ministry of Economic Planning and Budget, 2023). It has a Land area of 15,500km² (6,00sq mil). The state lies entirely in the tropical rainforest. Ondo State is bounded in the North by Ekiti/Kogi States; in the East by Edo State; in the West by Oyo and Ogun States and in the South by the Atlantic Ocean (Olarenwaju, 2004). The population of the state according to 2025 projection is 5.76million: comprising 2,880,000 Males and 2,880,000 Females, and population density of 220km/km². The climate of Ondo State is of the Lowland

Tropical Rain Forest type, with distinct wet and dry seasons. The temperature throughout the year ranges between 21⁰C - 29⁰C. The mean monthly relative humidity is less than 70%. The state is of the high forest, luxuriant vegetation. It is composed of varieties of hardwood timber such as Iroko (*Milicia excelsa*), False Iroko (*Antiaris africana*), White afara (*Terminalia superba*), Red ironwood (*Lophira procera*) and Hog gum tree/Cheesewood (*Symphonia globulifera*).

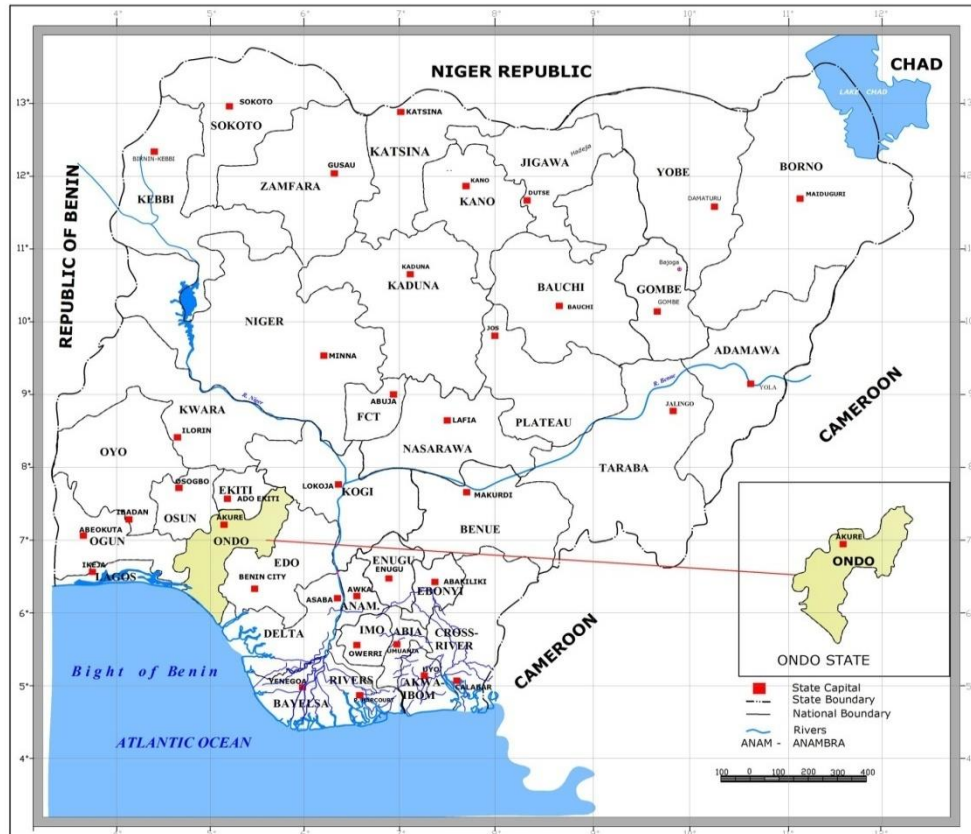


Fig 2: Map of Nigeria showing Ondo State

Source: Adapted from Ondo State Surveys, Akure.

A total of 1,500 participants were purposively selected from the eighteen (18) Local Government Areas (LGAs) within the state. This sample included 1,000 students and 500 teachers. At least Eighty three (83) respondents were chosen through a random sampling process within each LGA. A multistage sampling method was employed to ensure adequate representation. In the first stage, schools across all 18 LGAs were identified, with attention to balanced distribution across the state's three senatorial districts. In the second stage, approximately twenty-seven (27) teachers and fifty-five (55) students were randomly selected from each LGA. In the final stage, a structured questionnaire, specifically designed to address the study's objectives, was administered to the selected respondents.

This study utilized both primary and secondary sources of data. To gather firsthand information, the researcher employed a self-constructed questionnaire titled "Awareness of Teachers and Students on Climate Change (ATSCC)" as the primary data collection tool. The instrument was carefully designed to elicit relevant responses regarding the climate change awareness levels among the target population. To ensure the reliability of the instrument, it was subjected to the test-retest method. The resulting reliability coefficient was 0.89 (89%), indicating a high level of consistency and dependability in the measurement of responses over

time. The secondary data was sourced from relevant texts and reputable online journals. Both descriptive and inferential statistics were used. Frequency counts, means, percentages (%), and T-test were used to analyse the information gathered from the respondents. The T-test statistical tool was used basically to analyse objectives ii and iii respectively.

Results and Discussion

Causes of Climate Change

Climate change refers to long-term alterations in the Earth's climate system, including shifts in global temperatures, precipitation patterns, sea levels, and other environmental indicators. According to the Intergovernmental Panel on Climate Change (IPCC, 2007), the planet has witnessed an increase of approximately 0.6°C (1.1°F) in global mean annual temperature over the past century. Furthermore, projections indicate that between 1990 and 2100, global surface temperatures could rise by 1.4°C to 5.8°C (2.5°F to 10.4°F), depending on emission trajectories and environmental policies.

The primary drivers of these climatic changes are human activities. These include the combustion of fossil fuels, widespread deforestation, and certain agricultural practices that emit large amounts of greenhouse gases (GHGs) into the atmosphere. These gases trap heat, leading to the gradual warming of the Earth's surface—a phenomenon known as the greenhouse effect. In addition to anthropogenic factors, natural causes also play a role in climate variability. These include volcanic eruptions, fluctuations in ocean currents, variations in the Earth's orbit, changes in solar radiation, and the release of methane from natural sources such as wetlands and thawing permafrost in the Arctic. Historically, the Earth has undergone natural climate cycles that span approximately 40,000 years, contributing to long-term climatic shifts.

However, human-induced or anthropogenic factors are now recognized as the dominant cause of contemporary climate change. The burning of fossil fuels releases significant quantities of carbon dioxide (CO₂) into the atmosphere. Agricultural practices and deforestation further exacerbate the problem by removing vegetation that would otherwise absorb CO₂. Methane (CH₄), another potent greenhouse gas, is emitted from livestock, oil extraction, coal mining, and gas leaks. Additional contributors include chlorofluorocarbons (CFCs), nitrous oxide (N₂O), and ozone (O₃).

Globally, the relative contribution of human-generated greenhouse gases is estimated as follows: carbon dioxide accounts for approximately 50%, chlorofluorocarbons for 20%, methane for 16%, ozone for 8%, and nitrous oxide for 6%. These gases collectively intensify the greenhouse effect, driving the current trends in global warming and climate instability.

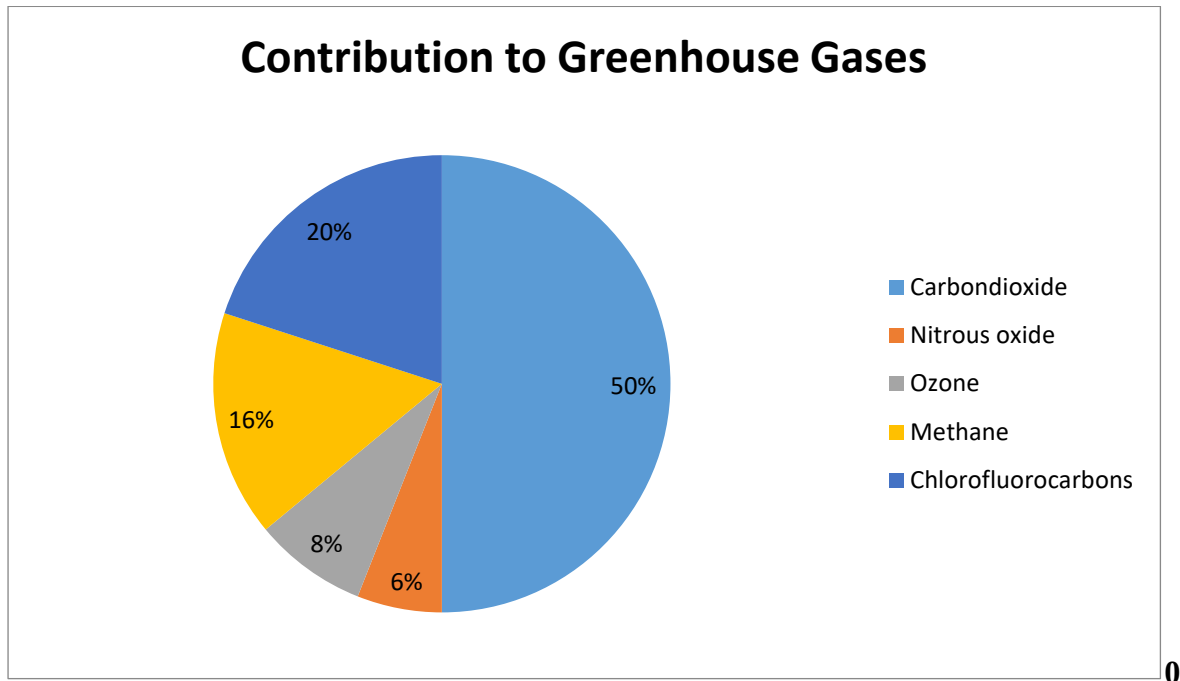


Figure 3: Contribution to Global Warming by Anthropogenic Releases of Gases into the Atmosphere

Source: Adapted from Cunningham, W.P. & Saigo, B.W. (1999)

Implications of Climate Change

1. Rising temperatures

The year 2019 was recorded as one of the three warmest years across the African continent, a trend that is projected to persist in the coming years. Recent decades have witnessed temperature increases in Africa at a pace comparable to most other continents, and slightly faster than the global average surface temperature rise, (WMO, 2020). According to decadal climate projections for the period 2020 to 2024, this warming trend is expected to continue, accompanied by declining rainfall in Northern and Southern Africa, while the Sahel region is likely to experience increased precipitation. The Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report further forecasts that under moderate emission scenarios, large portions of Africa will surpass 2 °C of warming above pre-industrial levels by the last two decades of the 21st century.

Additionally, many regions across Africa have already experienced warming exceeding 1 °C since 1901, with noticeable increases in the frequency of heatwaves and extremely hot days. Future projections indicate a likely decline in precipitation over North Africa and the south-western regions of South Africa by the end of the century, further intensifying the continent's vulnerability to climate variability and change, IPCC (2022).

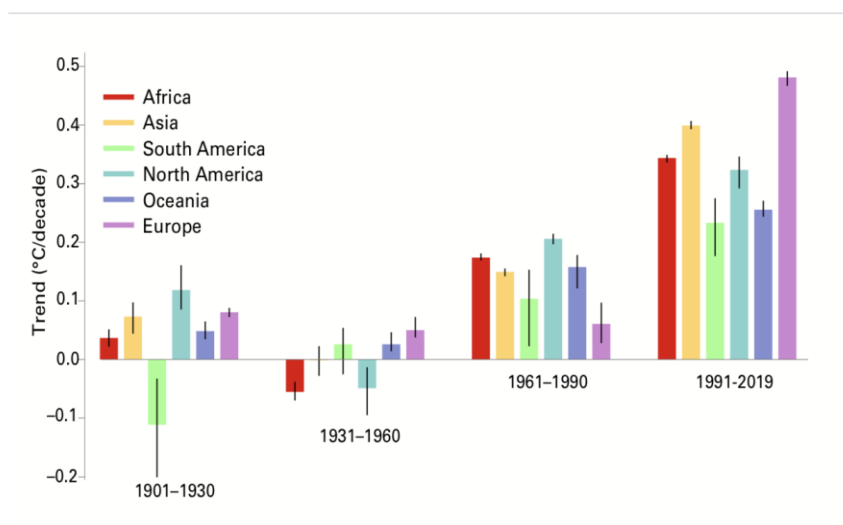


Figure 4: Trends in mean surface air temperature over few sub-periods using the HadCRUT4, NQAAGlobal Temperature and GISTEMP data sets. The bars indicate the trend in the mean of the three data sets, and the black lines indicate the range between the largest and smallest trends in the three individual data set.

2. Rising sea levels and coastal erosion

There is significant regional variability in sea-level trends around Africa. In several oceanic regions, notably along the eastern coast and in the south-western Indian Ocean (from Madagascar eastwards towards Mauritius), sea levels have been rising at rates approaching or exceeding 5 mm/year, above the global average rise of 3-4 mm/year. In West Africa, coastal degradation - including erosion, flooding, and pollution - is already a major challenge. A World Bank study estimates that about 56% of the coastline in Benin, Côte d'Ivoire, Senegal, and Togo is undergoing erosion at an average rate of 1.8 m/year. While sea level rise is not yet universally the dominant driver of coastal loss in all contexts, it is expected to combine with other stressors (e.g. land subsidence, human construction, sediment modification, climate change) to exacerbate vulnerability in the future, (WMO, 2020).

3. Extreme events

The report documents high-impact events in 2019. Tropical Cyclone Idai was among the most destructive tropical cyclones ever recorded in the southern hemisphere, resulting in hundreds of casualties and hundreds of thousands of displaced. Southern Africa suffered extensive drought in 2019. In contrast, the Greater Horn of Africa shifted from very dry conditions in 2018 and most of 2019 to floods and landslides associated with heavy rainfall in late 2019. Flooding also affected the Sahel and surrounding areas from May to October 2019 (WMO News Release, March 10, 2020).

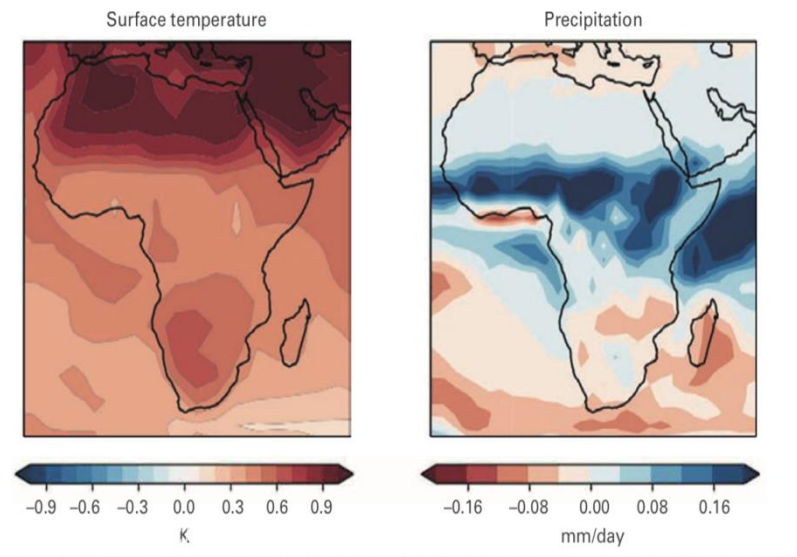


Figure 5: Multi-model average forecast of near surface temperature and precipitation for the five year period 2020-2024. Colours show anomalies relative to the period 1981-2010 for the average of several international forecasts contributing to the WMO Lead Centre for ADCP. (<https://hadleyserver.metoffice.gov.uk/wmolc>). Forecasts are initialized with observations and start on or after 1st November, 2019.

Source: Adapted from Met Office, United Kingdom

4. Food security impacts

In drought-prone regions of sub-Saharan Africa, the number of undernourished individuals has risen by approximately 45.6% since 2012, according to data from the Food and Agriculture Organization (FAO). Given that agriculture forms the cornerstone of Africa's economy and supports the livelihoods of a significant portion of the population, the continent is considered a climate vulnerability and exposure hotspot. The Intergovernmental Panel on Climate Change (IPCC) projects that future warming scenarios may have devastating consequences for agricultural productivity and food security. Key risks include declining crop yields due to increased heat and drought stress, heightened susceptibility to pests and diseases, and damage from flooding, all of which threaten agricultural infrastructure and food supply chains. These impacts are expected to affect food availability and livelihoods at household, national, and regional levels (UNFCCC, 2023).

By mid-21st century, major cereal crop yields in Africa are projected to decline under high warming scenarios, though the magnitude will vary by region and crop. Studies show reductions of perhaps 5-20% for many staples in various regions (with more severe losses under worst-case scenarios), with millets and sorghum likely among the more resilient, and rice and wheat among the more vulnerable, IPCC, 2022.

5. Health impacts

Increases in temperature and changes in rainfall patterns also significantly affect population health across Africa. Warmer temperatures and higher rainfall increase habitat suitability for biting insects and the transmission of vector-borne diseases such as dengue fever, malaria and yellow fever. In addition, new diseases are emerging in regions where they were previously not present. In 2017, an estimated 93% of global malaria deaths occurred in Africa. Malaria epidemics often occur after periods of unusually heavy rainfall. In addition, warming in the

East African highlands is allowing malaria-carrying mosquitoes to survive at higher altitudes, Obame-Nkoghe et al., 2024.

6. Economic impacts

According to the International Monetary Fund, adverse consequences of climate change are concentrated in regions with relatively hot climates, where a disproportionately large number of low-income countries are located. The African Climate Policy Centre projects that the Gross Domestic Product in the five African sub-regions would suffer significant decrease as a result of a global temperature increase. For scenarios ranging from a 1°C to a 4°C increase in global temperatures relative to pre-industrial levels, the continent's overall GDP is expected to decrease by 2.25% to 12.12%. West, Central and East Africa exhibit a higher adverse impact than Southern and North Africa, WMO, 2020.

Table 2: Long-term impacts of climate change on Africa's GDP (% change/year) according to four global temperature increase scenarios for the five sub-regions and for the whole of Africa

Sub-regions	GDP (% Change/Year)			
	1°C	2°C	3°C	4°C
North (n = 7)	-0.76 ± 0.16	-1.63 ± 0.36	-2.72 ± 0.16	-4.11 ± 0.97
West (n = 7)	-4.46 ± 0.63	-9.79 ± 1.35	-15.62 ± 2.08	-22.09 ± 2.78
Central (n = 9)	-1.17 ± 0.45	-2.82 ± 1.10	-5.53 ± 1.56	-9.13 ± 2.16
East (n = 14)	-2.01 ± 0.20	-4.51 ± 0.34	-7.55 ± 0.63	-11.16 ± 0.85
Southern (n = 10)	-1.18 ± 0.64	-2.68 ± 1.54	-4.40 ± 2.56	-6.49 ± 3.75
Whole of Africa (n = 55)	-2.25 ± 1.52	-5.01 ± 3.30	-8.28 ± 5.12	-12.12 ± 7.04

Source: Adapted from Economic growth, development and climate change in Africa, published by the African Climate Change Policy Centre (ACPC) of the United Nations Economic Commission for Africa (UNECA)

Teachers and Students' Awareness of Climate Change

1. Teachers' Awareness

Table 3: Teachers' Awareness of Climate Change and its Implications.

S/N	Question	Aware	%	Unaware	%
1	How aware are you of the concept of climate change?	418	84	82	16
2	How aware are you of the difference between climate and weather?	329	66	171	34
3	How aware are you that climate change is a current global issue?	461	92	39	8
4	How aware are you of the role the media plays in spreading information about climate change?	430	86	70	14
5	How aware are you of training programs or workshops on climate change for teachers?	444	89	58	12
6	How aware are you of integrating climate change education into your teaching practice?	453	91	47	9
7	How aware are you that human activities (e.g., fossil fuel use, deforestation) contribute to	442	88	58	12



	climate change?				
8	How aware are you of how industrial and agricultural activities affect climate change?	464	93	36	7
9	How aware are you of the link between greenhouse gases and global warming?	290	58	210	42
10	How aware are you of the effects of climate change on health, weather, and the economy?	438	88	62	12
11	How aware are you of climate-friendly practices that schools can adopt?	210	42	290	58
12	How aware are you of national or local policies addressing climate change?	171	34	329	66
13	How aware are you of ways you can model environmentally responsible behavior in school?	395	79	105	21
14	How aware are you of the importance of including environmental education in the curriculum?	479	96	21	4
15	How aware are you of the need to encourage students to participate in climate action?	457	91	43	9
16	How aware are you of the impact of transportation on climate change?	390	78	110	22
17	How aware are you of how waste management affects climate change?	356	71	144	29
18	How aware are you of climate change topics in the school curriculum?	379	76	121	24
19	How aware are you of how energy consumption in schools contributes to climate change?	362	72	138	28
20	How aware are you of government incentives for green energy in schools?	47	9	453	91
21	How aware are you of the role of environmental clubs in raising climate awareness?	422	84	78	16
22	How aware are you of tools or materials available to teach climate change effectively?	144	29	356	71
23	How aware are you of students' interest and engagement in climate issues?	105	21	395	79
24	How aware are you of how local communities are affected by climate change?	490	98	10	2
25	How aware are you of the interconnection between biodiversity loss and climate change?	413	83	87	17
26	How aware are you of classroom activities that promote environmental responsibility?	500	100	-	-
27	How aware are you of your school's environmental footprint?	78	16	422	84
28	How aware are you of professional development courses focused on sustainability?	402	80	98	20
29	How aware are you of the long-term	490	98	10	2

	consequences of ignoring climate change?				
30	How aware are you of global efforts and agreements addressing climate change (e.g., Paris Agreement)?	362	72	138	28

Source: Field Survey (2025)

The high level of awareness regarding the concept of climate change (84%), its status as a global issue (92%), and the anthropogenic causes (88%) aligns with global studies suggesting that climate change is a widely recognized phenomenon among educators (Monroe et al., 2019). However, the lower awareness of the fundamental distinction between *climate* and *weather* (66% aware) reveals a persistent conceptual weakness. This finding is critical, as literature shows that conflating weather (short-term) with climate (long-term) is a common misconception that can hinder students' understanding of climate trends and variability (Shepardson et al., 2017). This suggests that while teachers are aware of the *issue*, their foundational scientific literacy may require strengthening to teach these concepts accurately.

A near-universal awareness of the importance of including environmental education in the curriculum (96%) and encouraging student participation in climate action (91%) stands in stark contrast to a pronounced lack of awareness of practical, actionable elements. The very low awareness of government incentives for green energy (9%), the school's own environmental footprint (16%), and effective teaching tools and materials (29%) points to a significant "implementation gap." This supports the findings of Henderson & Long (2021), who argue that teachers often feel a moral imperative to teach about climate change but are stymied by a lack of resources, institutional support, and practical knowledge on how to translate complex global issues into localized, actionable lessons. The low awareness of national or local policies (34%) is a particularly telling result. It reflects a top-down approach to climate policy where mandates may exist, but dissemination and professional development for key implementers—teachers—are insufficient (Kagawa & Selby, 2010). Teachers cannot be expected to align their teaching or advocate for school-level changes in accordance with policy if they are unaware of the policies themselves. This disconnect between national climate strategies and on-the-ground educational practice is a common challenge documented in both developed and developing contexts.

Teachers demonstrated high awareness of global efforts like the Paris Agreement (72%) and how local communities are affected (98%). This shows an ability to connect the global scale of the problem with local impacts. However, awareness of climate-friendly practices for schools (42%) and specific local policies (34%) was much lower. This indicates that while teachers understand the problem abstractly, they may lack the specific, place-based knowledge to enact meaningful mitigation and adaptation within their own school environment (Blum et al., 2013). This gap between recognizing a problem and possessing the agency to implement solutions is a major barrier to effective CCE.

2. Students' Awareness

Table 4: Students' Awareness of Climate Change and its Implications.

S/N	Question	Aware	%	Unaware	%
1	How aware are you of the meaning of climate change?	211	21.10	789	78.90
2	How aware are you that climate change is caused by human and natural activities?	180	18	820	82



	How aware are you that climate change is already impacting the planet?	219	22	781	78
4	How aware are you of what you've been taught in school about climate change?	219	22	776	78
5	How aware are you of climate change information shared on social media?	151	15	849	85
6	How aware are you of conversations or discussions about climate change at home or school?	410	41	590	59
7	How aware are you of how cars, electricity, and plastic pollution contribute to climate change?	371	37	629	63
8	How aware are you of how cutting down trees affects the climate?	499	49.9	501	50.1
9	How aware are you that industries and farming practices contribute to climate change?	430	43	570	57
10	How aware are you that climate change causes floods, droughts, and heatwaves?	568	56.8	432	43.2
11	How aware are you that climate change affects your community and health?	343	34	657	66
12	How aware are you of how recycling, saving energy, and using public transport help the environment?	99	10	901	90
13	How aware are you of what you personally can do to reduce climate change?	215	21.5	785	78.5
14	How aware are you of the importance of learning about climate change in school?	224	22.4	776	77.6
15	How aware are you of any environmental activities you can join at school?	50	5	950	95
16	How aware are you of the link between climate change and rising sea levels?	50	5	950	95
17	How aware are you of the role of recycling in fighting climate change?	190	19	810	81
18	How aware are you of how your daily habits (e.g., using plastic) impact the environment?	568	57	432	43
19	How aware are you of how climate change affects wildlife and ecosystems?	503	50.3	497	49.7
20	How aware are you of how saving electricity at home can help the planet?	70	7	930	93
21	How aware are you of your school's activities to fight climate change?	50	5	950	95
22	How aware are you of how your diet and food choices affect the environment?	100	10	900	90
23	How aware are you of clean energy sources like solar and wind power?	151	15	849	85
24	How aware are you of how air pollution is connected to climate change?	500	50	500	50
25	How aware are you of how your community is responding to climate change?	198	20	802	80



	How aware are you of the concept of a carbon footprint?	20	2	980	98
27	How aware are you of ways you can reduce waste in school and at home?	410	41	590	59
28	How aware are you of what climate activists and youth movements are doing?	5	0.5	995	99.5
29	How aware are you of the importance of protecting forests for climate stability?	689	69	311	31
30	How aware are you of your personal responsibility in addressing climate change?	200	20	800	80

Source: Field Survey (2025)

The results above (Table 3) reveal a critically low level of fundamental awareness among students regarding the meaning, causes, and impacts of climate change. With only 21% aware of the meaning of climate change and 18% aware of its anthropogenic causes, these findings align with studies that indicate a significant gap in baseline climate literacy, despite the topic's prevalence in media (Stevenson et al., 2016). This profound lack of knowledge extends to mitigation strategies, as seen in the low awareness of personal actions like recycling and saving energy (10%) and the concept of a carbon footprint (2%). This suggests that while students may encounter the term "climate change," their understanding remains superficial and fragmented, failing to connect global issues to personal responsibility or actionable solutions, a common challenge documented in educational research (Monroe et al., 2019).

Notably, students demonstrated higher awareness in areas linked to tangible local examples or moral imperatives, such as the importance of protecting forests (69%) and how daily habits like plastic use impact the environment (57%). This pattern supports the construct of "psychological distance," where abstract or complex concepts like carbon footprints feel remote, while concrete, visible issues like deforestation and plastic pollution are more easily grasped (Spence et al., 2012). The extreme lack of awareness of youth movements (0.5%) and school activities (5%) is particularly striking and points to a failure within these specific educational and social contexts to leverage peer influence and school-based initiatives, which are known to be highly effective in fostering engagement and a sense of agency among young people (Ojala, 2012).

The difference in the Teachers and Students' Awareness of Climate Change.

Table 5: Independent Samples T-Test Comparing Teachers' and Students' Awareness of Climate Change

Value	N	Mean	SD	df	t-cal	t-tab
Teachers	500	121	21	1498	4.47	1.66
Students	1000	116	19			

The statistically significant difference in climate change awareness levels between teachers (Mean=121) and students (Mean=116), as confirmed by the independent samples t-test ($t(1498)=4.47, p<.05$), presents a nuanced finding. While teachers demonstrate a higher overall awareness, the relatively small difference in mean scores is itself a significant result. This suggests that while teachers hold an advantage, potentially due to their advanced education and professional development (Henderson & Long, 2021), their awareness levels are not high enough to create a vast gulf of knowledge. This aligns with literature suggesting that teachers often lack deep, transformative understanding of climate science and effective pedagogical

content knowledge (PCK) to bridge the gap between their own knowledge and student comprehension (Lombardi & Sinatra, 2013). The students' notably low scores across most items indicate that the teachers' current level of awareness and training is insufficient to effectively transmit this knowledge, resulting in a student body that remains largely unaware. This small but significant gap reinforces the critical role of teachers as central agents in closing the environmental literacy gap. However, it also underscores that simply having teachers who are *more aware* is not enough. The findings call for targeted professional development that moves beyond raising teachers' general awareness and focuses explicitly on *how* to teach climate change effectively. This includes developing skills to deconstruct complex concepts, counteract misinformation, and make abstract global issues locally relevant and actionable for students (Monroe et al., 2019). Ultimately, curriculum reform must be coupled with empowering teachers as transformative agents, equipping them with the tools, resources, and confidence to translate their modestly higher awareness into impactful student learning and engagement, thereby fostering a more climate-literate generation.

Table 6: Independent Samples T-Test Comparing Male and Female's Awareness of Climate Change

Value	N	Mean	SD	df	t-cal	t-tab
Male	800	124	23	1978	6.10	1.69
Female	700	119	21			

Table 6 presents the result of independent samples t-test comparing climate change awareness between the male and female respondents. The independent samples t-test reveals a statistically significant difference in climate change awareness between male ($M=124$) and female ($M=119$) respondents ($t(1978)=6.10, p<.05$). While this finding suggests a notable gender gap, with males reporting higher awareness, it is crucial to interpret this result within the complex and often contradictory context of existing literature. This disparity could be attributed to several factors documented in research, including gendered differences in science communication consumption, self-confidence in reporting scientific knowledge, and the historical framing of environmentalism in more masculine, technical terms (Sundström et al., 2020). However, it is important to note that numerous studies have found the opposite relationship or no significant difference, often indicating that women express higher levels of concern about climate change (McCright, 2010).

Therefore, this finding does not suggest a inherent cognitive difference but rather points to potential contextual or socio-cultural barriers within this specific population. These may include disparities in access to STEM education, gendered patterns in media consumption, or socio-cultural norms that influence the willingness to report awareness. The call for gender-responsive educational strategies is well-founded. Such strategies should move beyond a deficit model and instead focus on creating inclusive pedagogical approaches that actively engage diverse perspectives and learning styles (Buckingham & Le Mat, 2022). This involves ensuring information is disseminated through channels accessible to all genders and framing climate change not just as a scientific issue, but as a social, health, and intergenerational justice issue, which often resonates strongly across genders.

Conclusion

Climate change is globally recognized as one of the most significant challenges confronting contemporary human civilization, with far-reaching socio-economic and environmental consequences. Addressing this issue effectively requires the development of a transformative

educational framework - one that adopts an interdisciplinary and sustained approach. Such a curriculum must integrate core values, ethical principles, and sustainable practices aimed at influencing human behavior and promoting attitudinal change. Encouraging a shift in human attitudes and fostering a sense of respect for nature are critical steps toward mitigating the negative impacts of climate change.

Education serves as a powerful tool in raising environmental awareness and shaping societal values. Integrating climate change education into the curriculum has the potential to positively influence students' attitudes and behaviors regarding environmental stewardship. Many countries recognize the critical role of climate change education in promoting societal sustainability, stressing that both teachers and students must gain a thorough understanding of climate-related issues. Such education strengthens skills in problem solving and decision making, encourages a constructive environmental perspective, and increases classroom relevance by connecting lessons to real-world challenges. According to UNESCO and Nusche, D. et al. (2024), integrating climate change into curricula enhances critical thinking, empowers learners to act, and fosters resilience in communities.

Given the limited awareness of climate change among the students, it is imperative to embed climate-related topics across various subjects, including social studies, geography, biology, chemistry, and physics. This cross-disciplinary integration would help deepen students' understanding of the interconnectedness between local and global climatic systems and their implications for human societies. Furthermore, it would equip both teachers and learners with the necessary knowledge and competencies to address the long-term effects of climate change. As emphasized by UNESCO (2009), the educational response to climate change must involve a comprehensive reassessment of existing curricula at all levels. This includes reorienting educational programs to address not only the causes and consequences of climate change but also the strategies required for adaptation and mitigation. Educators are thus called upon to incorporate new content and pedagogical approaches into both formal instruction and public awareness initiatives.

In the context of Nigeria, the contribution of key stakeholders to advancing climate change education has been minimal. Notably, there has been inadequacy of policy implementations to formally introduce climate education into the national curriculum. This gap underscores the urgent need for the integration of climate education at all levels of the Nigerian educational system. Doing so would empower learners with the knowledge, skills, and values required to actively participate in building a sustainable future.

Recommendations

Climate education requires necessary links among sciences, the environment and other areas such as culture, ethics and economy. Thus, youths are to be encouraged to study arts, pure and social science, and science related professions that could anchor adequate research towards finding solutions to climate challenges. However, the following recommendations were made:

1. The government in collaboration with educational stakeholders should incorporate climate education into the school curricula.
2. There should be focus on areas where teachers show lower awareness, such as climate-friendly practices and government incentives for climate actions.



3. Opportunities should be provided for teachers to enhance their knowledge and skills in teaching climate education effectively
4. Share relevant materials and tools to support teachers in integrating climate change education into their practice.
5. Organise awareness campaigns and activities to educate students about climate change mitigation strategies and impacts.
6. Encourage community involvement and participation in climate change initiatives.



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