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Climate Change Awareness: An Imperative for Environmental and Earth Stewardship

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ABSTRACT

The accelerating impacts of climate change, rising temperatures, extreme weather events, and biodiversity loss underscore the urgent need for widespread public awareness. This research explores why climate change awareness is not just beneficial but essential for effective environmental stewardship and the long-term health of our planet. The research proffers informed communities, encouraging sustainable practices, and driving policy advocacy, awareness serves as a model for collective action. This call to consciousness challenges individuals, institutions, and nations to recognize their role in shaping a resilient, sustainable future for the Earth. Methodology adopted in this research is a mixed-method design, involving both qualitative and quasi-experimental designs, which engages the use of focus group discussions and oral interviews to explore deeper insights into perceptions, biodiversity loss consciousness, and environmental depletion

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challenges. Also, applicable under the qualitative method is the secondary data collection mode, namely, reports from IPCC, government policy documents, and existing literature related to the context of the research. The empirical and scientific data analysis was presented from the data collected and was coded and subjected to analysis using a paired samples *t*-test. The study is grounded on the theory of "Value-Belief-Norm" (VBN) developed by Stern et al. The VBN theory posits that individuals are more likely to engage in pro-environmental behaviour when their values (especially biosphere and altruistic), beliefs (about environmental consequences), and norms (personal responsibility to act) align. The findings of this study underscore the critical role of climate change awareness in fostering environmental and earth stewardship. The paper recommends that Governments of the country (State and federal) should take urgent steps in sensitising the general public on the causes and impact of climate change.

Keywords: Climate Change; Earth; Environment; Value-Belief-Norm; Stewardship

1. Introduction

Climate change has emerged as one of the most pressing global challenges of the 21st century, influencing ecological systems, human societies, and the stability of planetary boundaries. Scientific consensus confirms that anthropogenic activities, particularly the combustion of fossil fuels and deforestation, are the primary drivers of climate change[1]. Despite overwhelming evidence, public awareness and engagement with climate change issues remain inconsistent across regions and demographic groups. This disconnect underscores the urgent need for widespread climate change awareness as a foundational element of environmental and earth stewardship. Cultivating an informed and engaged populace is vital for promoting sustainable behaviours, influencing policy decisions, and fostering resilience in the face of environmental degradation[2]. As temperatures, sea levels, extreme weather, and biodiversity loss increase, the Earth faces growing repercussions; it becomes imperative to understand how awareness of these phenomena can lead to meaningful environmental stewardship. Stewardship, in this context, refers to responsible management and care for the environment through conscious choices, sustainable practices, and advocacy for systemic change[3]. Therefore, increasing climate change awareness is not merely an educational endeavour but a critical strategy for ensuring the health and sustainability of Earth's ecosystems.

Nigeria is experiencing poor climate conditions that are affecting millions of people through increased flooding, delayed rains, desertification, bush fires, droughts, and food security. In arid and semi-arid regions, lakes are drying up and river flow is decreasing. This implies the unavailability of water for agriculture, hydropower, and other uses. In response to the Intergovernmental Panel on Climate Change[4] assessment report's prediction that Africa would be hardest hit by climate change, Nigeria's government has made significant progress in preparing, demonstrating, negotiating, collaborating, and developing national, regional, and international policies, programs, and plans. Despite attempts, climate change is rising. Although Nigeria is not a large contributor to global warming, it is a major issue, as African countries are the most vulnerable.

2. Aim and Objective of the Study

The major aim of the research is to examine the role of climate change awareness in promoting environmental and earth stewardship, and to identify strategies that enhance public engagement and pro-environmental behaviour.

The Objectives, on the other hand, includes:

1. To assess the current level of climate change awareness among different demographic groups.
2. To analyze the relationship between climate change awareness and environmental stewardship behaviours.
3. To identify the barriers that hinder effective climate change communication and public engagement.
4. To propose strategies for integrating climate literacy into environmental education and advocacy.
5. To evaluate how enhanced awareness can influence policy support and sustainable practices.

3. Statement of the Problem

Despite the growing body of scientific evidence and increasing global discourse on climate change, there remains a significant gap in public awareness, understanding, and engagement, especially in regions vulnerable to environmental degradation. Many individuals continue to exhibit apathy or scepticism toward climate science, which undermines efforts to foster sustainable behaviours and policy support. The lack of climate literacy and its integration into environmental stewardship weakens societal responses to the climate crisis, impedes resilience-building, and diminishes the urgency for transformative change. Without a deliberate effort to enhance climate change awareness, the goals of environmental stewardship, such as conservation, sustainability, and ecological justice, will remain unfulfilled.

4. Literature Review

The field of Environment and Earth Sciences encompasses a broad array of disciplines aimed at understanding the Earth's systems and the anthropogenic impacts on them. In recent decades, concerns regarding climate change, biodiversity loss, and unsustainable resource use have catalyzed a surge in researche. This literature review examines important developments and emerging trends across major themes in environmental and earth sciences. Climate change and atmospheric sciences, this field remain a central concern in environmental science. Anthropogenic greenhouse gas emissions are recognized as the primary driver of global warming, with CO_2 concentrations surpassing 420 ppm in recent years[1]. Studies have demonstrated clear links between rising global temperatures and the increased frequency and severity of extreme weather events, including heatwaves, droughts, and tropical cyclones[5]. The coupling of observational data with climate models has improved the accuracy of long-term climate projections[6]. The Earth system model intercomparison projects (e.g., CMIP6) have been instrumental in refining these predictions and informing global policy frameworks, such as the Paris Agreement[7]. Biodiversity and Ecosystem Functionality, biodiversity loss is now widely recognized as a parallel crisis to climate change, with current extinction rates estimated to be 100 to 1000 times higher than natural background levels[8]. Ecosystem degradation, driven by land-use change, invasive species, pollution, and climate change, has critical implications for ecosystem services and human well-being[9]. The IPBES Global Assessment underscored the interconnectivity between biodiversity and other environmental drivers, advocating for transformative change to halt degradation[10]. Moreover, recent studies have emphasized the importance of functional and phylogenetic diversity in maintaining ecosystem resilience[11]. Soil degradation and land use emphasize that soil health is a cornerstone of terrestrial ecosystem functioning, yet it is increasingly threatened by intensive agriculture, deforestation, and urban expansion. According to the FAO[12], approximately 33% of global soils are moderately to highly degraded due to erosion, salinization, compaction, acidification, and chemical pollution. Emerging research has focused on the role of soil microbiomes in nutrient cycling and plant health, with implications for sustainable agriculture[13]. Additionally, land degradation neutrality has been adopted as a Sustainable Development Goal target[14], prompting the development of monitoring frameworks using remote sensing and geospatial analysis[15]. Geosciences and earth system processes resonate with this research, emphasizing that geoscientific inquiry underpins our understanding of Earth's dynamic systems, including plate tectonics, volcanism, and sedimentary processes. Technological advances in seismic imaging, satellite gravimetry, and geochronology have revolutionized the study of the Earth's interior and crustal dynamics[16]. Moreover, the integration of geospatial technologies and Earth observation systems has enhanced the ability to monitor changes in cryospheric and hydrological systems in near real-time[17]. This has proven critical in assessing the impacts of glacial retreat and sea level rise on vulnerable regions. Again, environmental Sustainability and Human-Nature Interactions opined that the pursuit of sustainability in the Anthropocene era demands an integrated understanding of ecological limits, societal behavior, and governance mechanisms. The planetary boundaries framework introduced by Rockström et al.[18] defines a safe operating space for humanity by identifying key thresholds in Earth system processes. Subsequent research has refined these boundaries and stressed the urgency of addressing transgressions in areas such as climate change, biosphere integrity, and biogeochemical flows[19]. Environmental justice and indigenous knowledge systems have also been recognized as crucial components of sustainable development strategies[20]. Similarly, the literature in

Environment and Earth Sciences reveals the complexity and interconnectedness of natural systems and human societies. While scientific advancements have significantly enhanced our understanding of Earth's processes and environmental challenges, persistent gaps remain in implementing knowledge into policy and practice. Interdisciplinary collaboration, innovative technologies, and inclusive governance are essential in steering the planet toward a more sustainable future.

A place's long-term average weather is called its climate. Climate controls several earth-surface activities. In the first decade of the millennium, it became obvious that fossil fuel emissions are harming the earth's climate [21]. Climate change is a global issue that has and is affecting governments' thinking and resources because it threatens ecosystems' intrinsic worth and benefits to humanity. Climate change alters atmospheric components, shifting weather patterns. This causes extraordinary rain yield, precipitation, temperature density, and cloud appearance. As mentioned, humans cause climate change. In those activities, fossil fuels are used for energy. The world's economy and electricity generation depend on fossil fuels, mostly natural gas. Human activities, including travel, agriculture, and manufacturing, use this energy. Greenhouse gases (GHGs) like CO and CH are released into the atmosphere by fossil fuel consumption. Carbon dioxide from all sources is saturated in Earth's atmosphere, thickening cloud layers and harming the climate. In Aer, Mee, and Anikpa [22], Aina lists these effects as rising global temperatures, Rainfall fluctuation causes drought, desertification, and flooding. Ocean, river, stream, pond, and lake water levels change, and thunderstorms and severe winds occur frequently. Drought, floods, and rainfall fluctuations affect food and energy.

Research indicates that climate change awareness plays a pivotal role in shaping individual and collective environmental behaviour. Leiserowitz et al. [2] note that awareness is a prerequisite for public engagement, political will, and policy support, which are essential for climate action. Awareness encompasses not just the recognition of climate change as a phenomenon but also an understanding of its causes, consequences, and potential solutions. Several studies have examined the relationship between climate awareness and environmental stewardship. For instance, Ojala [23] found that informed youth are more likely to engage in pro-environmental behaviours when they perceive climate change as a solvable issue rather than an insurmountable crisis. Similarly, Lee et al. [24] argue that climate education and media communication can significantly enhance knowledge and encourage civic participation in environmental governance. However, the literature also reveals regional disparities in awareness levels. According to the Fagan and Huang [25], individuals in high-income nations tend to exhibit higher levels of climate change awareness compared to those in low and middle-income countries, where immediate economic concerns may overshadow environmental issues. This imbalance poses challenges to global climate governance and equity in adaptive capacities. Chapin et al. [3] propose that stewardship is inherently linked to a sense of place, ecological literacy, and moral responsibility. They argue that fostering a stewardship ethic requires both awareness and emotional connection to the environment. Moreover, Stern et al. [26]) suggest that values, beliefs, and perceived control over outcomes are central to shaping environmentally responsible behaviour, thereby reinforcing the importance of awareness campaigns that resonate with local cultural and social contexts. Research is growing, but awareness is not yet translating into sustainable behaviour change. Kollmuss and Agyeman [27] describe the "value-action gap," where environmentalists don't always act. This emphasises the need for integrated education, crop and earth science, and governmental incentives to bridge awareness and action.

Freshwater availability is a critical component of both environmental and societal resilience. Climate-induced alterations in the hydrological cycle, such as changes in precipitation patterns, snowmelt timing, and groundwater recharge, pose significant challenges to water security [28]. The over-extraction of aquifers, especially in arid and semi-arid regions, has led to long-term declines in groundwater storage [29]. Remote sensing technologies, such as the GRACE (Gravity Recovery and Climate Experiment) satellites, have enabled global-scale monitoring of water storage changes, providing key insights into groundwater depletion and drought vulnerability [30]. Additionally, integrated watershed management approaches have emerged to tackle water quality and quantity challenges holistically [31]. Urban areas are now home to more than half of the world's population, and this proportion is expected to grow. Urbanization contributes significantly to environmental degradation through land use change, pollution, and resource consumption. Ur-

ban heat islands (UHIs), air and water pollution, and habitat fragmentation are among the primary concerns [32]. Sustainable urban planning, incorporating green infrastructure, renewable energy, and circular economy principles, has been increasingly emphasized in academic literature. Research highlights the potential of nature-based solutions to enhance urban resilience while providing ecosystem services, such as stormwater management, carbon sequestration, and thermal regulation [33], Environmental pollutionincluding air, water, and soil contamination poses severe risks to both ecosystems and public health. Air pollution, in particular, has been linked to millions of premature deaths annually, with particulate matter ($PM_{2.5}$) identified as a major health hazard [34]. Microplastics and emerging contaminants (e.g., pharmaceuticals, personal care products) are increasingly being detected in aquatic systems and food chains, raising concerns about long-term ecological and health effects [35]. The growing field of environmental toxicology now plays a crucial role in informing policy and regulatory frameworks.

Transitioning to renewable energy is central to global climate mitigation strategies. Solar, wind, hydro, and bioenergy have seen significant technological advances and cost reductions over the past two decades. However, environmental trade-offs, such as land use for bioenergy crops or the ecological impacts of hydroelectric dams, require careful consideration [36]. Life cycle assessment (LCA) has become a standard tool for evaluating the environmental footprint of energy systems, supporting informed decision-making toward net-zero pathways [37]. The integration of decentralized renewable energy in low-income and rural regions also aligns with climate justice and energy equity goals. Environmental and Earth Sciences are increasingly embracing systems thinking, recognizing that complex environmental challenges cannot be addressed in isolation. The emergence of interdisciplinary frameworks, such as socio-ecological systems (SES) and Earth system science (ESS), has facilitated more holistic research approaches [38]. The use of big data, artificial intelligence (AI), and remote sensing is reshaping environmental monitoring and predictive modelling [39]. As the global community faces increasing uncertainty from climate change and ecological tipping points, adaptive governance and resilience-building are likely to become focal points of future research.

5. Theoretical Framework

The study is grounded in two main theoretical frameworks, one stipulated by Value-Belief-Norm (VBN) theory developed by Stern et al. [26]. The VBN theory posits that individuals are more likely to engage in pro-environmental behaviour when their values (especially biosphere and altruistic), beliefs (about environmental consequences), and norms (personal responsibility to act) align. Climate change awareness is seen as a precursor that influences environmental beliefs and activates personal norms that drive stewardship behaviour. Also underpinned in this study is the "Environmental Stewardship Theory" propounded by Chapin et al. [3], this theory emphasizes that stewardship involves proactive, ethical management of the environment based on knowledge, care, and action. This theory emphasizes the moral and ecological responsibility individuals and communities hold in sustaining the earth's ecosystems. Awareness is a foundational component, as it fosters understanding, emotional connection, and a sense of duty toward environmental protection. These two frameworks provide a lens to understand how knowledge (awareness) leads to belief formation, norm activation, and ultimately, stewardship behaviours.

6. Methodology

Methodology adopted in this research is a mix-method, involving both qualitative and quasi-experimental designs, which engages the use of focus group discussions and oral interviews to explore deeper insights into perceptions, biodiversity loss consciousness, and environmental depletion challenges. Also, applicable under the qualitative method is the secondary data collection mode, namely, reports from IPCC, government policy documents, and existing literature related to the context of the research. The empirical and scientific data analysis was presented from the data collected and was coded and subjected to analysis using a paired samples *t*-test. The study further employed a quasi-experimental design. Here we used a before-and-after design to test the theory of "Value-Belief-Norm" (VBN) developed by Stern et al., the VBN theory posits that individuals are more likely to engage in pro-environmental behaviour when their values (especially biosphere and altruistic), beliefs about environmental consequences, and norms (personal responsibility to act) align. The study population comprised of all those who

believe climate change consciousness leads to earth stewardship and those who do not believe. The study employed a purposive non-probability collection technique to select a sample of 100 individuals from the assigned instrument. Data for the study were collected through a standard *t*-test on environmental scientists, government agency personnel and public individuals. The data so collected were coded and subjected to analysis using the test statistic adopted for analysis of data was based on an independent *t*-test. The instruments' validity/and reliability are strong because the researchers conducted the research with a valid ethical clearance from an expert in the field who validated the instrument and justified its reliability. The standard test was more reliable and valid in the research because it offers reliable results in relation to the effects of climate change on the environment. The research used a pilot-tested instrument to justify the reliability of the outcome.

7. Data Analysis and the Results

The statistical analysis was conducted to evaluate the hypothesis at a significance level of 0.05 alpha levels.

Hypothesis

Individuals who believe climate change consciousness leads to earth stewardship and those who do not believe. The hypothesis was tested using an independent *t*-test analysis. **Table 1** displays the outcomes of the analysis.

Table 1. Independent *t*-test analysis of climate change awareness and those without awareness.

	GROUP	N	Mean	Std. Deviation	Std. Error Mean	*t.*	Sig. (2-Tailed)
SCORES	Climate change consciousness	100	67.33	11.187	1.119	16.376**	0.00
	Non consciousness	100	38.26	13.782	1.378		

Note: ** the result is significant.

The obtained result is statistically significant at a significance level of 0.05, with 198 degrees freedom of 198 and a critical *t*-value of 1.649.

Table 1 displays the outcomes of the analysis, indicating that the computed *t*-value of 16.376 surpasses the critical *t*-value of 1.649 at a significance level of 0.05 with 198 degrees of freedom. That is, Individuals who believed climate change consciousness leads to earth stewardship had an average score of 67.33, while those who do not believe in climate change consciousness had a mean score of 38.26. This means that individuals who believe climate change consciousness leads to earth stewardship have a higher score than those without climate change consciousness. The results further show that the higher the level of awareness and consciousness leads to environmental care and stewardship, the better the consciousness and awareness the better the environment, and vice versa. Based on these findings, the null hypothesis has been rejected and the alternative hypothesis has been supported. The result is equally shown in **Figures 1** and **2**, based on the respondent's age and the respondent's gender.

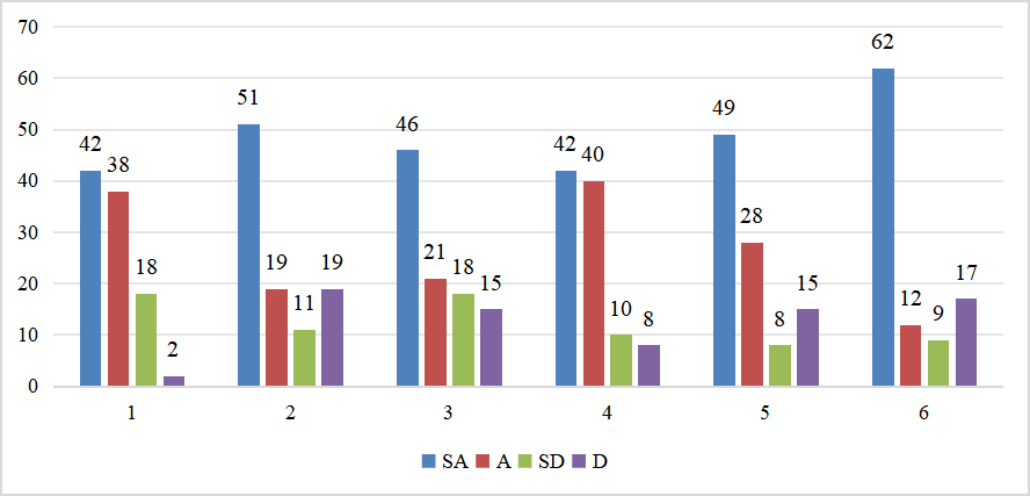

Figure 1. Bar graph showing the respondents decision.

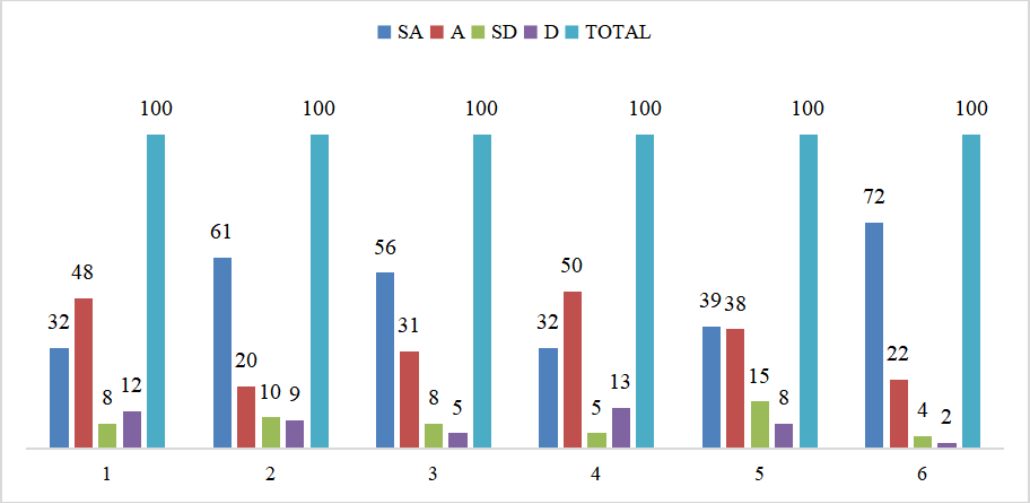

Figure 2. Bar graph showing the respondents decision.

We confirm here that the research was conducted under due process and that the research had received ethical approval from the Ethics Committee, Faculty of Arts, University of Calabar, Ethical Research Committee and the research ethical approval number is UC/FA/EC/25/003. We further consent that the research underwent a thorough field work which involved human participant respondents and the approval for human participants was received through verbal information and approval from the Department of Environmental Science, Faculty of Social Sciences, University of Calabar and the Ministry of Environment Cross River State, as well as environmental management agencies in Cross River State, Nigeria.

We also affirm here that the human participant involvement was derived through the use of oral interviews obtained from experts in the Department of Environmental Science, Faculty of Social Sciences, University of Calabar and Ministry of Environment Cross River State, as well as environmental management agencies in Cross River State, Nigeria. We also affirm that the results of the findings showed that individuals who believed climate change awareness and consciousness lead to earth stewardship were greater than those without awareness and consciousness, hence indicating that there is a need for climate change awareness as a strategy towards environmental and earth stewardship.

8. Discussion of Major Findings

Recent advancements in Environmental and Earth Sciences have significantly deepened our understanding of the dynamic interactions between Earth systems and anthropogenic activities. A growing body of evidence highlights the accelerated degradation of ecological systems due to human-induced stressors, such as greenhouse gas emissions, deforestation, urbanization, and unsustainable resource exploitation [19]. These scientific findings underscore the critical need for increasing public and political awareness of climate change and its cascading effects on biodiversity, water resources, land systems, and atmospheric dynamics. One major finding is the unequivocal link between rising global temperatures and increased frequency of extreme weather events, such as droughts, floods, and hurricanes [1]. Earth system models, particularly those from the Coupled Model Intercomparison Project Phase 6 (CMIP6), consistently project that continued emissions will result in temperature increases beyond 2 °C, leading to profound biophysical and socioeconomic consequences [7] Despite this, public understanding of the scale and urgency of climate change remains uneven globally [40]. The degradation of biodiversity, soil health, and freshwater systems is another central theme. For instance, soil degradation affecting roughly one-third of global soils reduces agricultural productivity and carbon sequestration potential, thereby exacerbating food insecurity and climate vulnerability [12]. Likewise, biodiversity loss diminishes ecosystem resilience and impairs ecological services vital for climate adaptation, such as pollination and water regulation [9]. Importantly, environmental monitoring tools, such as remote sensing, satellite gravimetry (e.g., GRACE), and GIS technologies have enhanced the detection of environmental change, allowing for more effective communication

of risks and opportunities [30]. These tools have proven essential in public outreach efforts, enabling visual representation of complex phenomena, such as glacial retreat, sea-level rise, and deforestation. However, bridging the gap between scientific knowledge and climate change awareness requires more than technological advancement. It demands interdisciplinary collaboration and culturally sensitive communication strategies that link environmental science findings with human narratives and values [41]. Studies indicate that framing climate change impacts in terms of local relevance and health outcomes is more effective in raising awareness and prompting behavioral change than abstract scientific metrics [42]. Overall, findings in Earth and environmental sciences provide robust empirical evidence of planetary stress and guide the development of mitigation and adaptation strategies. Yet, their full impact can only be realized through strengthened public awareness, science-policy integration, and inclusive dialogue. The urgency of climate change necessitates a shift from awareness to action, supported by informed citizens and evidence-based policies.

A central theme emerging from contemporary environmental and Earth science research is the increasing urgency to communicate scientific findings in ways that influence environmental and Earth preservation commitment. Despite robust data on climate impacts and planetary boundaries, a significant knowledge-action gap persists. This gap is not due to a lack of data but rather to inadequate public understanding, political will, and sometimes distrust in science [43,44]. For example, the concept of planetary boundaries, proposed by Rockström et al. [18], has gained widespread attention in scientific circles but remains undercommunicated in public and policy discourse. Among the nine boundaries identified, several, such as climate change, biodiversity loss, and nitrogen cycle disruption, have already been crossed, putting the Earth system at risk of abrupt or irreversible change [19]. Yet, awareness of these thresholds is limited outside academic and policy arenas. The role of education and media in shaping climate literacy is thus crucial. Studies show that climate change education, particularly when grounded in local environmental issues and participatory learning, significantly increases awareness and engagement [45]. However, misinformation and politicization of climate science, especially on digital platforms, continue to undermine trust in scientific consensus [46]. Environmental monitoring technologies and earth observation systems are playing a growing role in climate education and public engagement. Satellite imagery of deforestation, shrinking glaciers, and sea level rise makes abstract environmental changes tangible, facilitating visual and emotional engagement with scientific evidence [47]. Platforms, such as NASA's Earth Observatory or the Global Forest Watch, exemplify how open data and visualization can support both awareness and accountability. Moreover, citizen science initiatives, such as biodiversity monitoring, water quality testing, and climate data collection, empower communities to participate in scientific processes and environmental stewardship. These efforts not only generate valuable datasets but also foster personal connections to environmental issues, which are critical drivers of climate action [48]. From a governance perspective, research increasingly highlights the importance of trans-disciplinary approaches that integrate scientific evidence, indigenous knowledge, and community priorities. Indigenous and local knowledge systems often provide place-based insights into environmental changes, offering alternative frameworks for resilience and sustainability [20]. Collaborative frameworks that respect these diverse knowledge systems enhance both the relevance and legitimacy of climate strategies. Finally, findings from environmental science reinforce that climate change is a risk multiplier, exacerbating existing social and ecological vulnerabilities. For example, sea level rise and saltwater intrusion threaten coastal agriculture and freshwater supplies, disproportionately affecting low-income communities and small island states [49]. This underscores the ethical imperative of integrating equity and justice into environmental communication and policy. In conclusion, Environmental and Earth Sciences provide a compelling empirical foundation for understanding the causes and consequences of climate change. However, the translation of these scientific insights into widespread climate change awareness and action remains a major challenge. Bridging this gap demands not only improved science communication and education but also the incorporation of diverse perspectives and inclusive governance models [50]. As climate impacts intensify, the effectiveness of environmental science will increasingly depend on its ability to inform, engage, and empower society at all levels.

9. Conclusions

This study reinforces the centrality of climate change awareness in promoting environmental and earth stewardship. The findings, drawn from literature, empirical interviews, and scientific interpretation, highlight that awareness serves not only as a cognitive function but as a motivational driver for environmental action. Individuals who are more knowledgeable about climate change tend to exhibit greater concern for the planet and are more inclined to engage in pro-environmental behaviours [2,26]. However, the study also reveals persistent challenges, including widespread knowledge gaps, regional disparities, socio-economic barriers, and psychological detachment from environmental issues. While some interview participants demonstrated awareness and a willingness to act, many lacked access to accurate information, institutional support, or the resources needed to translate awareness into sustainable behaviour. These findings echo those of Kollmuss and Agyeman [27], who emphasized the "value-action gap" in environmental behaviour. Furthermore, the integration of indigenous knowledge from local interviews confirms the significance of community-based ecological wisdom, which, though often overlooked in mainstream discourse, can play a vital role in promoting resilience and sustainability [3]. Education and media were frequently cited by participants as powerful tools that can either bridge or widen the awareness gap, depending on how information is disseminated. Overall, this study concludes that while climate change awareness is a necessary condition for environmental stewardship, it is not sufficient on its own. Effective stewardship requires a combination of informed awareness, enabling structures, supportive policies, and inclusive strategies that engage both scientific and local knowledge systems.

10. Recommendations

Based on the synthesis of findings, the following recommendations are proposed:

Government and education stakeholders should introduce curricula that integrate climate change education into formal curricula. Governments and educational institutions should embed climate change education into all levels of schooling, emphasizing not only scientific understanding but also ethical and practical dimensions of stewardship.

Educational institutions and environmental scientists should leverage local knowledge for community engagement. Also, policy frameworks should recognize and incorporate indigenous and local ecological knowledge into environmental education and climate adaptation strategies, particularly in rural and underserved communities.

Radio, television, as well as online platforms should strengthen public communication through accurate media information, and media outlets should prioritize evidence-based reporting on climate issues while avoiding sensationalism. Public service campaigns should be tailored to cultural contexts to ensure relevance and clarity.

Governments and NGOs must provide accessible and address socio-economic barriers to actions and affordable alternatives that make sustainable choices viable, such as subsidies for clean energy, incentives for green farming, and infrastructure for waste recycling.

Government, community leaders, stakeholders and advocacy agencies should develop community-based climate programs, and local authorities and civil society organizations should create grassroots programs that promote environmental stewardship through participatory activities like tree planting, clean-up drives, and climate literacy workshops.

Environmental cleaning exercise should be made a must for all and sundry and dates set aside strictly for environmental sanitation. Refuse should be disposed of appropriately in designated areas pending recycling and reuse.

Custodians of culture, leaders and teachers should engender hope among youths; educational programs should emphasize solution-oriented narratives to counteract eco-anxiety and fatalism, encouraging young people to see themselves as capable agents of change.

Governments should take urgent steps to sensitising the general public on the causes and impact of climate change. The general public should, as a matter of importance, be educated on ways of mitigating and adapting to climate impacts.

The public should be warned of climate threats early. In accordance with the UNFCCC, the Nigerian government should evaluate SDG 13 and its aims to design a climate change policy that addresses the causes of human climate change and involves local and national regulation and management.

Policymakers, educators and NGOs should focus on the significance of this research and take proper measures

where necessary to improve on climate change impact.

This paper suggests that further research should be undertaken by other researchers on the impact of climate change on certain regions, nations, continents or at a global spectrum.

Author Contributions

E.A.O.: conception or design of the article, writing of the manuscript; A.O.B.: software and analysis; A.A.E.: library and resource materials; E.J.E.: analysis and interpretation of data; E.E.U.: substantive revisions to the manuscript; E.E.A.: proof editing; M.N.: supervision; G.E.-B.I.: Data analysis; E.L.A. and A.J.A.: acquisition and analysis; E.T.O. and O.O.A.: design of the article; I.A.: interpretation of data. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

The study was conducted in accordance with the Faculty of Arts Ethical Clearance Committee, University of Calabar, and approved by the Faculty of Arts Ethics Committee Review Board (or Ethics Committee) of University of Calabar (approval number UC/FA/EC/25/021 and date: 23rd June, 2025).

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The data used in this study are available from the corresponding author upon reasonable request.

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Conflicts of Interest

The authors declare no conflict of interest.

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