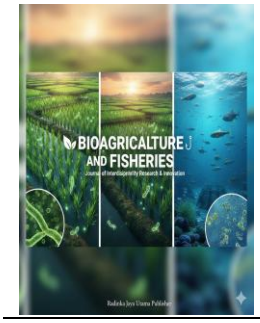

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Investigating the Role of Deforestation in Climate change and Air Pollution in Bauchi Local Government Area, Nigeria

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Abstract

This study investigated how deforestation contributes to air pollution and climate change in Bauchi Local Government Area of Bauchi State, Nigeria. Globally, deforestation reduces the capacity of forests to absorb carbon dioxide, thereby increasing atmospheric CO_2 levels and raising temperatures. Land-use change, including deforestation, accounted for 19% of global CO_2 emissions between 2020 and 2021. In the study area, a sample size of 345 respondents was determined using Yamane's (1967) formula from a total population of 2,507. Data were collected using stratified sampling and a quantitative survey research design. Multiple regression analysis revealed a significant relationship between deforestation and its environmental impacts, with the p-value (Sig. = .000) confirming statistical significance at the 95% confidence level ($p < 0.05$). Environmental and social effects were found to strongly influence climate change and air pollution, with an unstandardized coefficient of 0.475, standardized Beta of 0.432, and a t-value of 6.301. The findings emphasize that deforestation accelerates climate risks, degrades biodiversity, alters local ecosystems, and worsens air quality. The study recommends that government and community stakeholders prioritize sustainable forest management, enforce stronger environmental policies, and create widespread education and awareness programs on the consequences of deforestation. Such interventions are essential to mitigate climate change, reduce air pollution, and improve resilience in Bauchi LGA.

Keywords**:** Deforestation, climate change, air pollution, Bauchi, sustainable forest management

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Introduction

Deforestation is the practice of permanently removing or uprooting trees from the ground to give rise to something else other than forests (Alkhawaja, 2024). The reasons for deforestation are mainly to ensure that there is sufficient land for cultivation, infrastructure purposes, residential purposes, and manufacturing or industrial purposes. Deforestation is not only caused by human intervention but it can also be caused by other natural causes (Ghazoul & Medina, 2024). For example, when natural fires occur, large swathes of land covered by forests can be decimated within a short period. Forests are crucial for conservation and human survival. The climate change is increasing in magnitude worldwide. The global burden of climate change impacts already spans deaths, disease, the loss of livelihoods, damage to property and infrastructure, other economic losses, and the loss of biodiversity. Every to nine of carbon dioxide added to the atmosphere today compounds these impacts. Unless drastic action is taken to eliminate net emissions of greenhouse gases from human activity and remove historical emissions from the atmosphere, the impacts of climate change will persist for centuries. Some of its consequences, such as sea-level rise or glacier retreat, will become more severe over time, even if human emissions ceased today (Van Breedam et al., 2020). Climate change is a global crisis, though one whose impacts will be felt unequally around the world, with the greatest harm typically affecting communities in the Global South, vulnerable individuals in society, and future generations.

Despite the increasing importance of forest cover, many people contend that forests occupy lands that would otherwise be used for human settlement, development, and civilization. Forest cover utilizes land that can otherwise be used to provide settlement for millions of people now that in the world the population is fast rising (Tsering, 2019). Forests cover occupies land that would otherwise be converted into farming areas to be used crop and livestock farming so that the population of the world remains fed. The increasing trend of deforestation has negative impacts on the production and protection of the forests and livelihoods of those living around the forests. Due to illegal exploitation and poor implementation of legislation the forest cover is depleting at a devastation rate in the country. As a consequence of deforestation there is increasing risk of landslides, slope destabilization, floods, increase surface runoff and soil erosion. After the Kashmir earthquake (2023) an increased risk of landslides and debris flow was encountered due to exploitation of forests. Deforestation is the conversion of forest to an alternative permanent non-forested land use such as agriculture, grazing or urban development (Mishra et al., 2024). Deforestation is primarily a concern for the developing countries of the tropics (Eden, 1998) as it is shrinking areas of the tropical forests (Kusum Lata, 2024) causing loss of biodiversity and enhancing the greenhouse effect (Deb et al., 2018). FAO considers a plantation of trees established primarily for timber production to be forest and therefore does not classify natural forest conversion to plantation as deforestation (but still records it as a loss of natural forests).

Forest degradation occurs when the ecosystem functions of the forest are degraded but where the area remains forested rather cleared (Gao et al., 2018). However, the rapid increase in deforestation since 2020 has resulted in a major uptick in emissions of greenhouse gases from the Brazilian Amazon, which will have global humanitarian consequences. According to the World Resources Institute, in 2020, Brazil was the nation in the world with the highest decline in forestation where about 1,400,000 hectares of forest land was decimated through deforestation. Other areas include DR Congo, Bolivia, Malaysia, Peru, Madagascar, Cameron, Colombia, and Indonesia. In the list above, there are three African countries among the nations that are at the highest risk of losing a major chunk of their forest cover. This shows that African countries are among the nations in the world that are at risk of losing large forested areas and if the situation is not reversed, the continent

will be covered by large areas of land that have turned into deserts. Without forests, people will; lack the natural herbs they can use as medicine, without forests, the habitat for animals of all species will become destroyed. Forest cover also ensures that the air that the people breathe is filtered and the earth's surface is not affected by the harmful rays from the sun (Nazip Suratman & Abd Latif, 2020).

Over 4 billion hectares of the Earth's land are covered by forests. Of the world's forests, 93% are natural, while 7% are planted. Every year, the world loses 10 million hectares of the world's forests. Some 80% of the tropical rainforest are destroyed due to agriculture. Deforestation is the leading cause of 15% of carbon emissions. (Worku & Ayalew, 2024). Deforestation is considered to be a significant problem in various parts of the planet when it comes to preventing changes in the climate and also conserving biodiversity. Some nations are cutting trees at alarming rates Tropical forests hold approximately one-third as much carbon as is contained in the atmosphere.

Consequently, tropical forests are an important store of carbon, and their deforestation has the potential to contribute substantially to climate change. The Amazon contains 50% of the world's remaining tropical forest area and is therefore a globally-significant carbon sink. Deforestation increase affects the populations of world animals. With declining forest covers, the population of animals such as elephants and the orangutans will decline. Research by the World Wildlife Fund shows that if the current deforestation trend is not halted with strategic and sustainable solutions, over 420 million acres of forest cover will be lost between 2022 and 2030 (R et al., 2022). Forests play a critical role in the Earth's climate system, in a number of different ways. Most importantly for global climate change, they capture carbon dioxide from the atmosphere and convert it, through photosynthesis, into living biomass: tree trunks, roots, branches and leaves.

Forests also store carbon in forest soils, absorbed through leaf litter, woody debris and roots; whether these inputs are sequestered in the soil matrix or biodegraded and returned to the atmosphere as carbon dioxide, and if so at what rate, depends on complex interactions involving soil minerals, plants and soil organisms, and organic components, all influenced by factors such as local climatic conditions and forest management. This global warming has driven the retreat of glaciers, rising sea levels, and increasing frequencies and intensities of many extreme events, some of which are occurring with intensities unprecedented in the observational record. Nevertheless, it remains the case that not all climate-related harms occur due to climate change. In recent years, growing numbers of scientific studies have evaluated the role of climate change in a range of extreme events around the world, demonstrating the substantial role played by climate change in many of these events and therefore the gravity of climate change impacts experienced around the world.

Methodology

Research Design

The research used the descriptive survey design adopted a quantitative method because of its appropriateness to the topic under investigation. Survey design is a scientific method which involves observing and describing the behavior of the subjects without influencing of data for the purpose of answering research question under study (Ladia et al., 2025). The study is based on assess the role of deforestation on climate changes and Air pollution in Bauchi LGA. It is based on an in-depth investigation of individual group, or even to explore causation in order to find the underlying principles.

Population of the Study

The population of the study comprises of the entire wards in Bauchi LGA in Bauchi state as five (5) years 2020 - 2025. Censuses sampling will be adopted where the entire wards of Bauchi LGA. The target population comprised of Bauchi LGA wards of Bauchi state as retrieve from census sampling 2023.

Sample Size and Sampling Techniques

Simple random sampling techniques will be used by the researcher to collect the sample data from the population. Due to the nature of this research project, it appropriated to use simple random sampling techniques because of its feature of flexibility. The sample size to be used for the purpose of this research will be based on Yamane Formula for sample size. Accordingly, the sample size is (345) represented through the total population of (2507) as at 23rd February 2023.

Instrument for Data Collection

The researcher developed the instrument used in this thesis in order to obtain the required information. The four (4) point's likert's scale was scored as follows: Strongly agree, 1 point; Agree, 2 points; Disagree, 3 points; and Strongly Disagree, 4 points. From the questionnaire consisted of four sections A to E. Section A, demographic information of the respondents; section B contains information on the role of deforestation in driving climate change and air pollution in Bauchi LGA; Section C, concern with the 2. To identify the key causes of deforestation in driving climate change and air pollution in Bauchi LGA. Section D, contains information on the examine the environmental and social effects of deforestation and air pollution in Bauchi LGA while, section E, contains information on the explore sustainable forest management practices and for mitigating climate change in Bauchi LGA.

Data Validation and Reliability

In order to ensure the face and content validity of the instrument, the researcher structured questionnaire was submitted to supervisor for vetting so as to ensure their appropriateness, relevance and clarity.

Pilot Study

Test re-test reliability method was employed to establish the reliability of this research instrument. According to (Röseler et al., 2020) in test re-test reliability, the same measuring instrument was used to obtain two separate measurements on the same population at different times. The higher the degree of correlation between the two measurements, the higher the reliability of the instrument.

Data Collection

The researcher administered the instrument to the respondents and follow up with some explanations on how to respond to the questions but allow independent responses. However, the questionnaires have been administered each, face to face method of administration of the instrument will be use, each respondent will be given a considerate time to answer the questions, after which the researcher collect the questionnaire from the respondents.

Data Analysis

The data will be collected and analyzed using descriptive statistics of frequency in data analysis. This entails the used of frequency curves and percentages presented into table. Descriptive statistics of frequencies, percentages, means and standard deviations. Inferential statistics of Pearson Product Moment Correlation Coefficient analysis was used to test the research questions. All tests were carried out at 0.05 alpha level of significance. This statistic is suitable for this study, because, it's the relationship between the role of deforestation on climate changes and Air pollution in Bauchi LGA. The purpose of correlation analysis is to establish the association between the dependent and independent variables. Regression analysis will also be conducted to determine the relationship between independents variable and independent variable.

Model Specification

The process of determining which independent variables is on systems security, transaction

processing, report preparation and dependent variable ware the role of deforestation on climate changes and Air pollution in Bauchi LGAs however the statistics intuitive consist of graphs basics, using regression ANOVA probability time series model.

Results and Discussion

The chapter presents the results of the study based on the data collected using the methodology espoused in the previous chapter. The data was analyzed using the Statistical Package for Solutions and Services (SPSS). This chapter is organized into two main sections. The first sections consist of the demographic information of respondents and investigating the role of deforestation in climate change and air pollution in the study. In the second section, the main findings on the role of deforestation in driving climate change, causes of deforestation in driving climate change, environmental and social effects of deforestation, sustainable forest management practices and for mitigating on climate changes and air pollution in Bauchi LGAs are presented. This is followed by the measurement of the gap between the role of deforestation in driving climate change, causes of deforestation in driving climate change, environmental and social effects of deforestation, sustainable forest management practices and for mitigating on climate changes and air pollution in Bauchi LGAs by using the regression analysis for measure. The final section entails the discussion of the results on the role of deforestation in driving climate change, causes of deforestation in driving climate change, environmental and social effects of deforestation, sustainable forest management practices and for mitigating on climate changes and air pollution.

Table 1. Gender distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid variables	Male	154	44.6	44.6	44.6
	Female	191	55.4	55.4	100.0
	Total	345	100.0	100.0	

Source: Data gathered from the field

The gender distribution in the study indicates a slightly higher representation of females (55.4%) compared to males (44.6%). This suggests a fairly balanced sample with a moderate gender gap. The data reflects the demographic characteristics of the surveyed population, which could influence the study's findings depending on the context.

Table 2. Age distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid variables	18-30	54	15.7	15.7	15.7
	31-40	124	35.9	35.9	51.6
	41-50	69	20.0	20.0	71.6
	51-60	41	11.9	11.9	83.5
	Above 60	57	16.5	16.5	100.0
	Total	345	100.0	100.0	

Source: Data gathered from the field

The age distribution shows that the majority of respondents fall within the 31-40 age group (35.9%), followed by those aged 41-50 (20.0%) and above 60 (16.5%). Younger respondents (18-30) make up 15.7%, while the 51-60 group accounts for 11.9%. This indicates a diverse age representation, with a concentration in middle-aged groups, which may impact perspectives and responses depending on the study's focus.

Table 3. Marital status distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid variables	Single	53	15.4	15.4	15.4
	Married	187	54.2	54.2	69.6
	Divorce	105	30.4	30.4	100.0
	Total	345	100.0	100.0	

Source: Data gathered from the field.

The table on marital status distribution presents the composition of the 345 respondents in the study "Investigating the Role of Deforestation in Climate Change and Air Pollution in Bauchi LGAs." The majority of respondents, 187 (54.2%), are married, indicating that this demographic forms the most significant group in the study. This is followed by 105 respondents (30.4%) who are divorced, while single participants comprise 53 respondents (15.4%).

Table 4. Years of residency distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid variables	5–10 years	105	30.4	30.4	30.4
	11–20 years	152	44.1	44.1	74.5
	Over 20 years	88	25.5	25.5	100.0
	Total	345	100.0	100.0	

Source: Data gathered from the field.

The residency distribution reveals that most respondents (44.1%) have lived in the area for 11–20 years, followed by 30.4% with 5–10 years of residency, and 25.5% having lived there for over 20 years. This suggests that a significant portion of the population has substantial experience with the community, which could influence their perceptions and responses in the study.

Table 5. Pattern of Energy Use by the respondents

Variables	Frequency	Percentage	Valid Percent	Cumulative Percent
Fuel wood	126	36.8%	36.8%	36.8%
Fossils fuel	218	63.2%	100%	100%

Source: Data gathered from the field

The data indicates that the majority of respondents (63.2%) rely on fossil fuels for energy use, while 36.8% use fuel wood. This suggests a higher dependence on modern energy sources, though a significant portion still relies on traditional fuel wood, which may have implications for environmental sustainability and energy access in the area.

Table 6. Frequency of using fuel wood in a day (n= 126)

Variables	Frequency	Percentage	Valid Percent	Cumulative Percent
One	**10**	**7.9%**	**7.9%**	**7.9%**
Twice	39	31.0%	31.0%	38.9%
Thrice	64	50.8%	50.8%	89.7%
Four times	13	10.3%	10.3%	100%
Total	**126**	**100%**	**100%**	**100%**

Source: Data gathered from the field.

The frequency of fuel wood usage shows that most users (50.8%) rely on it three times a day, while 31.0% use it twice daily. A smaller proportion uses it four times (10.3%) or once (7.9%). This indicates a significant dependence on fuel wood among its users, likely for cooking and heating, which may have implications for deforestation and air quality.

Table 7. Supplied of the wood.

Variables	Frequency	Percentage	Valid Percent	Cumulative Percent
Commercial fuel wood seller	**73**	**57.94%**	57.94%	57.94%
Farmers	28	22.22%	22.22%	80.16%
Get it by yourself	17	13.49%	13.49%	93.65%
Others	8	6.35%	6.35%	100.00%

Source: Data gathered from the field

Table 7 Showed that (36.8%) of the respondents used fuel wood and the remaining used fossils fuel. Among the fuel wood users the majority (50.8%) used the fuel wood thrice in a day, followed by four times and above (10.3%), once (7.9%) and the rest of them were using it twice in a day (31.0%). Little below (57.94%) of the respondents were getting the fuel wood from commercial fuel wood sellers, followed by farmers (22.22%), get it by themselves (13.49%) and the rest from other suppliers (6.35%).

Table 8. Do you notice climate changes (n=345)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	106	30.7	30.7	30.7
	No	239	69.3	69.3	100.0
	Total	345	100.0	100.0	

Source: **Data gathered from the field.**

The data reveals that a majority of respondents (69.3%) do not notice climate changes, while 30.7% acknowledge experiencing them. This suggests a potential lack of awareness or perception of climate-related shifts among most respondents, which could influence attitudes toward environmental policies and sustainability efforts in the area.

Table 9. Model summary between suitable forest management practice, environmental and social effect, role of deforestation, courses of deforestation.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.444[a]	.197	.188	.40349

Source: Data gathered from the field

The model summary provides an analysis of the relationship between suitable forest management practices, environmental and social effects, the role of deforestation, and the causes of deforestation. The value of R = 0.444 indicates a moderate positive correlation between these variables, suggesting that there is some degree of association but not a strong relationship. The R Square value (0.197) implies that approximately 19.7% of the variance in the dependent variable can be explained by the predictors included in the model. This indicates that while the model explains some of the variability, a large proportion (approximately 80.3%) remains unexplained, highlighting the potential influence of other factors not included in this analysis. The Adjusted R Square (0.188) accounts for the number of predictors in the model and adjusts the R Square value accordingly. This slightly lower value compared to R Square indicates that adding more variables did not significantly increase the model's explanatory power, emphasizing the need to carefully evaluate the included predictors. The Standard Error of the Estimate (0.40349) represents the average distance that the observed values fall from the regression line. A smaller value would indicate better model precision, but here, it suggests some variability in the data. Overall, the model provides a moderate understanding of the relationships between the variables but indicates room for improvement in identifying additional factors or refining the model for better predictive accuracy.

Table 10. ANOVA[a] Respondent Role of Deforestation, causes of deforestation, Environmental and social effect, Role of Deforestation, causes of deforestation on climate changes and air pollution

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.616	4	3.404	20.908	.000[b]
	Residual	55.354	340	.163		
	Total	68.970	344			

The ANOVA table evaluates the statistical significance of the relationship between sustainable forest management practices, environmental and social effects, the role of deforestation, and causes of deforestation on climate change and air pollution. The Regression Sum of Squares (13.616) indicates the variability in climate change and air pollution explained by the predictors, while the Residual Sum of Squares (55.354) represents the unexplained variance. The Total Sum of Squares (68.970) shows the overall variability in the dependent variable. The Mean Square for Regression (3.404) and Residual (0.163**)** provide an average variance for each component. The calculated F-value (20.908) demonstrates the overall fit of the model, testing whether the included predictors significantly explain the variability in the dependent variable. The p-value (Sig. = .000) confirms that the relationship is statistically significant at a 95% confidence level ($p < 0.05$). This result suggests that the predictors collectively have a meaningful impact on climate change and air pollution. However, while the model is statistically significant, the specific contribution of each variable would require further examination through individual regression coefficients. These findings highlight the importance of addressing deforestation's causes and effects, alongside sustainable forest management, to mitigate climate change and air pollution in Bauchi LGAs.

Table 11. Respondent coefficients[’]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.399	.177		7.887	.000
	Role of Deforestation	.429	.068	.421	6.262	.000
	causes of deforestation	-.391	.078	-.427	-4.979	.000

Environmental and social effect	.475	.075	.432	6.301	.000
Sustainable forest management practice	-.146	.037	-.201	-3.912	.000

a. Dependent variable: climate changes and air pollution

The Table 11 coefficients provides insight into the individual predictors' contribution to explaining climate change and air pollution. The Unstandardized Coefficients (B) indicate the raw effect of each predictor, while the Standardized Coefficients (Beta) represent the relative influence of each variable in comparison to the others. The regression analysis provided in Table 8 of the study examines the relationship between various factors like the role of deforestation, causes of deforestation, environmental and social effects, and sustainable forest management practices, with the dependent variable being climate change and air pollution. The results show that the constant term has a statistically significant value of 1.399, indicating the baseline level of climate change and air pollution when all independent variables are zero. The role of deforestation is a strong positive predictor, with a coefficient of 0.429, suggesting that an increase in the role of deforestation contributes significantly to an increase in climate change and air pollution. This finding is consistent with other studies that highlight deforestation as a key driver of environmental degradation (Akinwale, 2010; Rono & Abongo, 2018).

The Constant (1.399) represents the baseline level of climate change and air pollution when all predictors are set to zero. It is statistically significant with a t-value of 7.887 and p-value of 0.000, suggesting that this constant term is a valid starting point for the regression model. The Role of Deforestation has a positive impact on climate change and air pollution, with an unstandardized coefficient of 0.429 and a standardized coefficient (Beta) of 0.421. The t-value of 6.262 and p-value of 0.000 indicate that the role of deforestation significantly contributes to the variability in climate change and air pollution. The Causes of Deforestation show a negative relationship with climate change and air pollution, with an unstandardized coefficient of -0.391 and a standardized coefficient (Beta) of -0.427. The negative sign suggests that addressing the causes of deforestation may reduce the impacts on climate change and air pollution. The t-value of -4.979 and p-value of 0.000 confirm the statistical significance of this variable. The Environmental and Social Effects variable also positively influences climate change and air pollution, with an unstandardized coefficient of 0.475 and a standardized coefficient (Beta) of 0.432. The t-value of 6.301 and p-value of 0.000 suggest a significant relationship between environmental and social effects and the climate outcomes. Sustainable Forest Management Practices show a negative relationship with climate change and air pollution, with an unstandardized coefficient of -0.146 and a standardized coefficient (Beta) of -0.201. The t-value of -3.912 and p-value of 0.000 suggest that sustainable forest management practices may help mitigate the impacts of deforestation on climate change and air pollution.

Overall, all variables are statistically significant ($p < 0.05$), and the coefficients indicate that both the positive and negative impacts of deforestation-related factors significantly contribute to climate change and air pollution. Similarly, the environmental and social effects also show a positive relationship with climate change and air pollution (B = 0.475), suggesting that the negative consequences of deforestation on society and the environment exacerbate the issues of climate change and air pollution. This aligns with research emphasizing the compounded effects of deforestation on local ecosystems and communities (Hallaj et al., 2024). On the other hand, causes of deforestation, such as agricultural expansion and illegal logging, present a negative coefficient (-0.391), implying that addressing these causes might help mitigate some of the adverse effects on climate and air quality, which has been supported by studies focusing on sustainable land use practices (Teano, 2025). Sustainable forest management practices, with a negative coefficient of -0.146, show that these practices, although having a smaller effect, help reduce the impacts of deforestation on climate change and air pollution. This result is in line with the literature that underscores the importance of adopting sustainable forestry practices in combating environmental challenges (Magalhães & Furtado, 2025).

Overall, these findings suggest that controlling deforestation and promoting sustainable forest management practices are critical to reducing the negative impacts of climate change and air pollution.

Discussion

This study, "Investigating the Role of Deforestation in Climate Change and Air Pollution in Bauchi LGA," sought to understand the factors driving deforestation and its implications for climate change and air pollution in the region. The findings highlight the significant role that deforestation plays in exacerbating environmental challenges, with clear links to local climate alterations and increasing pollution levels. The research involved 345 respondents, and data was collected through structured questionnaires focused on various demographic variables, perceptions of deforestation, and its environmental impacts. The results showed that a large majority of respondents (69.3%) were unaware of climate changes occurring in their area, pointing to the need for more widespread environmental education. Moreover, while some respondents (30.7%) observed climate changes, the majority (69.3%) did not. The study also revealed that deforestation directly contributes to both environmental and social effects, with unsustainable land management practices being the primary causes. Sustainable forest management practices were found to have a positive role in mitigating deforestation's impact, but there remains a significant gap in adopting these practices. Furthermore, demographic variables such as gender, age, and years of residency showed varying levels of awareness, with older and more long-term residents showing a better understanding of deforestation's effects. The statistical analysis (ANOVA and regression models) confirmed the strong relationship between deforestation, climate change, and air pollution. Specifically, variables like the role of deforestation, the causes of deforestation, and environmental/social effects were significant predictors of the local climate changes and pollution levels. Deforestation was identified as a key driver of environmental degradation, leading to negative social and economic outcomes, especially through unsustainable land management practices. The study found that sustainable forest management practices could play a vital role in mitigating the adverse effects of deforestation (Ali et al., 2025). The results from regression and ANOVA models confirmed the statistically significant relationship between deforestation and climate change, as well as the link between environmental/social effects and air pollution (Butt et al., 2021).

Conclusion

The study concluded that deforestation is a critical issue affecting climate change and air pollution in Bauchi LGAs. Unsustainable land use practices, inadequate forest management, and the rapid expansion of agricultural land contribute significantly to the degradation of the environment. These changes are not only impacting the local climate but also leading to increased air pollution, which further exacerbates health risks and reduces the quality of life in the region. The limited awareness among residents about the role of deforestation in these environmental issues suggests a need for better education and community engagement. Without a deeper understanding of how deforestation influences climate and air quality, efforts to combat these problems will be less effective. By addressing deforestation in Bauchi LGAs requires a concerted effort from all stakeholders, including government bodies, local communities, and environmental organizations. Only through collective action and sustained efforts can the region hope to mitigate the negative impacts of deforestation on climate change and air pollution. The loss of forests, driven by agricultural expansion, urbanization, and illegal logging, has led to increased vulnerability to environmental problems, including the intensification of climate change and the rise in air pollution levels (De Marco et al., 2022). Furthermore, the lack of awareness about the impact of deforestation on the environment hinders effective action. Public education on the consequences of deforestation, the importance of

forest conservation, and its effects on the local climate is crucial to improving understanding and fostering more responsible behavior among residents(Kalpana Soni, 2023).

Conflicts of Interest

No conflicts of interest are disclosed by the writers.

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Author contribution

Conceptualization, H.S.I, methodology, S.U.M, validation, S.U.M; formal analysis, S.U.M.; investigations. H.S.I; resources, S.U.M; data curation, S.U.M.: writing original draft preparation, H.S.I.; writing review and editing, S.U.M: visualization, H.S.I. All authors have read and agreed to the published version of the manuscript.

Declaration of generative AI in scientific writing

The author acknowledges having used the Generative AI tool Grammarly-AI for grammar/language improvement, summarizing supporting literature. The author is solely responsible for all published content and has verified the accuracy and authenticity of the AI output.

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