

Anthropogenic Pressures on Selected Ahmadu Bello University Forest Plantations: Assessing the Consequences for Forest Sustainability

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Abstract

Every year, forests are lost due to a variety of human-caused factors, even with the efforts to reduced deforestation through afforestation, reforestation, tree planting, and agro-forestry techniques. At Ahmadu Bello University, anthropogenic activities stress on selected forest plantations were examined in order to determine the implications for the sustainability of the forests. A total of 120 questionnaires were randomly administered and 100 were retrieved. The questionnaire was administered in the following other; Forestry officials (20) community members (50) and Farmers (50). The questionnaire was designed in English Language and administered in two ways, some are distributed to the respondents and retrieved later while others are administered by group of interviewers who could speak and write in local dialects. Face - to - face method of interviews was adopted by the group. A total of 6 plantations were randomly selected based on their proximity, stock density, economic values and vulnerable to various anthropogenic activities. Simple descriptive statistic was used to analysed the data collected. The results show that 39.0% of the respondents were between the age brackets of 31 – 40 years. 50% of sampled respondents are married while 25% are single. 68% are male while 32% are female. 30% of the respondents are forestry practitioners. 37% of the respondents had primary school education, 10% had no form of formal education, 15% had Quranic education, 12% had secondary school education, 26% had tertiary education. 38.10% of the respondents identified that farming / livestock activities are the major anthropogenic activities in the study area. 45% of the respondents identified that extent and intensity of various anthropogenic activities is very severe on ecosystem, 95% of the respondents agreed and have observed that human activities cause changes in forest plantation ecosystem 45% are of the opinion that impact of anthropogenic activities results in habitat loss. 34.88% o engaged in these negative acts because of poverty and lack of alternative livelihood. 37.12% identified that these acts only make minimal contribution to the household in supporting their family as alternative source of income while 45% of the respondents identified that public awareness is the main strategy to adopt in curbing these acts in our forest plantation estates. It was recommended that the stakeholders draft and implement new forest policy reforms that would severely punish offenders in order to deter future offenders. Finally, it was suggested that forest guards be hired to patrol plantations in order to curb all of these anthropogenic activities.

Keywords: Pressures, Sustainability, Consequences, Anthropogenic, Plantation, Deforestation

Introduction

The world has lost roughly 178 million hectares of forest since 1990, which is an area roughly the size of Libya (FAO, 2020). Developing nations, including Nigeria, are beset by issues resulting from environmental degradation that has a significant impact on climate change. These issues are obvious and pose a threat to human survival. The majority of people in Sub-Saharan Africa are well known to rely on forests for their social and economic needs due to a lack of alternative livelihoods, these reliance triggers various anthropogenic activities within forests resulting in different levels of deforestation and degradation (Daudi *et al.*, (2025) and despite efforts to reduce deforestation through afforestation, reforestation, tree planting, and agro-forestry practices, forests continue to be lost annually (Vogt *et al.*, 2019; FAO 2020). Human activities like industrial farming, subsistence farming, building materials consumption, illegal logging, or industrial logging intensify deforestation (Gwalema, 2015). The future of African forests stands uncertain due to the continent's rapid population growth and high rate of urbanization (Mhache 2012; Jacovelli 2014). Africa had the highest annual rate of net forest loss in 2010-2020, with 3.9 million ha, followed by South America, at 2.6 million ha (FAO 2020). Similar trends may be seen in Nigeria, where between 2000 and 2005, the country had one of the highest rates of deforestation worldwide, at 12.2%, or 11,089,000 hectares, according to an FAO report (FAO, 2005).

Nigeria is among the nations with the greatest rates of deforestation worldwide, having lost over half of its forests in the past 50 years, according to a 2011 FAO analysis (FAO, 2011). Furthermore, Nigeria has the highest rate of deforestation at 3.5% or 400,000 hectares annually, making it one of the least developed nations, according to the International Institute of Tropical Agriculture (IITA, 2011). 400 out of 1,000 hectares of forestland are deforested annually, and only 26 hectares of these are replanted, leaving 374 hectares deforested, according to another report by Babalola (2012). Adewuyi & Olofin (2015) reported that anthropogenic activities such unregulated wood harvesting for fuel, the pursuit of food and fruits, medicine, animal feed, and building are among the primary causes of the depletion of Nigerian forest resources. According to other research, Nigeria's forest loss is being driven more and more by logging, agriculture, urbanization, and wildfire (Ehigiator and Anyata, 2011; Bamba *et al.*, 2011; Ogundele *et al.*, 2016; Otum *et al.*, 2017; Oyetunji *et al.*, 2020).

According to Ogundele *et al.*, (2016), some of the causes of deforestation and anthropogenic activities in Nigerian plantations include urbanization, industrialization, infrastructure development, tourism, bush burning, mining, logging, and fuelwood collection, corruption, and inadequate policy implementation. Human-induced acts that modify the ecology, biodiversity, and natural environment are known as anthropogenic activities (Sodimu, 2016). The environment may be impacted by these actions in a favourable or negative way. Furthermore, the loss of biodiversity due to deforestation decreases the Earth's natural resilience to environmental change, threatening global ecological stability. (Daudi *et al.*, (2025). Global warming (Cook, 2016) and environmental degradation (Sahney, 2010) are examples of human-caused changes to biophysical landscapes and ecosystems, biodiversity, and natural resources (Hawksworth & Bull, 2008). Anthropogenic impact on the environment, or human impact on the environment, is the aggregate term for these alterations. As long as there is an issue with unsustainable human population expansion, the negative effects of changing the environment to meet social expectations will only worsen (Stockton, 2015).

All the same, these ecosystems are under a great deal of stress due to anthropogenic activities such as human population growth and related activities. Plantations' ability to remain sustainable is seriously threatened by anthropogenic activities, which include a broad range of human-induced consequences. (FAO, 2019). According to a Lambin *et al.*, (2003) and FAO (2006), they found that logging, agriculture, and other human activities cause the loss of roughly 6 million hectares of primary forest every year, along with changes in land cover and usage. Between 1981 and 2017, Nigeria's NPP rose in grasslands and woodland areas but declined in 40% of cropland and hardly changed in cropland. This took place against the backdrop of the doubling of the human population and the increasing demand for food resources (Bai & Dent, 2006). Several forest plantations were established on the expansive grounds of Ahmadu Bello University's (ABU) main campus, and in addition to their aesthetic value, they provide essential ecosystem services like carbon sequestration, air filtration, and habitat provision for a variety of fauna. However, the growing number of students, staff, and visitors on campus, as well as the surrounding neighbourhood, have resulted in more anthropogenic stresses on these plantations. For this reason, it is essential to comprehend the type and scope of anthropogenic activities on these particular plantations in order to develop effective management strategies that will lessen their detrimental effects and guarantee the long-term sustainability of these priceless ecosystems.

Materials and Methods

The Study Area

The study was conducted in Ahmadu Bello University main campus in Samaru – Zaria located at $11^{\circ} 15'N$ to $11^{\circ} 3'N$ of the equator and longitude $7^{\circ} 30'E$ to $7^{\circ} 45'E$ of Greenwich Meridian (Ibrahim *et al.*, 2020) in Sabon Gari local government Area of Zaria, Kaduna State. The vegetation in the local government area is the Northern Guinea Savanna with annual rainfall of 1500mm -2000mm. The local Government is an Agrarian community. They produce crops such as rice, maize, millet, soya beans, beans etc. The indigenous people of the local Government are predominantly Muslims and are Hausa's. (NPC, 2006; Sodimu *et al.*, 2021)

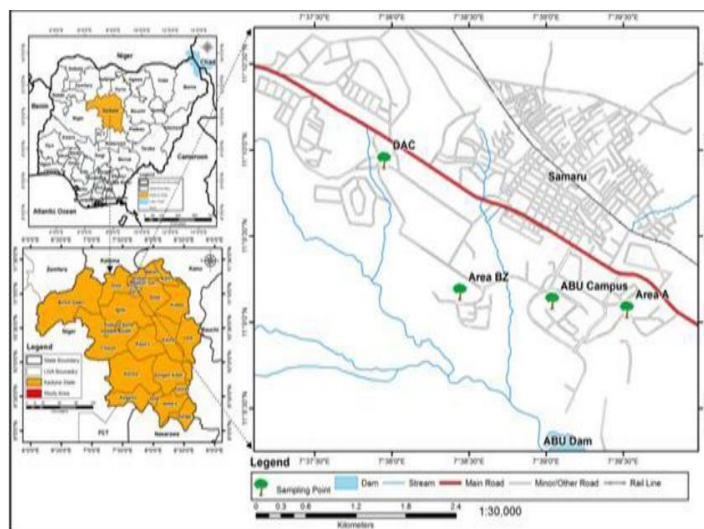


Figure 1: Map of the Ahmadu Bello University Main Campus

Data Collection and Source

Primary data and secondary were used for this study. The primary data were collected using Mixed – methods approach (structured questionnaire and field observations). The questionnaire was designed to collect the following types of information:

- Demographic characteristics of the sample respondents such as age, marital status, education status and so on.
- What are the primary anthropogenic activities affecting the Ahmadu Bello University and Savannah Forestry plantation?
- How do these affect forest ecosystem (structure, composition and biodiversity)?
- What strategies can mitigate the negative impacts of anthropogenic activities and promote sustainability of the plantations in the study area?

The field observations involved using observation sheets to records various / primary anthropogenic activities noticeable on the selected plantations in the study area. The secondary data involved the use of textbook, journals, conference, proceedings and so on.

Sampling Technique

A total of one hundred and twenty (120) questionnaires were randomly administered and one hundred (100) were retrieved. The questionnaire was administered in the following other; Forestry officials (20) community members (50) and Farmers (50). According to Sodimu & Abdulkadir (2025), the questionnaire was designed in English and administered in two ways: some are distributed to the respondents and retrieved later while others are administered by group of interviewers who could speak and write in local dialects. Face - to - face method of interviews was adopted by the group. A total of six (6) plantations were selected based on their proximity, stock density, economic values and vulnerable to various anthropogenic activities. The selected plantation in ABU are *Khaya senegalensis* (Lat.11.14'38'', Long.7.64'80''), *Albizia lebbek* (Lat.11.14'15'', Long.7. 64'78''), *Azadiracta indica* (Lat.11.14'66'', Long.7.64'48''), *Adansonia digitata* (Lat.11.16''73'', Long.7.63'01''), *Tectona grandis* (Lat.11.16'68'', Long. 7.63'10'') and *Eucalyptus camaldulensis* (Lat.11.16'80'', Long.7.62'87''). Six (6) observation sheets were used, one per plantations to records various / primary anthropogenic activities noticeable.

Analytical Technique

Data collected using questionnaires were cleaned, edited, coded and analysed using Statistical Package for Social Science (SPSS) Version 21 and Microsoft Excel Spreadsheets. Quantitative data were compiled, summarized and analyzed using descriptive statistics (percentages, frequency distribution tables, mean, standard error and charts) and cross tabulation technique after which tables showing relationship between variables and percentages were drawn. Data collected using observation and interviews were subjected to conceptual content analysis for generating of narratives.

Results and Discussions

Demographic Characteristics of Sampled Respondents

Some demographic characteristics are known to influence anthropogenic pressures on selected Ahmadu Bello University plantations. The variable analysed include Age, Marital status, years of experience, educational status and so on.

Table 1: Socio-economic characteristics of sampled respondents

Variable	Respondents	Percentage (%)
* Age in years		
10 - 20	12	12.0
21 - 30	18	18.0
31 - 40	39	39.0
41 - 50	16	16.0
51 and above	15	15.0
*Marital status		
Married	50	50.0
Single	20	20.0
Divorced	10	10.0
Widowed	12	12.0
Widower	08	8.0
*Gender		
Male	68	68.0
Female	32	32.0
*Educational level		
Primary	37	37.0
Secondary	12	12.0
Tertiary	26	26.0
Quranic	15	15.0
No formal education	10	10.0
*Occupation		
Farmers	42	42.0
Students	10	10.0
Forestry practitioner	30	30.0
ABU/SFRS Community	18	18.0
Total	100	100.0

Source: Survey data (2024)

Table 1 revealed that 39.0% of the respondents were between the age brackets of 31 – 40 years. This implies that they are at the middle and economically active age which could have positive effect on their standard of living. Sodimu *et al.*, (2008) observed that age bracket has a positive influence on forestry management. 50% of sampled respondents are married while 25% are single. 68% are male while 32% are female. 30% of the respondents are forestry practitioners. 37% of the respondents had primary school education, 10% had no form of formal education, 15% had Quranic education, 12% had secondary school education, 26%

had tertiary education. This indicates that a great percentage of the respondents in the study area had formal education at various levels. This finding has therefore reflected the importance of education in forestry management and plantation techniques. Zira & Boni (2018) observed that the more individuals are exposed to any form of education, the more likely they will have a better understanding of their environment.

Primary Anthropogenic Activities Affecting Plantation

The forest plantation areas play significant environmental and socio-economic roles toward national development, maintenance of environmental quality and enhancement of socioeconomic standards of the people (Sodimu, 2016). However, various anthropogenic activities in these plantations affected them negatively from sustainably achieving the objective and main purpose of establishment (Wright, 2005). The principal anthropogenic activities affecting forest plantation in the study area are elucidated in figure 2 below.

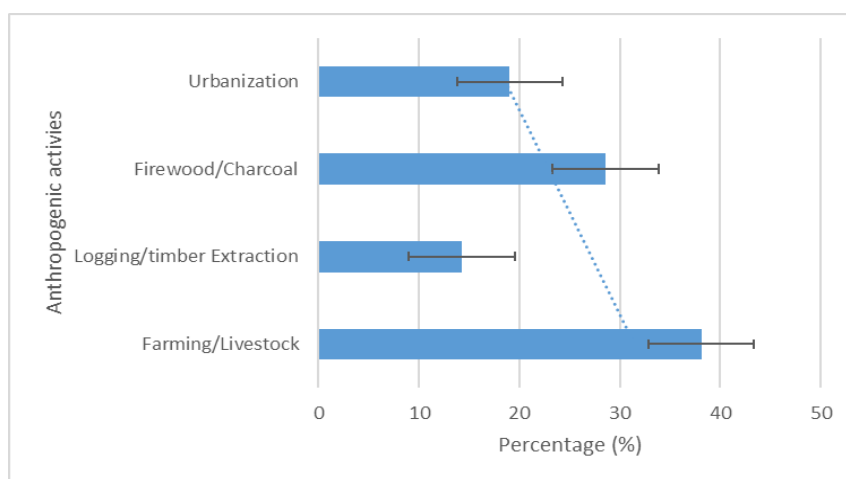


Figure 2: Primary Anthropogenic Activities affecting plantation

**Multiple response*

Figure 2 shows that 38.10% of the respondents identified that farming / livestock activities going on in the plantations and livestock coming in to graze unauthorized are the major primary anthropogenic activities in the ABU plantation this is closely followed by Firewood/charcoal production (28.5%) and logging/timber had the least (14.29%) This agree with the submission of (Khaleghi, 2017) who said that farming and illegal logging constitutes serious environmental problems. Also, in consonance with the work of Mhache (2024) Who said farming, logging, firewood collection and over grazing by livestock are the major primary causes of anthropogenic activities in our forest estate leading to biodiversity loss, change in forest ecosystem, wildlife disturbances, deforestation and drying of water sources.

Extent And Intensity of Anthropogenic Activities on Ecosystem

Table 2 shows various extent and intensity of anthropogenic activities on both flora and fauna activities in the plantation. The following variables were observed, impact on forest ecosystem, impact on local wildlife population and so on

Table 2: Intensity of Anthropogenic Activity on Forest Plantation Ecosystem

S/N	Variables	Frequency	Percentages (%)
1	*Impact on Ecosystem		
	Very Severe	45	45
	Severe	25	25
	Less Severe	20	20
	Not Severe	10	10
	Total	100	100
2	*Changes in forest ecosystem		
	Yes	95	95
	No	05	5
	Total	100	100
3	*Impact on Local Wildlife Population		
	Habitat loss	45	45
	Fragmentation	22	22
	Population decline	30	30
	No impact	03	03
	Total	100	100

Source: Survey data (2024)

Table 2 revealed that majority (45%) of the respondents identified that extent and intensity of various anthropogenic activities is very severe on ecosystem, closely followed by 25% of respondents who identified the impact severe while 10% identified the impact Not severe, 95% of the respondents agreed and have observed that human activities causes changes in forest plantation ecosystem while only 5% disagree with the assertion. Furthermore, 45% of the respondents in the study area are of the opinion that impact of anthropogenic activities results in habitat loss, closely followed by wildlife population decline (30%) while No impact (3%). The above results are in agreement with the findings of NEST (1991); Sodimu (2016), who indicated that diverse anthropogenic activities result in significant losses of local wildlife habitat, which, if unmitigated, may lead to the extinction of certain valuable species.

Socio- Economic Drives of Anthropogenic Activities

Social and economic factors as shown in table 3 that motivate individual, community or organization to engaged in such act of anthropogenic activities that impact the environment negatively particularly in relation to forest plantation ecosystem. Such as the benefits, income, raw materials and so on

Table 3: Social and Economic Drives of Anthropogenic Activities

S/N	Variables	Frequency	Percentage (%)
1	*Motivation of individual/community to engage in these acts.		
	Economic benefit	45	26.16
	Poverty/ lack of alternative livelihoods	60	34.88
	Cultural/traditional practices	25	14.53
	Lack of awareness	32	18.61
	Government policies	10	5.81
	Total	172	100

2	*Contribution To Household Income		
	Secondary source	24	18.18
	Primary source	37	28.03
	Minimal contribution	49	37.12
	No contribution	22	16.7
	Total	132	100

Source: Survey data (2024) *Multiple Response

Table 3 shows that 34.88% of the respondents engaged in this negative acts because of poverty and lack of alternative livelihood closely followed by lack of awareness (18.61%) where most of the respondents claimed that they are not aware, what they are doing is wrong, some even says it is a natural resources therefore, no one can prevent them from engaging in this act while various government policies is the least with 5.81%. 37.12% of the respondents identified that these acts only make minimal contribution to the house hold in supporting their family as alternative source of income closely followed by primary source of income (28.03%) while respondents identified that these acts did not contribute anything to house hold income is the least with 16.7%.The aforementioned findings are consistent with research of Ijigah & Akinyemi (2015); Sule *et al.* (2016), who found that people working on forest plantations for a variety of reasons do so to support their families and raise their standard of living. Sule *et al.* (2016) also emphasized the fact that, some people use this as their main source of income in order to support their families.

Strategies To Mitigate the Effect

It is of paramount importance to curb these activities by formulating various policies and strategies because lots of flora and fauna species are already being threatened of extinction some of important species are on watch list. Strategies elucidate in figure 3 were suggested to mitigate the effect.

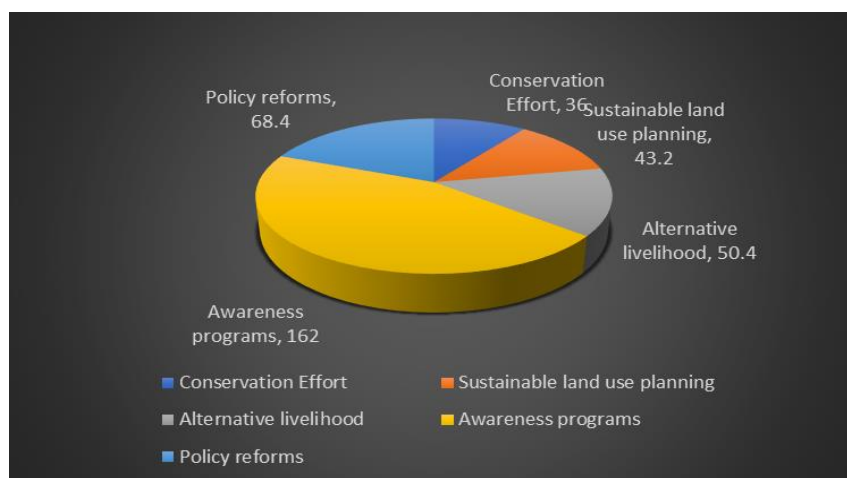


Figure 3: Strategies to mitigate anthropogenic effect on forest plantation

Figure 3 revealed that majority (68.4%) of the respondents identified that public awareness is the main strategy to adopt in curbing these acts in our forest plantation estates closely followed is Policy reforms (68.4%) and lastly is the conservation effort (36.0%). These results are in agreement with NEST (1991) and Sodimu (2016) where they reported that public awareness through either documentary or making jingles

on television and radio stations or organizing workshops is usually the most effective methods of creating awareness on forestry related opinions supported with aggressive afforestation, reforestation, agroforestry and enrichment planting projects.

Conclusion and Recommendation

The findings show that anthropogenic activities performed in ABU plantation accelerated deforestation. There is a growing threat to the forest sustainability due to human activities performed. The principal anthropogenic depletion (farming/livestock; firewood/) of the forest plantation in ABU for many uses ranging from socio - economic benefits constitutes serious environmental problems without proper control especially during the onset of raining season to young plantations. The continuous depletions of forest plantation areas by such acts needs to be addressed through legal and strategic applications such as the public awareness, forest policy reform and aggressive afforestation and reforestation projects before most of the valuable and promising forest plantation and local fauna species gone into extinction. Also, new forest policy reforms should be done by the stakeholders and implement in such a way that the offenders should be severely punish to serve as deterrent to others and lastly, forest guards should be employee to be patrol both the ABU plantations to curb all these anthropogenic activities.

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