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Amusa T O ● Oladaride R O ● Wahab M K A



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## ASSESSMENT OF PUBLIC PERCEPTION OF SOCIOECONOMIC IMPACTS OF FOREST PLANTATION AT UNIVERSITY OF ILORIN, NORTH-CENTRAL NIGERIA

AMUSA T O <sup>a\*</sup> • OLADARIDE R O <sup>a</sup> • WAHAB M K A <sup>b</sup>

<sup>a</sup> Department of Forest Resources Management, University of Ilorin, Nigeria

<sup>b</sup> Department of Forest Resources Management, Osun State University, Nigeria

\*Corresponding Author's email: [amusa.to@unilorin.edu.ng](mailto:amusa.to@unilorin.edu.ng)  
Phone: 07033831616; 08051750289

**ABSTRACT:** The area of planted forests across the globe has continued to increase. However, the environmental and socioeconomic impacts of planted forests have not been well investigated in this part of the globe. In this study, we examined people's perception of socioeconomic impacts of a teak plantation at University of Ilorin, north-central Nigeria. A simple random sampling technique was used to select 356 respondents from four categories of stakeholders in the university community. Data were obtained with the aid of a structured questionnaire on issues relating to both positive and negative perceptions of the impacts of the plantation. The data were analysed using descriptive and inferential statistical tools. Respondents across stakeholder groups agreed to both positive and negative impacts of the plantation. The highest positive impact of the plantation was its contribution to job creation and income generation, while the danger of fire outbreaks and risk to lives and properties was the most concerned negative perspective for the respondents. There were no statistical associations between socioeconomic variables of respondents on perception of both positive and negative impacts measured for the plantation, except for level of education ( $R = 0.744$ ;  $p < 0.05$ ). The study lends credence to the importance of socioeconomic impact assessment in the establishment of a large-scale project such as a forest plantation in order to reduce potential social conflicts that may arise during and after establishment of the plantation. We suggest the need for response mechanisms that integrate the management objectives of establishing the plantation with socioeconomic concerns of the people.

**Keywords:** Teak plantation, land use, social conflicts, management objectives

### 1. INTRODUCTION

The area of planted forests across the globe has increased by 123 million hectares since 1990 and now covers about 294 million hectares (FAO and UNEP, 2020). This increment has been viewed as a means of addressing the challenges of deforestation, forest degradation, climate change, energy and livelihood needs of the human population. It has also been justified by the expected profitability of investing in large-scale tree plantations to meet increasing global

demand for timber and industrial roundwood (Jürgensen *et al.*, 2014; Malkamäki *et al.*, 2018). However, concerns have been raised on the environmental and socioeconomic impacts of plantation forestry. The socioeconomic impacts of establishing large-scale tree plantations have been shown to vary across geographical and managerial contexts, resulting in both positive and negative outcomes on local communities (Malkamäki *et al.*, 2018).

Flaten (2011) in a study on the impacts of tree plantation expansion on rural communities in the Central North of Tasmania, reported that respondents described a greater number of negative impacts than positive impacts. Similarly, D'Amato *et al.* (2017) examined the views of local communities on changes in ecosystem services associated with rapid land use transformation through plantation-based forestry in southern China. The study reported some negative effects on environmental quality after the establishment of the industrial plantations, especially on soil and water. Furthermore, the reduced productivity from cropland surrounding industrial plantations, coupled with other financial drivers, induced several villagers to switch from agricultural crop production to household plantations. Cuong *et al.*, (2019) opined that forest plantation establishment did not improve household's income and livelihoods in rural areas of Bac Kan Province, Vietnam.

In contrast, Ofoegbu (2014) in the study of contribution of industrial tree plantation to welfare of rural households in villages located in the industrial tree plantations in Iswepe and Piet Retief communities of Mkhondo local municipality, South Africa showed that household in these communities enjoyed direct benefits such as employment opportunities, and indirect benefits such as provision of housing linked to the social responsibility spending of tree plantation companies operating in the locality. In the same vein, Pirard *et al.* (2017) investigated the perceived impacts of industrial tree plantations across three islands in Indonesia (Java, Borneo, Sumatra) and showed that perceptions toward pine and teak plantations tend to differ from those toward acacia pulpwood plantations in several ways. Pine and teak plantations were perceived to have a higher number and variety of benefits and services, a higher number of positive impacts, a better environmental record, and to present more opportunities to local people for use of plantation land and products for improving rural livelihoods.

University of Ilorin in her effort to key into the national and global efforts of planting trees, especially within the highly deforested savanna zone of Nigeria, embarked on a large-scale teak plantation project in July 2008, with the planting of 57 hectares of the species that year. Within five years (2008 – 2012), a total of 616 hectares of teak was established (Amusa and Adedapo, 2021). The principal objectives of the teak plantation project were: protection of the environment, provision of aesthetic value to the vast landscape of the university, development of wood capital for poles and timber that can significantly contribute to the internally generated revenue of the university at maturity and provision of model field laboratories for teaching, research and innovations for academic staff and students of the university. The entire plantation area of the University was considered

as the most ambitious and single largest plantation own by an academic institution in sub-Saharan Africa.

There is need for more scientific research into the environmental and socioeconomic effects of planted forests. A deeper understanding of the local socioeconomic impacts of existing large-scale tree plantations, their interlinkages, and those conditions that have resulted in positive impacts is required to better design and manage plantations so that they contribute to both environmental and socioeconomic conditions of the local people. Against this backdrop, this paper reports on a study of people's perception of socioeconomic impacts of forest plantation at University of Ilorin, north-central Nigeria.

## 2. MATERIALS AND METHODS

### 2.1. Study Area

The University of Ilorin teak plantation is located in the north-eastern part of the main campus of the institution. It is geographically situated on Latitude 08° 27' 24.6" N - 08° 29' 54" N and Longitude 04° 39' 56.7" E - 04° 40' 01" E covering about 616 hectares (Figure 1). It sits within an elevation range of 278m to 340m above sea level (Mohammed *et al.*, 2021). The plantation's terrain is characterized by east and west facing slopes that drain into the central part to create a major river channel that flows northwards. The University has a land area of about 15,000 hectares and lies in the Southern Guinea Savanna Ecological Zone of Nigeria. It has a tropical climate with distinct wet (April – November) and dry seasons (December – March). The rainfall pattern exhibits a double-maxima, with an annual range of 1000 to 1500 mm. The temperature ranges between 25° and 30°C during the wet season and between 33° and 37°C during the dry season. The relative humidity is between 75 and 80% during the wet season and between 35 and 80% during the dry season (Olanrewaju, 2009). The soil is underlain by Precambrian basement complex rock and composed of loamy soil with medium-to-low fertility (Ajibade and Ojelola, 2004).

### 2.2. Survey and Sampling Procedure

The sampled population comprised communities that share proximity with the teak plantation. These are the University junior and senior staff quarters. The junior staff quarters (Jalala quarters) is the closest community and less than 100 m away from the teak plantation. While, the senior staff quarters is about 250 meters from the plantations. The study population also included academic and non-academic staff of the university, contractors and plantation workers. In each of the population pool (Table 1), a simple random sampling technique was used to select respondents. In order to bring order and some level of precision, 10% of people in junior and senior staff quarters were

sampled. Total enumeration was carried out for contractors and plantation workers, while 5% sampling

intensity was used for the staff of the university. A total of 356 respondents were interviewed (Table 1).

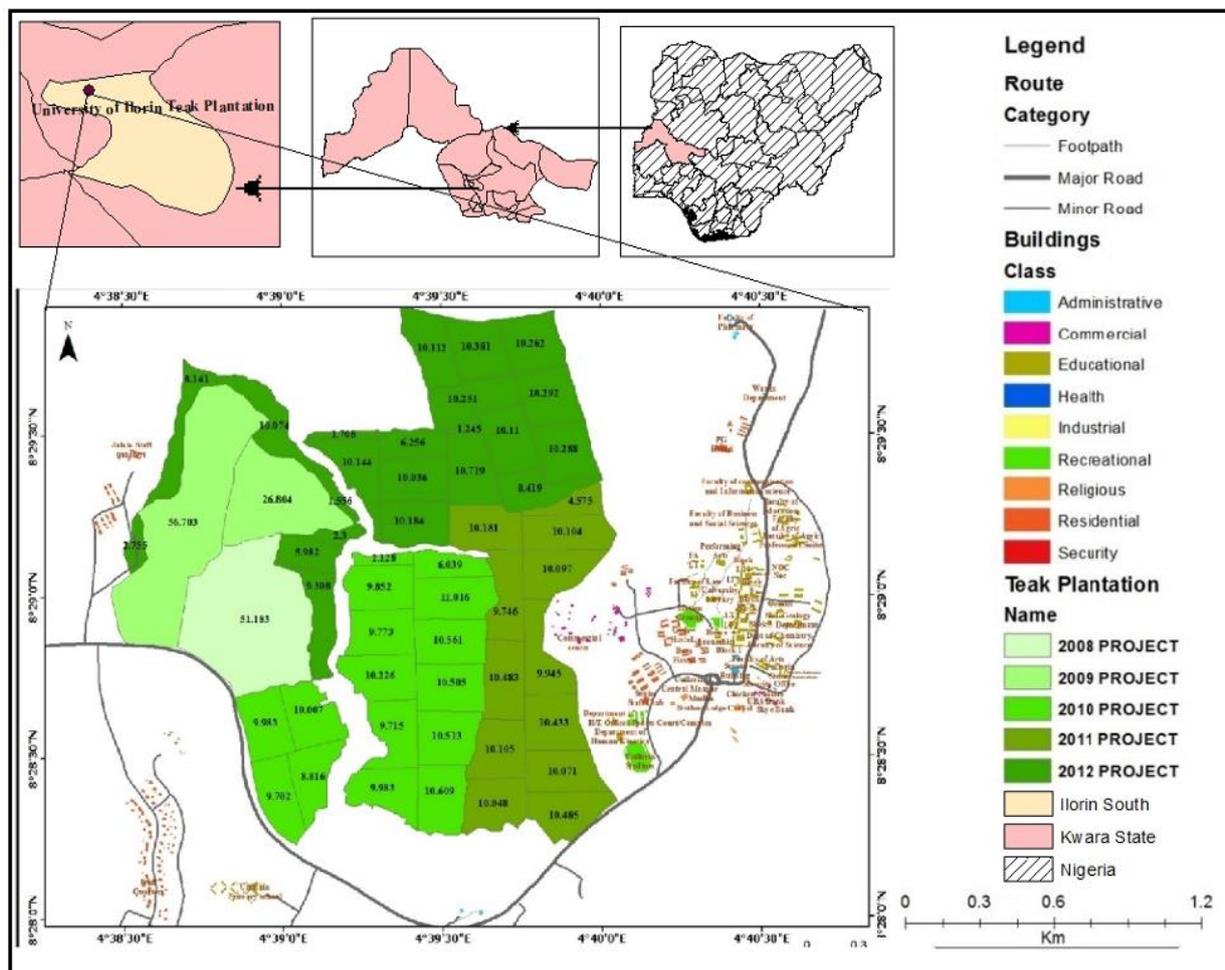


Figure 1: Map of University of Ilorin Teak Plantation (Source: Amusa and Adedapo, 2021)

Table 1: Community, sampling size and sampling intensity of respondents for the study

S/N	Community	Estimated Population	Sampling intensity (%)	Number of respondents
1	Jalala quarters	345	10	35
2	Senior staff quarters	912	10	91
3	General workers in the university	3974	5	199
4	Workers in the plantation	31	100	31
	<b>Total</b>			<b>356</b>

### 2.3. Data Collection

A structured questionnaire was used to elicit information on the issues relating to the objectives of the study. The socio-economic impacts of the plantation, both positive and negative were measured with respect to contributions to jobs and income generation activities, contributions to infrastructural development, contributions to aesthetic value of the university’s environment, effect on ease of access to fuelwood within the landscape, impact on land use for

subsistence farming, perceived effect on safety of live and properties and impact on general security. We also collected data on socioeconomic characteristics of respondents, employment and use of plantation land. The questionnaire comprised both open-ended qualitative items and multiple-choice questions to allow for simultaneous collection of qualitative and quantitative perception data. This approach helps to counteract the biases of single data sources (Tashakkori and Teddlie, 2015).

## 2.4. Data Analysis

Descriptive statistical tools involving the use of frequency tables and percentages were employed in analyzing the obtained data. Inferential statistics were carried out on the association between the socioeconomic characteristics of the respondents and their responses on the perceived socioeconomic impacts of the plantation. This involved the use of Chi-square test and Spearman's rho correlation analysis.

## 3. RESULTS

## 3.1. Socioeconomic Characteristics of Respondents

There were two hundred and twenty-nine (229) males and one hundred and twenty-seven females (127) interviewed. Respondents' modal age ranged from 20 – 39 years old. Majority (69.4%) were married with 55.1% having tertiary education. They mainly work in the university as staff and contractors. Most respondents had been resident in the university and its adjoining communities for five to ten years (Table 2).

Table 2: Socioeconomic characteristics of respondents for the study

Variables	Frequency	Percent
<b>Gender</b>		
Male	229	57.3
Female	127	42.3
Total	356.0	100.0
<b>Age (years)</b>		
<20	18	5.1
20 - 39	221	62.1
40 – 59	115	32.3
60 and above	2	0.6
Total	356.0	100.0
<b>Marital status</b>		
Single	105	29.5
Married	247	69.4
Divorce	4	1.1
Total	356.0	100.0
<b>Level of Education</b>		
No formal education	4	1.1
Primary education	45	12.6
Secondary education	111	31.2
Tertiary education	196	55.1
Total	356.0	100.0
<b>Main occupation</b>		
Casual work	49	13.7
Contract work	5	1.40
Civil servant	33	9.30
Student	70	19.6
University worker	356	56.0
Total	356.0	100.0
<b>Experience at work or stay in the University</b>		
< 5 years	123	34.6
5-10 years	140	39.3
11-15 years	49	13.8
16-20 years	25	7.0
> 20 years	19	5.3
Total	356	100.0

### 3.2. Respondents' Perception of Positive Impacts of the Teak Plantation

#### 3.2.1. Contributions to creating jobs and income generation activities

Table 3 shows that 94.3% of respondents from Jalala staff quarters, who are mainly junior staff, opined that the plantation contributes meaningfully to creating jobs and income generation activities, while 5.7% did not agree. Likewise, 91.2% of respondents in the senior staff quarters shared the opinion, while 8.8% did not agree. Majority (92.5%) of the university workers were also of the opinion that the plantation contributes substantially to creating jobs and income generation activities but 7.5% disagreed. All the workers on the teak plantation believe that it has contributed significantly to creating jobs and income generation activities within the university community.

#### 3.2.2. Contributions to infrastructural development

Table 3 also shows that 60.0% of respondents from Jalala staff quarters believed that the plantation has helped in attracting infrastructural development to the university community. In the same vein, 65.9%, 71.9% and 80.6% of respondents from the senior staff quarters, general workers in the university and plantation workers respectively believed that the plantation helps in bringing infrastructural development to the community. Further probing of this

theme showed that the establishment of the teak plantation has been responsible for the setting up of a firefighting service unit in order to help control and manage fire outbreaks in the plantation. The presence of the firefighting service unit is seen as a positive impact in the establishment of the teak plantation. Apart from this, preventing the incidence of fire outbreak from the plantation has often seen the university management embarking on road grading and construction of breaks in and around the plantation and by extension the neighbouring communities.

#### 3.2.3. Contributions to aesthetic value

Table 3 further shows that 65.7% of respondents from Jalala staff quarters agreed that the plantation improves the aesthetic values of the environment while 34.3% disagreed. Also, majority of respondents (73.6%) from among the residents of the senior staff quarters believed that the plantation helped improve the aesthetic values of the university environment while 26.4% of them disagreed. Similarly, 79.4% of respondents among the general workers in the university agreed that the plantation improves the aesthetic values of the environment while 20.6% of them opined otherwise. About 87.1% of the respondents among the plantation workers submitted that the plantation has helped in improving the aesthetic value of the university environment while 12.9% of them disagreed.

Table 3: Respondents' perception of positive impacts of the teak plantation

Positive impacts	A		B		C		D	
	Yes	No	Yes	No	Yes	No	Yes	No
The plantation has contributed to job creation and income generation activities	33 (94.3%)	2 (5.7%)	83 (91.2%)	8 (8.8%)	184 (92.5%)	15 (7.5%)	31 (100.0%)	0 (0.0%)
The plantation has contributed to infrastructural development	21 (60.0%)	14 (40.0%)	60 (65.9%)	31 (34.1%)	143 (71.9%)	56 (28.1%)	25 (80.6%)	6 (19.4%)
The plantation has contributed to aesthetic value of the environment	23 (65.7%)	12 (34.3%)	67 (73.6%)	24 (26.4%)	158 (79.4%)	41 (20.6%)	27 (87.1%)	4 (12.9%)

*A = Sampled respondents from Jalala staff quarters, B = Sampled respondents from senior staff quarters, C = Sampled respondents from the general workers in the university and D = Respondents from the plantation workers.*

### 3.3. Respondents' Perception of Negative Impacts of the Teak Plantation

#### 3.3.1. Ease of access to fuelwood within the landscape

From Table 4, it was revealed that majority (68.6%) of respondents from Jalala staff quarters opined that the plantation had negatively affected the availability of fuelwood the university community, while 31.4% disagreed. About 50.5% of respondents from among the residents of the senior staff quarters shared similar opinion on fuelwood availability while 49.5% thought otherwise. For respondents among the general workers in the university, 58.3% also believed that the establishment of the plantation has affected the availability of fuelwood negatively while 41.7% of them disagreed. About 87.1% of respondents among the plantation workers also held the opinion that the plantation has affected the availability of fuelwood negatively for members of the university community while 12.9% disagreed.

#### 3.3.2. Land use for subsistence farming within the landscape

Table 4 also shows that majority (74.3%) of respondents from Jalala staff quarters submitted to the opinion that the plantation has limited and curtailed land use for subsistence farming within the landscape, while 25.7% of them disagreed. In the same vein, 59.3% of respondents from among the residents of the senior staff quarters shared the same opinion, but 40.7% did not. Many (55.3%) of the respondents from among the general workers in the university also believed that the plantation has limited and curtailed land use for subsistence farming within the landscape with 44.7% disagreeing. About 80.6% of respondents among the plantation workers opined the same way while 19.4% disagreed.

#### 3.3.3. Safety of lives and properties

Table 4 further indicates that majority (71.4%) of respondents from Jalala staff quarters agreed with the opinion that the plantation poses a safety risk to live and properties through fire outbreak, but 28.6% disagreed. Similarly, 64.8% of respondents from among the senior staff quarters shared the same opinion

while 35.2% disagreed. Majority (54.8%) of the respondents from among the general workers in the university also believed in the safety risk posed by the plantation, while 45.2% disagreed. In the same vein, 83.9% of the respondents from among the plantation workers submitted that the plantation poses a safety risk to live and properties through fire outbreak, but 16.1% of them disagreed.

#### 3.3.4. Impact on general security

Majority (74.3%) of respondents from Jalala staff quarters held the view that the plantation poses serious security risk as a hideout for miscreants and criminals who were already stealing their personal belongings, while 25.7% disagreed. About 57.1% of respondents from among the senior staff quarters shared the same opinion, while 42.9% of them did not. In the same vein, 50.8% of the respondents from among the general workers in the university submitted that the plantation poses serious security risk as a hideout for miscreants and criminals, while 49.2% disagreed. About 61.3% of the respondents from among the plantation workers held the same opinion, while 38.7% did not (Table 4).

### 3.4. Association between Socioeconomic Characteristics and Perceived Impacts of the Teak Plantation

There was no association between gender and perception of both the positive and negative impacts measured for the plantation ( $\chi^2 = 12.22$ ;  $\chi^2 = 18.73$ ;  $p > 0.05$ ). This shows that there is no specific difference in how male and female respondents perceive the impacts of the teak plantation. The same findings were made for marital status ( $\chi^2 = 16.02$ ;  $\chi^2 = 10.58$ ;  $p > 0.05$ ) and occupation ( $\chi^2 = 22.36$ ;  $\chi^2 = 16.03$ ;  $p > 0.05$ ) (Table 5). Similarly, the results of Pearson Product Moment Correlation (PPMC) analysis revealed that age ( $R = 0.235$ ;  $p > 0.05$ ) and experience at work or stay in the University ( $R = 0.018$ ;  $p > 0.05$ ) have positive correlation coefficient, but a very low association on perception of both the positive and negative impacts measured for the plantation. Only level of educational of respondents showed a strong association on perception of both the positive and negative impacts measured for the plantation ( $R = 0.744$ ;  $p < 0.05$ ) (Table 6).

Table 4: Respondents' perception of negative impacts of the teak plantation

Negative impacts	A		B		C		D	
	Yes	No	Yes	No	Yes	No	Yes	No
The plantation has affected ease of access to fuelwood within the landscape	24 (68.6%)	11 (31.4%)	46 (50.5%)	45 (49.5%)	116 (58.3%)	83 (41.7%)	27 (87.1%)	4 (12.9%)
The plantation has limited and curtailed land use for subsistence farming within the landscape	26 (74.3%)	9 (25.7%)	54 (59.3%)	37 (40.7%)	96 (55.3%)	103 (44.7%)	25 (80.6%)	6 (19.4%)
The plantation poses a safety risk to live and properties through fire outbreak	25 (71.4%)	10 (28.6%)	59 (64.8%)	32 (35.2%)	109 (54.8%)	90 (45.2%)	26 (83.9%)	5 (16.1%)
The plantation poses serious security risk as a hideout for miscreants and criminals	26 (74.3%)	9 (25.7%)	52 (57.1%)	39 (42.9%)	98 (50.8%)	101 (49.2%)	19 (61.3%)	12 (38.7%)

*A = Sampled respondents from Jalala staff quarters, B = Sampled respondents from senior staff quarters, C = Sampled respondents from the general workers in the university and D = Respondents from the plantation workers.*

Table 5: Chi-square test result of association between socioeconomic characteristics of respondents and impacts of the teak plantation

Socioeconomic characteristics of respondents	Socioeconomic impacts of teak plantation					
	Assumed positive impacts of the plantation			Assumed negative impacts of the plantation		
	$\chi^2$	p-value	Remark	$\chi^2$	p-value	Remark
Gender	12.22	0.086	NS	18.73	0.091	NS
Marital status	16.02	0.197	NS	10.58	0.617	NS
Occupation	22.36	0.041	S	16.03	0.201	NS

*NS= Not Significant;  $\alpha=0.05$*

Table 6: Spearman's rho correlation analysis of association between socioeconomic characteristics of respondents and impacts of the teak plantation

Socioeconomic characteristics of respondents	Socioeconomic impacts of teak plantation					
	Assumed positive impacts of the plantation			Assumed negative impacts of the plantation		
	R	p-value	Remark	R	p-value	Remark
Age	0.235	0.321	NS	0.112	0.632	NS
Educational qualification	0.744	0.005	S	0.737	0.023	S
Experience	0.018	0.529	NS	0.118	0.214	NS

*NS= Not Significant, S= Significant;  $\alpha=0.05$*

#### 4. DISCUSSION

The most obvious positive impact of the plantation is contribution to job creation and income generation activities. This observation is in line with reports of several workers on the subject matter (Jürgensen *et al.*, 2014; Malkamäki *et al.*, 2018; D' Amato *et al.*, 2017; Cuong *et al.*, 2019), confirming the fact that introduction of forest plantations generally contributes to income earnings of people in the local communities. However, it is important to stress that the needed labour for the work on a forest plantation varies strongly over the rotation period. While initially much labour is needed for clearing the area and planting the seedlings, the demand for labour decreases after this initial phase and only increases again when the trees are to be harvested (Tyynela *et al.*, 2002). This tends to limit the social and economic development potential and reduction of employment possibilities of plantation forests.

Meanwhile, a large number of respondents in this study considered the setting up of a firefighting service unit by the university to address the incidence of fire outbreak from the plantation as a positive impact, although the occurrence of fire outbreak is in itself seen as a negative effect of the plantation. This perception is in line with the report of Degnet *et al.* (2018). Furthermore, our results have also shown that majority of the respondents indicated that the plantation beautifies the university environment, particularly during the rainy season. There are several reasons which indicate the importance of taking visual appearance of a forest into consideration. First of all, aesthetics is a primary dimension of people-landscape interactions and most people experience forest landscape visually (Gobster, 1996; Ode, 2003). The way the forest is managed influences its physical appearance and thereby perception by the general public.

The results have also shown that the plantation has impacted negatively on ease of access to fuelwood within the landscape, especially for those living in the Jalala quarters. It was revealed that the plantation site used to be the closest free area to the community where fuelwood was collected, but with the establishment of the plantation they have to now move further distances to get the fuelwood as the plantation is not an option. This is in addition to limitation in access to other array of non-wood forest products. The plantation is roundly criticized for being a non-native monoculture species plantation that is low in biodiversity.

The safety risk to live and properties posed by the plantation through incessant fire outbreak remains a serious source of concern to many of the respondents. The claim of incessant fire outbreak was further linked to inability to access non-wood forest products like

snails, bushmeat, and locust beans seeds (*Parkia biglobosa*) that are often collected from the plantation site before its establishment. Clearly, the outbreak of fire on the plantation as suggested by van Wilgen and Richardson (2012) cannot be divorced from the increased fuel loads and biomass often associated with planted forests, which can lead to higher intensity fires and other detrimental effects including encroachment on fragile ecosystems.

Meanwhile, there were no statistical association between socioeconomic variables of respondents on perception of both the positive and negative impacts measured for the plantation, except for level of educational. This agrees with findings of previous studies (such as Zhang *et al.*, 2016 and Edsand and Broich, 2020) which showed that environmental awareness is influenced by education. This further underscore the importance of education over the environmental and socioeconomic effects of planted forests, and a means to better design and manage plantations among local populations. This implies that effective environmental education can help enhance environmental attitudes, values, and knowledge, as well as builds skills that prepare individuals and communities to collaboratively undertake positive environmental action (Ardoin *et al.*, 2020). Although opinions among respondents tended to be homogeneous across groups, plantation workers were more confidently inclined to the positive impacts of the plantation.

#### 5. CONCLUSION

1. Respondents perceived the socioeconomic impacts of teak plantation at University of Ilorin from both positive and negative points of view.
2. The most important positive impact of the plantation is its contribution to job creation and income generation activities.
3. The plantation has impacted negatively on ease of access to fuelwood and other non-timber forest products within the landscape.
4. Respondents' level of education is the only variable that has statistical association on perception of both the positive and negative impacts measured for the plantation.
5. Future studies are recommended to better understand the driving forces behind the annual fire incidence at the plantation for effective risk assessment and management.
6. The University authorities should include environmental education in her approach to integrate the management objectives of establishing the plantation with socioeconomic concerns of the people.

## REFERENCES

- Ajibade LT and Ojelola AO (2004). Effects of Automobile Mechanics Activities on Soil in Ilorin. *Nigeria Geo-Studies Forum an International Journal of Environmental and Policy*, 2:18-27.
- Amusa TO and Adedapo SM (2021). Growth and yield characteristics of *Tectona grandis* (Linn. F.) in different age series at University of Ilorin, North Central Nigeria. *Forestist*, 2021, 71 (3): 127–133. <https://doi.org/10.5152/forestist.2020.20022>
- Ardoin NM, Bowers AW, and Gaillard E. (2020). Environmental education outcomes for conservation: A systematic review. *Biological Conservation*, 2020, 241: 108-224.
- Cuong T, Thi T, Chinh Q and Xie Y (2019). *The Impacts of Forest Plantation on Household 's Income*. 6, 1–17. <https://doi.org/10.4236/oalib.1105587>
- D'Amato DD, Rekola M, Wan M, Cai D, and Toppinen A (2017). Land Use Policy Effects of industrial plantations on ecosystem services and livelihoods: Perspectives of rural communities in China. *Land Use Policy*, 2017, 63: 266–278.
- Degnet MB, van der Werf E, Ingram V and Wesseler J (2018). Forest plantations' investments in social services and local infrastructure: an analysis of private, FSC certified and state-owned, non-certified plantations in rural Tanzania. *Land Use Policy*, 2018, 79: 68–83.
- Edsand HE, and Broich T. (2020). The impact of environmental education on environmental and renewable energy technology awareness: Empirical evidence from Colombia. *International Journal of Science and Mathematics Education*, 2020, 18(4): 611–634.
- FAO and UNEP (2020). *The State of the World's Forests* 2020. <https://doi.org/https://doi.org/10.4060/ca8642en>
- Flaten K (2011). *Tree Plantation Expansion : Impacts on Rural Communities in the Central North of Tasmania*.
- Gobster PH (1996). *Forest aesthetics, biodiversity, and the perceived appropriateness of ecosystem management practices*.
- Jürgensen C, Kollert W and Lebedys A. (2014). Assessment of industrial roundwood production from planted forests. *Planted Forests and Trees Working Papers (FAO) Eng No. FP/48/E*.
- Malkamäki A, D'Amato D, Hogarth NJ, Kanninen M, Pirard R, Toppinen A and Zhou W (2018). A systematic review of the socio-economic impacts of large-scale tree plantations, worldwide. *Global Environmental Change*, 2018, 53: 90–103. <https://doi.org/10.1016/j.gloenvcha.2018.09.001>
- Mohammed OI, Babalola FD, Dahir MO, Abdul-Ganiyu Y, Ayo B (2021). *Planted Forest Fire Burn Area and Impact Assessment Using Sentinel-2 : Case Study of the University of Ilorin Teak Plantation*. *IOP Conf. Ser.: Earth Environ. Sci.* 620 012013. Available at <https://doi.org/10.1088/1755-1315/620/1/012013>
- Ode Å. (2003). *Visual aspects in urban woodland management and planning*. Published PhD dissertation, Swedish University of Agricultural Sciences. ISSN: 1401-6249.
- Ofoegbu C. (2014). The contribution of tree plantations to household welfare: case study of Piet Retief and Iswepe communities. *International Forestry Review*, 2014, 16(2): 172–179.
- Olanrewaju R (2009). The Climate Effect of Urbanization in A City of Developing Country: The Case Study Of Ilorin, Kwara State, Nigeria. *Ethiopian Journal of Environmental Studies and Management*, 2009, 2 (2): 67–72. <https://doi.org/10.4314/ejesm.v2i2.45921>
- Pirard R, Petit H, and Baral H (2017). Land Use Policy Local impacts of industrial tree plantations: An empirical analysis in Indonesia across plantation types. *Land Use Policy*, 2017, 60: 242–253. <https://doi.org/10.1016/j.landusepol.2016.10.038>
- Tashakkori A and Teddlie C (2015). *SAGE Handbook of Mixed Methods in Social & Behavioral Research*. *SAGE Handbook of Mixed Methods in Social & Behavioral Research*. <https://doi.org/10.4135/9781506335193>
- Tyynela T, Otsamo A and Otsamo R (2002). Changes and Alternatives in Farmers' Livelihood Planning in an Industrial Forest Plantation Area in West Kalimantan, Indonesia. *Forests, Trees and Livelihoods*, 2002, 12(4): 257–281.
- van Wilgen BW and Richardson DM (2012). Three centuries of managing introduced conifers in South Africa: benefits, impacts, changing perceptions and conflict resolution. *Journal of Environmental Management*, 2012, 106: 56–68.
- Zhang Y, Song W, and Nuppenau EA (2016). Farmers' changing awareness of environmental protection in the forest tenure reform in China. *Society and Natural Resources*, 2016, 29 (3): 299–310.