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Research Article

Trees Ouside Forests (Trees on Farmlands): Assesment of Farmers Perception in Gaya Local Government Area, Kano State, Nigeria

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Abstract: The study was carried out in order to assess the perception of Farmers on Trees outside Forest (Trees on Agricultural Lands) in Gaya Local Government Area of Kano State. Stratified random sampling was used, the study area was partitioned in to eleven wards from which three wards were selected at random; selection of villages was done proportionally from the selected wards. One hundred and twenty (120) questionnaires were administered to farmers. Data collection was done through direct contact with farmers. Descriptive and inferential statistics were used in analyzing the data. Charts, frequency distribution and percentages were used to preset demographic information while chi-square test of association was used to check relationship between socio-economic characteristics and tree planting on farm lands. The results obtained on demography showed that, majority of the respondents fall between 48-58 years, about 91% are male and 9% are female, 94% are farmers and 92% are married. Chi-square result revealed no significant association between socio-economic characteristics finally, age and house hold size shows significant association with tree planting.

Keywords: Perception, Farmers, Trees Outside Forest, Sampling and Chi-Square.

INTRODUCTION

Lack of appropriate forest management and utilization, land tenure policy and lack of compatible forest legislations could result to deforestation. However, Population growth and the associated expansion of agricultural lands is the primary cause of present-day deforestation [1, 2]. Globally, substantial efforts are put into the monitoring of forest resources [3] and there are good reasons for this due to the multitude of ecosystem services provided by forests. However, tree resources that grow outside forests typically are not taken into account by forest monitoring programmes even though they provide similar services as forest trees. Such tree resources are summarised with the term trees outside forests (TOF). Furthermore, the relevance of TOF for human livelihood, general environmental conditions, and biodiversity was emphasized [4, 5]. Trees outside forest (TOF) are said to be trees that have attained 10 cm or more diameters at breast height present on lands not regarded as forests [6]. The TOF plays a vital ecological role, social and economic roles providing goods and ecosystem services to the people [7, 5, 8]. They basically include woodlands, shrubberies, urban trees, scattered trees, farm trees and many more. People have managed TOF in the form of agroforestry and urban plantings for longer term [9, 10] for instance in the form of agroforestry systems [11]. However, TOF have mostly been left out in most forest statistics, assessments and policies because they are typically split among the various categories of agroforestry, urban and rural forestry [12]. But the interest in TOF and its assessments have emerged basically because the protection and enhancement of tree cover in non-forest land will be needed to complement the protection of forest areas [13]. Trees are typically the largest components of aboveground biomass in terrestrial ecosystem [14, 15] and regardless of their location they are important for carbon storage. Likewise, reporting obligations from international conventions has also made it necessary for conduct TOF assessment particularly the United Nations Framework Convention on Climate Change (UNFCCC) and United Nations Convention on Biological Diversity (UN-CBD) have urged on keeping up-to- date information on tree resources within and outside forests [15]. Likewise, the Kyoto protocol has particularly, emphasized on the

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inclusion of TOF in national forest monitoring systems [16].

Farm trees provide fodder, food, farm-yard-manure (FYM) and fuelwood (4Fs), high value crops, coffee, teas, edibles, medicinal plants. Food and income from cultivated, agroforestry, and naturally growing trees in farm land and urban land constitute an important component on individual household food supply [17]. These trees support the daily livelihood of people in both direct and indirect way. The cultural benefits of TOF extend to neighborhoods and environmental benefits may accrue to whole urban area, like the reduction of urban heat island effect [18]. TOF provide various ecosystem services such as control over soil erosion, nutrient and water cycling, biodiversity conservation or pest control [19, 20]. The 80% of the requirements of the wood-based industries are met from TOFs [21]. TOF also play an important role in both the sequestration and storage of carbon [22] considering as mitigation alternatives. In the context of Climate Change, the assessment of TOF has become much more relevant as TOF make an important contribution to climate change mitigation but are not systematically accounted for in either global carbon budgets or national carbon accounting. Globally, it has been estimated that about 33 giga tones of biomass carbon is stored in trees on agricultural land using coarse spatial resolution satellite data [7]. On a finer scale, the data of TOF is rare and availability varies typically across fragmented institutions and stakeholder [16]. But there are exceptions where systematic study has been conducted such as the National Forest Monitoring and Assessment (NFMA) program by FAO [16] and some of the country's own assessment such as China's national forest inventory [23].

Trees influence rainfall through evapotranspiration. About 10-20% of the rain falling onto the forest never reaches the ground; the rain drops are intercepted by the tree canopy and evaporated back into the atmosphere. This is experienced in most tropical forests. Forest canopy and the understory vegetation protect the soil surface against the abrasive action of rain drops, thereby minimizing erosion and surface runoff. The roots of trees grow deeper in the soil than arable crops. These roots absorb water at a deeper soil depth which is transpired to the atmosphere, forming clouds that in turn release water in the form of rainfall [24]. Tree crops are often used in shelterbelts, particularly in arid regions to minimize wind speed, and combat desert encroachment. Trees provide a barrier against the destructive action of heavy windstorm; acting as windbreak for annual crops. Binding action of the roots, if left undisturbed, the ground beneath tree crops becomes covered with a layer of debris called forest litter (comprising dead leaves, twigs, branches, and logs at various stages of decomposition). The litter and humus layers that accumulate in the long run absorb moisture and further modulate the infiltration rate of the underlying soil. The heavy canopy of plantations is effective in maintaining ideal humidity and microclimate in the immediate and adjoining environments, while the dense root volume explores the soil for nutrients and water thereby minimizing leaching and runoff losses; thus, reducing pollution of underground and surface water [24]. The roots of trees are estimated to be 1.5-3 times stronger than the roots of grassy plants of the same diameter, and a tree possesses thousands of leaves and hundreds of kilometers of roots with hundreds of thousands of root tips; all contributing to the binding action on soil particles. When land is devoid of vegetation, the organic matter which decomposes gradually will be exposed to high temperature which leads to rapid depletion and resultant CO_2 emission that increase global warming. Because plantation crops are heavy feeders, they are capable of absorbing large amounts of substances introduced to the soil either through fertilizer application and waste management or atmospheric impurities washed down with torrential rainstorms. Trees and other plantation crops take up nutrients from the soil and incorporate them in their biomass. These nutrients are only released back to the soil when the leaves of the trees fall or when the plants die and decay. Part of the tree biomass is eaten by various soil animals (including insects and earthworms), and their excreta return nutrients to the soil. In the soil, a huge number of soil microorganisms are involved in the decomposition of organic materials which makes nutrients available to plant roots [24].

MATERIALS AND METHODS

Study area

This study was conducted in Gaya local Government Area of Kano State Nigeria. It is located on latitude 11º 12' N and longitude 9º 12' E. It is bordered in the North by Ajingi Local Government, to the West by Wudil Local Government, to the South by Albasu Local Government, and to the East by Dutse Local Government area of Jigawa State. Gaya Town is the headquarter of Gaya Local Government, established in 1976, and it is located in the southern part of Kano State with distance of 65 Km from Kano City. Gaya has an estimated population of about 201,016 [25].

Soil and Vegetation

The soil types are mainly sandy, loamy and brown to reddish brown in color; however, alluvial soils are found around rivers which make the soil highly productive. The natural vegetation of the study area falls under Sudan Savannah type [26]. It is composed of variety of tree species scattered over an expanse of grassland. The trees are usually characterized by broad canopies and they are hardly taller than 2 meters. Grasses hardly grow more than 1.5 meters at maturity except in favored spots. There are also some thorny shrubs and medium trees in the drier interfluves and the rocky areas or dissected terrain. The types of trees mostly found in the study area include *Adansonia*

digitata, (baobab), Acacia species, Mahogany, *Azaradica indica* and *Eucalyptus species* etc.

Weather and Climate

The precipitation occurs during the summer month starting mostly from May and ends in October. The beginning and length of rainfall vary from year to year. The highest amount of rainfall is characterized by strong wind, thunder and lightning. The showers are intense and last for short period. The average rainfall in a normal year is about 864.1 mm. The dominance of this wind system in this region marked the period of dry season, which is partly dry and hot and the dry and cold. The dry hot season period is between March and May.

Sampling procedure and Sampling size

Reconnaissance survey will be carried out to make the researcher familiarize himself with the study area; determine the demography and economic activities in the study area with interest on farmers. Gaya Local Government constitute eleven wards (Balan, Gaya, Garmarya, Gamoji, Gaya Arewa, Gaya Kudu, Kademi,, Wudiyawa, Shagogo, Maimakawa ,Kazurawa) three of these districts were selected at random through balloting, proportional sampling was used in selecting villages.

Table-1: Sampling Procedure used in the study Area

Wards	Number of Villages	Sampled villages	N0. of respondents
Balan	11	3	30
Shagogo	13	4	40
Kademi	17	5	50
Total	41	12	120

DATA COLLECTION

Primary and Secondary information were used for this study. One hundred and Twenty questionnaires were administered, retrieved and analyzed while the secondary information was obtained from relevant literatures, text book, journals, past projects and internet.

DATA ANALYSIS

The data obtained were screened and organized, analyzed using descriptive and inferential statistics to achieve the stated objectives. The statistical tool to be used include percentages, pie-chart, frequency distribution and chi-square to test association between socioeconomic characteristics and the dependent variables (deforestation and trees on agricultural land). SPSS version16 was used for the analysis.

RESULTS AND DISCUSSION

Socioeconomics characteristics of the Respondents

Figure 1 above shows the age distribution of respondents. It was revealed that majority of the respondents 43(35.8%) were between the age ranges 48-58 years, while those with 37-37 years were representing 39(32.5%). Also, 29 respondents (24.2%) are 59 and above, while 9 respondents (7.5%) are between 15-25 years old.

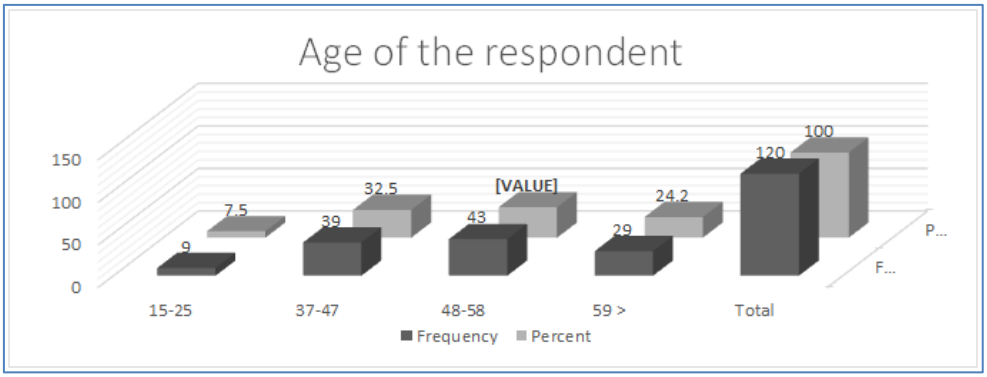

Fig-1: Age of the respondents

Gender of the Respondents

Figure 2 showed the distribution of respondents by gender. It indicated that of the 120 respondent 109(91%) were males and 11(9%) were females. This revealed that there are more male farmers than female in the study area.

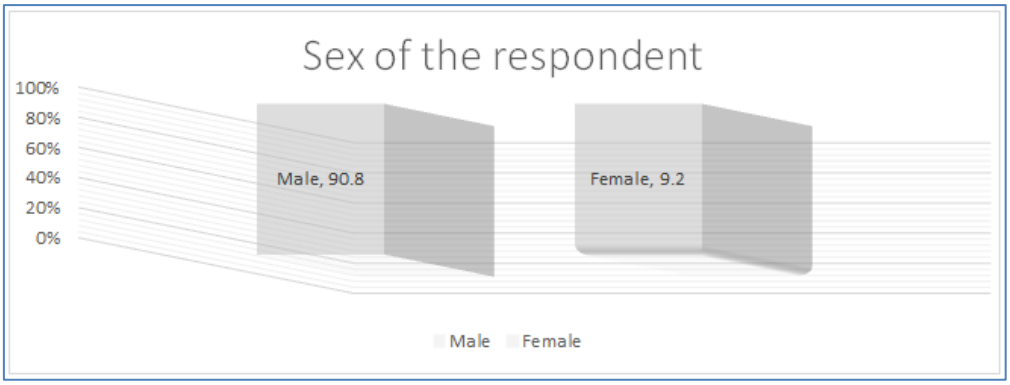

Fig-2: Gender of the respondents

Marital status of the respondents

The result from the research shows that 94 (78.3%) of the respondent are married and 6 (5%) are single, while 4 (3.3%) are divorced and 16 (13.3%) are widow. From this we can deduce that, the ajority of the respondent is married.

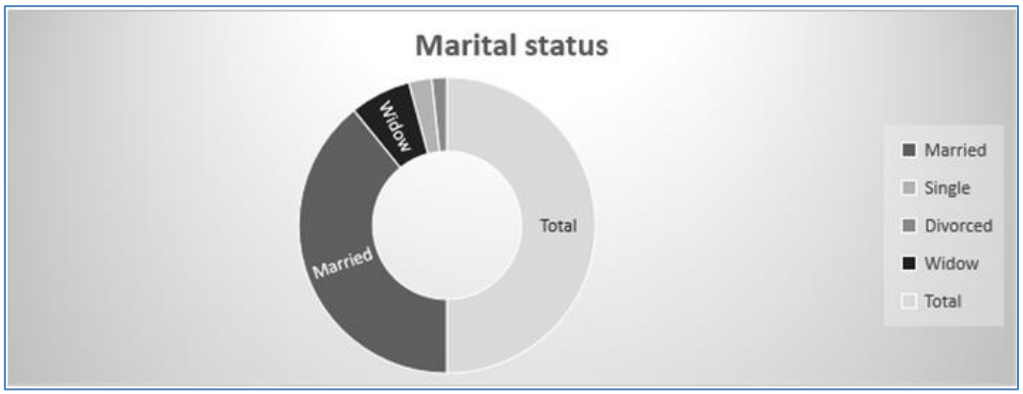

Fig-3: Marital status of the respondents

Household size

A household unit comprises the household head, wife or wives, children and other dependents living with them. From the results in the table below shows that, there are more respondents with household size ranges from 4-7, having a frequency of 49 and 39.2 percent.

Table-2: Household size

Household	Frequency	Percentage (%)
0-3	9	7.5
4-7	49	39.2
8-11	31	25.8
>12	33	27.5
Total	**120**	**100.%**

Educational status of the respondent

Table 3 shows the educational status of the respondent 61(50.8%) being the highest with non-formal education (Qur'anic literacy), 54 (45.) the majority of the respondents to have attend secondary school 3(2.5) respondents did complete primary school only 3(1.7%) of the respondent attend tertiary institution. This indicated that majority of respondent (farmers) are informally educated.

Table-3: Educational status of the respondents

Educational status	Frequency	percentage
Primary	3	2.5
Secondary	54	45.0
Tertiary	2	1.7
Non-formal	61	50.8
Total	**120**	**100**

Occupation of the respondents

The figure above shows the occupation of the respondent, frequency and percentage of the distribution are as follows, farming, business, civil servant with 113 (94.2%), 3 (2.5%) and 4 (3.3%) frequency and percentage respectively.

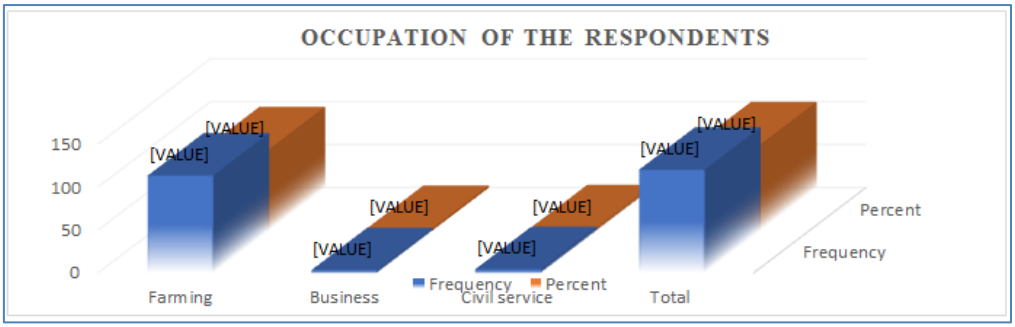

Fig-4: Occupation of the respondents

Types of Farming practice

The types of farming practice in the locality are basically three, which are mixed farming, mixed cropping and agroforestry. 70% of the sampled population are practicing mixed farming, 21.7% Mixed cropping and the lowest value was obtained from agroforestry with 8.3%, this shows that majority of the farmers in the study area do not plant trees which are very important in conserving nutrients, moisture and farmland protection from wind and water erosion.

Table-4: Farming practices of the respondents

Farming practice	Frequency	Percentage
Mixed Farming	84	70.0
Mixed cropping	26	21.7
Agroforestry	10	8.3
Total	**120**	**100.0**

Importance of Trees on Farmlands

From the result in table 5 below, 54.2 percent opined that trees on farmlands improve soil fertility with only 5% said trees prevent desert encroachment.

Table-5: Trees outside Forests (Trees on Farmlands)

Benefits	frequency	Percentage
Serves as wind breaks	31	25.8
Prevent erosion	18	15.0
Improve soil fertility	65	54.2
Prevent desertification	6	5.0
Total	**120**	**100**

Perception of farmers on trees outside forests TOF

This presents descriptive statistics and chi-square analysis of the respondents, opinion concerning trees on Farmlands. In analysing and establishing relationship between socioeconomic characteristics of the respondents and TOF, chi-square was used. The variables of TOF were tested with demographic are planting of trees. Results of the test revealed non-significant relationship with all the variables except age and household size as presented in Table

Chi-square result (relationship between socio economic characteristics and trees outside forests)			
Variables	**X^2**	**Df**	**P-value**
age	45.070	6	0.000*
sex	1.99	2	0.368
Marital status	7.363	6	0.289
House hold size	37.160	6	0.000*
Educational status	11.269	6	0.080
occupation	1.227	4	0.874

*Significant (P<0.05)

CONCLUSION AND RECOMMENDATION

Conclusion

Conclusively, there were more male than the female farmers in the study area, most of the respondents have no formal education. There was no significant relationship between demography and ideas people have about deforestation (i.e whether one is male, female, young, old, or educated everyone can have the idea on deforestation). On the causes of deforestation, all have strong relation except gender, there was significant relation between age, household size and planting of trees on the farmlands i.e older people plant trees than the younger ones and also larger household plant more trees than the smaller one.

From the above results obtained during this research, I strongly recommend the followings:

- Government should provide a vastly expanded funding mechanism, such as competitive grants to enable farmer's plant and monitor economic tree species on their farmlands as one of the mechanisms in combating climate change and achieving sustainable agriculture.
- Extension services are strongly needed to enlighten farmers to adopt planting of trees and arable crops on the same land

(Agroforestry) to achieve sustainability between agriculture and environment.

- There should be a specific program for women in agriculture so as have more women in farming enterprise as the sector is dominated by men.

Common Tree Species Found in the Study Area			
S/n	Family name	Botanical name	Local names
1	*Fabaceae*	*Tamarindus indica*	Tsamiya
2	*Fabaceae*	*Parkia biglobosa*	Dorawa
3	*Fabaceae*	*Piliostigma reticulatum*	Kalgo
4	*Malvaceae*	*Adansonia digitate*	Kuka
5	*Fabaceae*	*Faidherbia albida*	Gawo
6	*Meliaceae*	*Khaya senegalensis*	Madaci
7	*Ebenaceae*	*Diospyrus mesipiliformis*	Kanya
8	*Fabaceae*	*Acacia sieberrians*	Fara-kaya
9	*Sapotaceae*	*Butyrospernum parkii*	Kadanya
10	*Fabaceae*	*Acacia nicotica*	Bagaruwa
11	*Anacacardiaceae*	*Mangifera indica*	Mangoro
12	*Meliaceae*	*Azadirachta indica*	Darbejiya

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