



ASSESSMENT OF TREES OUTSIDE FOREST (ToF) BENEFITS IN WAMAKKO LOCAL GOVERNMENT AREA OF SOKOTO STATE, NIGERIA

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Abstract

A study on assessment on benefits of Trees Outside Forest (ToF) was carried out at Wamakko Local Government Area, Sokoto State, Nigeria. Multi stage sampling design was used to select three (3) wards based on distribution and abundance of ToF, and one hundred and twenty (120) respondents were selected. Interview schedule were administered to the respondents. Descriptive statistics was used in analyzing the data. The results obtained indicated that 19.28%, 10.48% and 10% of the respondents from Kaura kimba, Gumbi and Dundaye used ToF as their major sources of fuel wood. Forty-two (42) different ToF species were identified. The results further revealed that deforestation was the major management challenge on services and function of ToF. Conclusively, there is no doubt that with continued growth in populations, coupled with the shrinking of forest, ToF is especially utilized for several purposes particularly as source of fuel wood, and these trees are in a very strong position to substantially relieve to the pressure on forest resources. Therefore, efficient utilization of ToF shall be given for promoting sustainable rural livelihood.

Keywords: Trees Outside Forest; Species; Kaura kimba; Gumbi; Dundaye; Fuel Wood

Introduction

Deforestation is now a global problem, due to inappropriate management and lack of appropriate forest policies and legislations (Gibbs *et al.*, 2010). Population growth and agricultural land expansion were today the major cause of deforestation (Foley *et al.*, 2011). Vigorously carry out monitoring and evaluation of forest resources (FAO, 2010), which is important for the multitude services provided by forests. However, there are some trees that grow outside the forest, even if they provide similar services to the forest trees, which are not usually considered by forest monitoring programs, these trees are termed as trees outside forest (ToF) (Pain-Orcet and Bellefontaine., 2004). Trees outside forest (ToF) refers to trees that do not belong to forests and or woodlands, in area of human influence where conditions for tree growth are favorable and are found in spatial patterns and a wide range of situations (FAO, 2010).

Basically, “trees outside forest refers to trees on land not defined as forest and other wooded land” (Bellefontaine *et al.*, 2002). This definition is related to the two FAO categories; forest and other wooded land (Foresta *et al.*, 2013). Forest, other wooded land, trees outside forest and all trees growing in a site were covered in FAO’s Global Assessment of Forest and other tree resources (Foresta *et al.*, 2013).

Trees outside forest have increasingly becomes an important feature in the build-up and or agricultural lands (Bellefontaine *et al.*, 2001; Gutzwiller, 2002; Konijnendijk *et al.*, 2005; Forester *et al.*, 2013). Trees outside forest in agricultural landscape are often referred to as scattered, isolated or paddock trees (Manning *et al.*, 2009; Gibbons *et al.*, 1989). All trees in cities and towns planted at back yards, road sides and streets are also known as trees outside forest (Tyrvaieren *et al.*, 2005).

Recently, however, local and international communities have been awakened to the importance of these trees and their increasing importance in scientific, economic and policy discussions (FAO, 2010). Trees outside forest are under threat from logging and agricultural expansion receiving no adequate consideration, thus, neglected. (FAO, 2001). The drivers of trees outside forest spatial distribution either in urbanization or in agricultural landscapes are not much known, because they are often not present in forest inventories (Rossi *et al.*, 2016). It is against the afore-highlighted that the present study is expected to provide answers to: the benefits provided by the ToF and the challenges faced in managing ToF, as well as the species of ToF found in the study area?

Materials and Methods

Study Area

This research was conducted at Wamakko Local Government Area, which lies on a latitude of 13^o 02’ 16” N and longitude 5^o 5’ 37” E in Sokoto state. Wamakko Local Government Area is located in the Sudan savannah region of Nigeria with scattered trees and shrubs, characterized with a prolong dry season and a short rainy season (with a rainfall distribution of 553.43-628.94mm) and a relative humidity of about 16-55.5% during the dry season and can rise up to 81% during the rainy season (NMA, 2009).

Sampling Procedure and Sampling Size

Reconnaissance survey was done in the study area to observe and assess trees outside forest in the area. Multi stage sampling design was used for this study, Wamakko Local Government constitutes eleven wards (Arkilla, Bado/Kasarawa, Dundaye/Gumburawa, Gidan Yaro, Gidan Hamidu, Gumbi, Gwamatse, Kimba/Gedewa, Kalambaina, Kammata, Wamakko), three (3) of these wards were selected. Similarly, three (3) villages (Dundaye, Kimba and Gumbi) were selected purposively from each of the initially identified wards due to the abundance and distribution of ToF in the areas. Forty (40) respondents were interviewed purposively based on

availability and willingness from each of the respective villages to respond to the questionnaire, which makes a total sample size of 120 respondents.

Data Collection

Secondary and Primary data were both used in this study. Secondary data were obtained from relevant literature and research reports specific to the area of study. Questionnaires/scheduled interview were used in the collection of the primary data. Data collected include; species of ToF, information on benefits provided by ToF and challenges faced in managing ToF in the study area.

Data Analysis

The data collected were subjected to descriptive statistics using frequency distribution and percentages to achieve the study objectives.

Results and Discussion

Perceived Benefits Provided by Trees Outside Forest (ToF) in the Area under Study

One important observation in the result from table 1 below was that almost all the respondents from the villages 15.38% of Dundaye, 15.71% of Gumbi, and 13.25% of Kaura kimba used the trees for medicinal and shade by 13.85% of respondents of Dundaye, 13.81% of the respondents from Gumbi, and 16.27% of Kaura kimba, which agreed with Okafor, (1980); Arnold, (1990) findings that ToF provide numerous goods and services that includes fuelwood, herbal medicines, and fibers. Another important observation was that 13.85%, 10.48%, and 19.28% of respondents from the villages major source of fuelwood is from ToF, this result agrees with Arnold *et al.* (2003) who opined that ToF supply majority of fuelwood consumed by rural populace. This is also in conformity with the finding of Food Agricultural Organization (2010) who described ToF products (food, medicine, cooking fuel, animal fodder and construction materials) as critical for the maintaining or supporting hundreds of millions of people.

The table also showed 8.46%, 7.62% 11.45% of the respondents from Dundaye, Gumbi and Kaura kimba villages used the trees for fencing/boundary of their homes and farmland. This is in conformity with Millennium Ecosystem Assessment, (2005) who stated that ToF are used for fencing to protect individual infrastructure from damages. However, 6.15%, 6.19%, and 11.45% of the respondents of the villages said the ToF serve as windbreak, 4.62% of respondents from Dundaye, 9.05% of Gumbi respondents also said the trees on their farmland improves the soil fertility, and 11.54% of the respondents, and 3.61% of respondents said the trees helps in preventing desertification in the area. This agreed with Dantani *et al.*, (2020) who reported that 25.8% farmers in Gaya Local Government area use ToF as wind breaks, and 54.2% of the respondents said ToF improve soil fertility on their farmland, and 5.0% of the respondents said ToF prevent desertification.

The study further revealed that 10.95% of the respondents in Gumbi, and 10.24% of the respondents from Kaura kimba used the trees for aesthetic value to add beauty to their surroundings by adding color to the area for importance. This in conformity with Herzog (2000) who observed that trees outside forest are used on scenic or recreation. The results also showed that 9.23%, 5.71% and 3.61% of the respondent from the villages stated that ToF are source of timber and 7.62% and 4.22% of respondents used the trees for poles. Longi *et al.*, (1999) and Singh *et al.*, (2012) also reported ToF as the main source for forest communities demand on timber and firewood in Terai (plain) Nepal. 6.92% and 9.05% of the respondents from Dundaye and Gumbi said ToF are under agroforestry management and 3.81% of Gumbi and 6.63% of Kaura kimba respondents stated that the trees are in garden; this agreed with Baral *et al.*, (2013) who reported the acceptance of agroforestry system of farming as an important component of rural farming systems in Nepal and mostly considered ToF because of the predominance of agricultural land use.

Table 1: Perceived Benefits Provided by ToF in Dundaye, Gumbi and Kaura kimba

Benefits	Dundaye		Gumbi		Kaura Kimba	
	Frequency	Percentage%	Frequency	Percentage%	Frequency	Percentage%
Medicinal	20	15.38	33	15.71	22	13.25
Agroforestry	9	6.92	19	9.05	-	-
Fencing/Boundary	11	8.46	16	7.62	19	11.45
Aesthetic	13	10.00	23	10.95	17	10.24
Fuelwood	18	13.85	22	10.48	32	19.28
Garden	-	-	8	3.81	11	6.63
Timber	12	9.23	12	5.71	6	3.61
Shade	18	13.85	29	13.81	27	16.27
Serve as windbreak	8	6.15	16	7.62	7	4.22
Improve soil fertility	6	4.62	13	6.19	19	11.45
Prevent desertification	15	11.54	19	9.05	6	3.61
Total	130*	100%	210*	100%	166*	100%

Sources: Field survey 2021

* Multiple responses were observed

Perceived Challenges in Managing Trees Outside Forest (ToF)

Table 2 showed that 51.43% of the respondents from Dundaye,; 29.59% of Gumbi respondents, and 30.61% of Kaura kimba; perceived that deforestation is the major challenge, which is in conformity with (Syaka and Patricia, 2003) who stated that increase in population on limited forest and land resources resulted to a failure of traditional tree-based practices of vegetation cover regeneration. The results also revealed that inadequate knowledge and management skills account for 24.29%, 21.43% and 27.55% of respondents from Dundaye, Gumbi and Kaura kimba respectively. Damage by Pest and Disease account for 14.29%, 9.19% and 5.71% of Gumbi, Kaura kimba, and Dundaye respondents respectively. Limited water account for 32.65%, 22.45% and 10% of respondents from Kaura kimba, Gumbi and Dundaye respectively. Laws and regulation account for 8.57% of the respondents from Dundaye, and 12.24% of respondents from Gumbi ;which agreed with Dogra and Chauhan, (2016) who observed that trees outside forest are not supported by financial institutions and extension services; unavailable improved planting material, no separate laws and regulations for trees outside forests, guided by forest act, and trees are host to insects and birds are part of many constraints to growth and development of trees outside forest.

Table 2: Perceived Challenges in Managing ToF in the Study Area

Challenges	Dundaye		Gumbi		Kaura kimba	
	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %
Limited water	7	10	22	22.45	32	32.65
Deforestation	36	51.43	29	29.59	30	30.61
Inadequate knowledge skills	17	24.29	21	21.43	27	27.55
Pest and Disease	4	5.71	14	14.29	9	9.19
Laws and regulation	6	8.57	12	12.24		
Total	70*	100%	98*	100%	98*	100%

Sources: Field survey 2021

* Multiple responses were observed

Species of Trees Outside Forest (ToF)

Table 3 showed that forty-two (42) different species of ToF were identified in the study area. This is in line with the findings of Dantani et al. (2020) who identified *Tamarindus indica*, *Adansonia digitata*, *Faidherbia albida*, *Acacia nicotica*, *Azadirachta indica* as ToF species in Gaya Local Government Area of Kano State, Nigeria.

Table 3: ToF Species Dominance in the Study Area

S/N	Species name	Common name	Local name	Dundaye	Gumbi	Kaura kimba
1.	<i>Adansonia digitate</i>	Baobab	Ichen kuka	✓	✓	✓
2.	<i>Acacia nilotica</i>	Gum Arabic	Bagaruwa	✓	✓	✓
3.	<i>Acacia seyal</i>	Vachellia seyal	Farar kaya	✓	✓	✗
4.	<i>Anogeissus leocarpus</i>	African birch	Marke	✓	✓	✗
5.	<i>Azadirachta indica</i>	Neem tree	Dogonyaro	✓	✓	✓
6.	<i>Bauhinia monandra</i>	Pink bauhinia	Alkawarii	✓	✓	✗
7.	<i>Bauhinia rufescens</i>	Mauritania	Jirga	✓	✓	✓
8.	<i>Balanites aegyptiaca</i>	Desert date	Aduwa	✓	✓	✓
9.	<i>Cassia arereh</i>	Mishuski	Malga	✓	✓	✓
10.	<i>Calotropis procera</i>	Soom apple	Tumfafiya	✓	✓	✓
11.	<i>Carica papaya</i>	Pawpaw	Gwanda	✓	✗	✗
12.	<i>Ceiba pentandra</i>	Silk cotton tree	Rinin masar	✓	✓	✗
13.	<i>Citrus lemon</i>	Lemon	Lemon tsami	✓	✓	✓
14.	<i>Combretum geitonophyllum</i>	Red bushwillow	Farar taramniya	✗	✓	✓
15.	<i>Combretum glutinosum</i>	Bushwillow	Jar taramniya	✓	✓	✓
16.	<i>Commiphora Africana</i>	African myrrh	Dashi	✗	✓	✗
17.	<i>Diospyros mespiliformis</i>	Jackal berry tree	Kaiwa	✓	✓	✓
18.	<i>Eucalyptus camaldulensis</i>	River red gum	Turare	✓	✓	✗

19.	<i>Faidherbia albida</i>	Apple ring acacia	Gawo	✓	✓	✓
20.	<i>Ficus polita</i>	Heart leaved	Durumi	✓	✓	✓
21.	<i>Ficus sycomorous</i>	Sycamore	Baure	✓	✓	✓
22.	<i>Ficus thonningii</i>	Chinese banyan	Cediya	✓	✓	✓
23.	<i>Gmelina arborea</i>	Gmelina	Mulela	✓	✓	✓
24.	<i>Guiera senegalensis</i>	Moshi medicine	Sabara	✓	✓	✓
25.	<i>Hyphaene thebaica</i>	Doum palm	Goriba	✓	✓	✓
26.	<i>Khaya senegalensis</i>	African mahogany	Madacci	✓	✓	✓
27.	<i>Mangifera indica</i>	Mango	Mangoro	✓	✓	✓
28.	<i>Mimosa pigra</i>	Giant sensitive tree	Gumbi	✓	✓	✓
29.	<i>Moringa oleifera</i>	Drum stick tree	Zogala	✓	✓	✓
30.	<i>Olea europaea</i>	Olive tree	Zaitun	✓	✗	✓
31.	<i>Parkia biglobosa</i>	African locust bean	Doruwa	✓	✓	✓
32.	<i>Pilliosigma reticulatum</i>	Camel foot tree	Kalgo	✓	✓	✓
33.	<i>Prosopis Africana</i>	African mesquite	Kiryia	✗	✓	✓
34.	<i>Phoenix dactylifera</i>	Date palm	Dabino	✓	✓	✗
35.	<i>Psidium guajava</i>	Guava	Gwaba	✓	✗	✓
36.	<i>Sclerocarya birrea</i>	Jelly plum	Nunu	✓	✓	✓
37.	<i>Tamarindus indica</i>	Tamarind	Tsamiya	✓	✓	✓
38.	<i>Terminalia mantaly</i>	Madagascar almond	Ichen setlite	✓	✗	✗
39.	<i>Terminalia catappa</i>	Indian almond	Fruits, Umbrella	✓	✓	✓
40.	<i>Vitex doniana</i>	Black plum	Dunya	✗	✓	✓
41.	<i>Ziziphus mauritiana</i>	Indian jujube	Magarya	✓	✓	✓
42.	<i>Ziziphus spina-christi</i>	Christ's thorn jujube	Kurna	✓	✓	✓

Sources: Field survey 2021 ✓ Identified ✗ not identified

Conclusion and Recommendations

The present study focused on trees outside forests, which play very important roles in the nutritional and economic life of the people. There is no doubt that with continued growth in populations, coupled with shrinking forests, and degraded ecosystems, trees outside forest are bound to play a much greater local and global role in meeting the challenges of resource sustainability, poverty reduction and in contributing to food security. The findings of this research revealed that, these trees are in a very relevant position to substantially relieve the pressure on forest resources, conserve farmlands, and boost agricultural productivity.

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