

TO ASSESS TREE SPECIES FREQUENCY AND DENSITY IN BUNZA LOCAL GOVERNMENT AREA OF KEBBI STATE, NIGERIA.

Umar, I.¹; Gwimmi, D.P.¹; Abdulrahman, A.² and Wele, H.K.³

¹Kebbi State University of Science and Technology, Aliero, Nigeria.

²College of Agriculture and Animal Science, Bakura, Zamfara State, Nigeria.

³College of Agriculture, Zuru, Kebbi State, Nigeria.

Correspondence e-mail: iliyasudyu@gmail.com

ABSTRACT

The study considered tree species frequency and density in Bunza Local Government Area of Kebbi State, Nigeria. Four villages in Bunza Local Government Area were proportionately selected in the study area. Four sample plots (50m x 50m) were laid at random within the villages, and tree species found were enumerated, a total of 16 villages were sampled. The data was analysed using descriptive statistics. The results indicated that different tree species were identified in the study area, which include *Combretum glutinosum* which recorded the highest (36), followed by *Azadirachta indica* with (23), while *Pilostigma thoningii* and *Hyphaene thebaica* (17), and *Gmelina arborea* and *Ziziphus mauritiana* recorded the lowest (1). *Combretum glutinosum* has the highest density of (144/h) across the study area, followed by *Azadirachta indica* (92/h) density followed by *Adansonia digitata* with (60/h) and the trees with lowest density are *Ziziphus mauritiana*, *Gmelina arborea*, both with density of (4). The result further explains that Fabaceae family recorded the highest with (5) followed by the family *meliaceae*, *Arecaceae* with (2), and the lowest families are *Verbenaceae* and *Rhamnaceae*. The highest genus is *Africana* and the least genus are *mauritiana*, *aborea*. This study discovers the existence of different tree species, but most of the species are being endangered as a result of over exploitation, fuel wood, charcoal production, bush burning and agricultural activities which led to environmental degradation. It is recommended that farmers should practice agro-forestry services, because it leads to successful recycling of nutrients and soil protection as well as improving their livelihood and agricultural production, government should provide alternative source of living in the area so as to reduce the pressure on forest trees.

Keywords: Diversity, Relative frequency, Relative density, Species.

INTRODUCTION

Forests are dominant terrestrial ecosystem of the earth, which are distributed across the globe; forest account to 75% of the gross primary production of earth's biosphere, and contain 80% of the earth's plant biomass. The distribution and abundance of different tree species over a landscape is what constitutes diversity in respect of tree species (Tripath, 2009).

In every land and in all age forests have an influence on the progress and welfare of humans. The progress from premature cave dwellers to the present civilized state cannot be told without frequent references to trees and their product (USDA, 1967). Trees provide early inhabitant with food, medicine, fuel, shelter, protection shade tools and other needs. Today over 10,000 products are reportedly made of wood (USDA, 1952). Vegetation provide food, shelter habitat and other number of services to humans, trees are such crucial components of ecology system that have productive and recreative functions. They control soil erosion, stabilize regional and global climate service as carbon sink and act in pollution control (Tripath,2009).As the size of the area sample increases the bias also increases. Another issue worth noting is that tree height and length of the live crown do not affect the estimates of canopy cover, whereas canopy closure increases as the trees become taller, and as the height to the live base of the crown decreases (Husch, et al, 2003).

In forestry tree light can be described as the vertical distance from ground level to the highest green point on the tree (which will be referred to as the tip of the tree). Forest ecosystem undergoes several natural and human disturbances, due to major difference in terms of life form and regeneration with understory plant species playing important roles in the overall plant species diversity in such ecosystem (Gilliam 2007). Pressure on forest, especially in the tropical world provides economic resources, have been increasing rapidly as a result of geometric increase of human population in the region (salami, 2006).

This has led to unabated deforestation, which has been recognized as one of the major drivers of biodiversity loss (Ojonigu et al, 2010). According to FAO (2005), each year about 13 million hectares of world's forest are lost due to deforestation. The assessment of plant diversity in mature plantation has become important in ecosystem management. As a matter of fact, one of the major concerns of forest managers in resources development is the maintenance of plant diversity especially the predominant trees (Aubert et al., 2003; Ellum et al.,2010), deforestation and overexploitation of trees and clearing of natural vegetation as a result of conversion of forest into the agricultural lands, shifting cultivation, due to infertility of the farm lands high or excessive cutting of trees for fire wood and local roofing and converting woody trees in to logs, overgrazing, bush burning, debarking of trees for traditional medicine in Bunza local government ward area, especially the recent use of bark of *Diospyros mespiliformis* with the English name Ebony tree, which is called *Kanya* in Hausa. It has medicinal use of many diseases mostly in the study area.

High population resulted in increase in demand of charcoal fuel wood production, the high demand on food crop resulted in tree species extinction which constitute the tree of Bunza. The negative effect of poor plant distribution causes desertification, high temperature, low

humidity, and drought. Therefore, an accurate data is needed to have information on tree species available for proper planning and sustainable management of trees in the study area.

Trees species as a habitat for biodiversity represent foundation of human existence as it supplies the most important human need in northern Nigeria. All forest and reserve areas are subjected to human activities which resulted in serious depletion and reduction of forest trees.

A study to provide about tree species diversity, their frequency, density and importance of trees to the people and environment in the study area may be useful in planning forest development strategies on both local and state level. It could also be used to change old practice of high exploitation of forest resources by the local people through proper management practice.

Study Area

The study was carried out in Bunza Local Government Area of Kebbi State, Nigeria. The Local Government has its administrative headquarters in Bunza; it was created in 1975 from former Sokoto state during the local government reform of the administration of General Murtala Ramat Mohammad. Bunza is bounded in the east by Kalgo Local Government Area, in the north by Dandi and Arewa Local Government Areas; in the south and west by Suru Local Government Area.

Bunza Local Government Area falls within Kebbi Central Senatorial Zone alongside with Birnin Kebbi, Aleiro, Gwandu, Kalgo, Koko/Beese and Maiyama Local Government Areas. The local government forms a federal constituency alongside with Birnin Kebbi and Kalgo Local Government Areas. Agriculture is the main occupation of the inhabitants of Bunza local government area, it has four districts: Bunza, Raha, Zogirma and Tilli. It consists of 10 Councillors representing the 10 wards of the local government area. The 10 wards of Bunza are: Bunza Dangaladima, Bunza Marafa, Gwade, Maidahini, Raha, Sabon Birni, Salwai, Tilli/Hilewa, Tunga and Zogirma. Bunza local government has a population of 12,746 and its latitude is 12°053.98”N and longitude of: 4°01’16.00E.

Sampling Techniques

The study proportionately considered four districts in Bunza Local Government Area; Bunza district, Zogirma, Tilli, and Raha, to assess tree species diversity. Four sample plots (50m x 50m) were laid at random within the villages, and tree species found were enumerated based on frequency and density, a total of 16 villages were sampled.

Data Analysis

The data was analysed using descriptive Statistics.

Result and Discussions

The result obtained for tree species diversity, frequency and density and importance of trees to people and environment in general, are presented in tables, while the tree species found are presented in table below.

Table 1: Different tree species found in Bunza Local Government Area of Kebbi State, Nigeria.

Scientific name	Common name	Family name
<i>Adansonia digitata</i>	<i>kuka</i>	<i>Malvaceae</i>
<i>Ficus sycomorus</i>	<i>Baure</i>	<i>Moraceae</i>
<i>E. camaldulensis</i>	<i>River red gum</i>	<i>Myrterceae</i>
<i>Vitellaria paradoxa</i>	<i>Shea butter tree</i>	<i>Sapotaceae</i>
<i>Accacia nilotica</i>	<i>Bagaruwa</i>	<i>Fabaceae</i>
<i>Pillostigma thoningii</i>	<i>Kalgo</i>	<i>Fabaceae</i>
<i>Azadirachta indica</i>	<i>Neem tree</i>	<i>Meliaceae</i>
<i>Tamarindus indica</i>	<i>tsamiya</i>	<i>Fabaceae</i>
<i>Hyphaene thebaic</i>	<i>Goriba</i>	<i>Arecaceae</i>
<i>Prosopis africana</i>	<i>ion tree</i>	<i>Fabaceae</i>
<i>Ziziphus mauritiana</i>	<i>Chinese date</i>	<i>Rhamnaceae</i>
<i>Balanites aegyptiaca</i>	<i>desert date</i>	<i>Balanitaceae</i>
<i>Gmelina arborea</i>	<i>white teak</i>	<i>Verbenaceae</i>
<i>Khaya senegalensis</i>	<i>mahogany</i>	<i>Meliaceae</i>
<i>Vitex doniana</i>	<i>Dunya</i>	<i>Lamiaceae</i>
<i>Commiphora africana</i>	<i>Duruma</i>	<i>Burseraceae</i>
<i>Acasia sieberiana</i>	<i>malga</i>	<i>Fabaceae</i>
<i>Diospyrus mespliformis</i>	<i>kanya</i>	<i>Ebenaceae</i>
<i>Borassus flabellifer</i>	<i>giginya</i>	<i>Arecaceae</i>
<i>Combretum glutinosum</i>	<i>tarauniya</i>	<i>Combretaceae</i>
<i>Steculia satigera</i>	<i>kukuki</i>	<i>steculiaceae</i>
<i>Scelerocya birrea</i>	<i>lodaloda</i>	<i>Anacardiaceae</i>

4.1 Result

The result obtained from this study shows that there are 23 different tree species which are very important to the people, and many are endangered due to fuel wood, medicine, agricultural activities and other factors, with the highest family of *Fabaceae* (5) and with the lowest of *Rhamnaceae, mauritiana* (1).

Table 2: Tree species with their Frequencies and Density found in the study area.

S/no	Name of Trees	Frequency	Density/ha.
1	<i>Adansonia digitata</i>	15	60
2	<i>Ficus sycomorus</i>	5	20
3	<i>E. camaldulensis</i>	2	8
4	<i>Vitellaria paradoxa</i>	3	12
5	<i>Accacia nilotica</i>	7	28
6	<i>Ptilostigma thoningii</i>	17	68
7	<i>Azadirachta indica</i>	23	92
8	<i>Tamarindus indica</i>	4	16
9	<i>Hyphaene thebaica</i>	17	68
10	<i>Prosopis Africana</i>	4	16
11	<i>Ziziphus mauritiana</i>	1	4
12	<i>Balanites aegyptiaca</i>	13	52
13	<i>Gmelina arborea</i>	1	4
14	<i>Khaya senegalensis</i>	2	8
15	<i>Vitex doniana</i>	4	16
16	<i>Commiphora africana</i>	3	9
17	<i>Acacia sieberiana</i>	16	64
18	<i>Diospyrus mespliformis</i>	11	44
19	<i>Borassus flabellifer</i>	5	20
20	<i>Combretum glutinosum</i>	36	144
21	<i>Steculia sategera</i>	5	25
22	<i>Scelerocya birrea</i>	13	52
23	<i>Parkia biglobosa</i>	4	16

Result: The result obtained from this table shows that *Combretum glutinosum* has the highest density of (144/h) across the study area, followed by *Azadirachta indica* (92/h) density

followed by *Adansonia digitata* with (60/h) and the trees with lowest density are *Ziziphus mauritiana*, *Gmelina arborea*, both with density of (4).

Table 3: Tree species found in the study area with their frequency, family, genus and species.

s/no	Species	Genus	Family	Frequency
1	<i>Combretum glutinosum</i>	<i>glutinosum</i>	<i>Combretaceae</i>	36
2	<i>Azadirachta indica</i>	<i>indica</i>	<i>Meliaceae</i>	23
3	<i>Pilostigma thoningii</i>	<i>thoningii</i>	<i>Fabaceae</i>	17
4	<i>Hyphaene thebaic</i>	<i>thebaic</i>	<i>Arecaceae</i>	17
5	<i>Acasia sieberiana</i>	<i>Sieberiana</i>	<i>Fabaceae</i>	16
6	<i>Adansonia digitata</i>	<i>digitata</i>	<i>Malvaceae</i>	15
7	<i>Balanites aegyptiaca</i>	<i>aegyptiaca</i>	<i>Balanitaceae</i>	13
8	<i>Scelerocya birrea</i>	<i>Birrea</i>	<i>Anacardiaceae</i>	13
9	<i>Diospyrus mespliformis</i>	<i>mespliformis</i>	<i>Ebenaceae</i>	11
10	<i>Accacia nilotica</i>	<i>nilotica</i>	<i>Fabaceae</i>	7
11	<i>Steculia setegra</i>	<i>setegra</i>	<i>Steculiaceae</i>	5
12	<i>Borassus flabellifer</i>	<i>flabellifer</i>	<i>Arecaceae</i>	5
13	<i>Fiscus sycomorus</i>	<i>sycomorus</i>	<i>Moraceae</i>	5
14	<i>Tamarindus indica</i>	<i>indica</i>	<i>Fabaceae</i>	4
15	<i>Prosopis Africana</i>	<i>Africana</i>	<i>Fabaceae</i>	4
16	<i>Vitex doniana</i>	<i>doniana</i>	<i>Lamiaceae</i>	4
17	<i>Parkia biglobosa</i>	<i>Biglobosa</i>	<i>Mimosaseae</i>	4
18	<i>Commiphora africana</i>	<i>africana</i>	<i>Burseraceae</i>	3
19	<i>Vitellaria paradoxa</i>	<i>paradoxa</i>	<i>Sapotaceae</i>	3
20	<i>E. camaldulensis</i>	<i>camaldulensis</i>	<i>Myrterceae</i>	2
21	<i>Khaya senegalensis</i>	<i>senegalensis</i>	<i>Meliaceae</i>	2
22	<i>Gmelina arborea</i>	<i>arborea</i>	<i>Verbenaceae</i>	1
23	<i>Ziziphus mauritiana</i>	<i>mauritiana</i>	<i>Rhamnaceae</i>	1

Result: The result obtained from this table shows that Fabaceae family recorded the highest with (5), followed by the family meliaceae, Arecaceae with (2), and the lowest families are Verbenaceae and Rhamnaceae. The highest genus is Africana and the least genus are mauritiana, arborea, and others.

Conclusion

The research was aimed to assess tree species frequency and density. The research shows that within a sample plot of 50X50m² of each selected village in the study area, a total of (211) tree stands were identified which gives a total of (16) families, and total of (23) species of trees were identified in the study area. This study discovers the existence of different trees in the study area. But these species are being endangered as a result of overexploitation, fuel

wood, charcoal production, bush burning and agricultural activities which led to environmental degradation. Rural people who engage in marketing of fuel wood and charcoal production and illegal felling of trees contribute to forest destruction in making the forestry research in the study area, Kebbi State, and Nigeria at large.

References

- Aubert, M., Alard D. And F. Burea (2003), diversity of plant assemblages in managed temperate forest; a case study in Normandy (France). *Forest ecology and management*, 172; 322-327.
- Ellum, D.S., Ashton, M.S. and T.G. Siccamo. (2010). Spatial pattern in herb diversity and abundance of second growth mixed deciduous evergreen forest of southern New England, USA *Forest ecology and management*, 249:1416-1426.
- Food and Agriculture Organization (FAO) 2005. *Forest resources assessment*. Retrieved from <http://www.fao.org/forestry/30515/en/> retrieved 3rd Feb. 2014. 178 Pp.
- Gilliam F.S. 2007. The ecological significance of the herbaceous layer in forest ecosystems. *Bio science*. 57: 845-858.
- Husch, B., Beers, T.W and Kershaw J. A (2003). *Forest mensuration*, 4th edition Wiley, New Jersey ISBN 0-471-38420-0, 340 Pp.
- Maingi, J.K. and Marsh, S.E. (2006). Composition, structure, and regeneration patterns in a gallery forest along the Tana River near Bura, Kenya. *Forest Ecology and Management* 236: 211-215
- Ojonigu F.A, Tabitha S., Abbas, I, and Muhammad. S.O. (2010). Assessing changes in Kogro forest, Kaduna state, Nigeria. Using remote sensing and GIS. *Journal of Applied Science, Engineering and Technology* 2(2): 121-132
- Omiyale, O. (2001) Impacts of Encroachment on Sustainable Development. *Journal of Highlands: A Review. Tropical Ecology* 50: 57-.
- Salami, A.T. (2006): Towards a geo-information based forest monitoring in Nigeria. In: Salami A.T (ed), *Imperatives of space technology for sustainable forest management in Nigeria* proceeding of an international stakeholder workshop sponsored by National Space Research and Development Agency (NASRDA), Abuja. Pp. 146-160.
- Tripathi (2009) effect of disturbances. Habitat fragmentation and a line invasive plants on floral diversity in dry tropical forest of Vindhyan highlands *Tropical Ecology*. 50:57-69.34. USDA (1967). *Agricultural information bulletin* no; 278 Washington D.C
- USDA (1967). *Forest conservation*. Agricultural bulletin 83 Washington D.C. U.S. (1973). *Forest Service protection bulletin* no.047. Washington D.C UNFCCC. 2007b. *Report on the African Regional Workshop on Adaptation*. FCCC/SBI/2007/2. UN Office at Geneva, Switzerland.