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Diversity and Population Status of Tree Species in Bakin-Dutse of Ardo-Kola LGA, Taraba State, Nigeria

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ABSTRACT

Nigerian forest resources are constantly threatened due to many anthropogenic activities and considering their importance in recycling oxygen, preventing erosion, biodiversity habitats etc. This study was carried out to determine the diversity and population status of trees. A 50km² plot was studied using the line transect method, and the Point Centered Quartet technique was deployed to enumerate standing tree biomass. Total Height, Diameter at Breast Height and Crown cover were also measured and recorded. The results showed that 200 trees spread across fifteen (15) families and forty (40) species were identified. The Fabaceae Family had more representatives 12 (30%) while Bignoniaceae, Euphorbiaceae, Meliaceae, Sapotaceae, Rutaceae and Olecaceae had 1 (2.5%) representation each. Parkia biglobosa had highest abundance 37 (18.5%) while Anacardium ocidentale, Brachystegia eurycoma, Ceiba pentandra, Cocos nucifera, Combretum molle, Ficus thoninngii, Khaya senegalensis, Haematostaphis barterii, Lannea microcarpa, Limonia. acidissima, Mangifera indica, Mitragyna inermis, Nauclea latifolia, Newbouldia laevis, Psidium guajava and Tamarindus indica all recorded the least abundance of 1 (0.5%). Diversity indices of H'=2.65 (North), H'=2.49 (South), H'=2.72 (East) and H'=2.37 (West) were recorded. The results also showed that 90% of the tree species enumerated are in need of serious conservation efforts. Parkia biglobosa had the highest Importance Value (46.84%) while Psidium guajava recoded the least (2.21%). It was then concluded that trees in Bakin-dutse community of Ardo-kola LGA needs conserving, hence, we suggest that a concerted effort from Governmental Organizations, Non-Governmental Organization and the Local Community to curtail the rapid decline in the population of these important biodiversity resources.
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Keywords: Biodiversity, Line, Transect, Point, Centered, Quartet

1.0. Introduction

Globally, forests and savannahs account for about 60% of terrestrial productivity, playing important roles in the welfare and economy of man (Ikyaagba et al., 2015). Forest ecosystems are important not only for supplying timber and other economically important products such as charcoal, but also for generating indirect benefits, which include the control of soil erosion, supporting soil fertility, providing shade, and buffering hydrological cycles (Clarke et al., 2013). Recently, forests have received priority in many multilateral agreements and global biodiversity conservation initiatives (IUCN, 2010; Swamy et al., 2010). This is due to their crucial roles in meeting the Sustainable Development Goals (i.e., SDGs 1, 2, 3, 7, 12, 13 and 15). Despite the numerous benefits and contributions of forest resources to human well-being, these resources have been subjected to varying degrees of anthropogenic disturbances for several centuries (Valentini et al., 2014; Fischer et al., 2016), which have led to their substantial losses and degradation.

Forests and woodlands in Africa play an important role in the livelihood of many communities and in the economic development of many countries (Sebukeera et al., 2006). African savannahs and forests occupied about 15.1 million km2 (Soboola et al., 2021) of the continent's land mass, but due to climatic changes and human land uses, this vegetation is undergoing extreme changes (Zerbo et al., 2016). Vancutsem et al. (2021) had reported an estimated loss of 218.7 million ha of tropical forests between

1990 and 2020, with 10% of the remaining 1071 million ha in a degraded state, thus affecting the overall function and structure of these forests. Adigbli et al. (2019) reported that the drivers of these changes include mining, agricultural expansion, population explosion, and logging. According to a global assessment, roughly 9,000 tree species are threatened with extinction, and many species have therefore become the focus of increasing conservation practices (Jensen and Meilby, 2012). Hence, understanding their floristic composition and structure, including their diversity and conservation status, is key for evaluating their sustainability and resilience (Owusu et al., 2022).

These studies can provide useful information on forest stability, growth patterns, and regeneration for conservation planning, monitoring, and management (Pandey et al., 2016; Girma et al., 2018). To a greater extent, the sustainability of forests and their resource management requires understanding of how these changes affect species diversities and compositions (Collins et al., 2017; Dieler et al., 2017), as well as their community structure (Chai et al., 2016) in order to effectively monitor and plan conservation efforts (Yates et al., 2019). Hence, this endeavour is critical to evaluating the current status of forest ecosystems in order to predict their future in the context of ongoing global environmental disturbance. Particular, understanding the diversity and conservation status of forest ecosystems, bearing in mind the global risks of extinction of these species, has become vital for providing information on conservation actions and policy changes (Watson et al., 2018; IUCN, 2020).

Tree resources are having a positive impact on the rural economic development of Bakin-Dutse, where fuel wood and timber extraction provide employment to people of the area but are also causing serious negative effects on the forest diversity of the area, which could lead to deteriorating conditions that might result in local extinction, habitat loss, and aggravated climate change. Also, recently, there has been uncontrolled mining of Pterocarpus erignaceous (Madrid) in Taraba State, which has greatly depleted its abundance and subsequently exerted pressure on other tree species in the state.

Most of the research work conducted in the area with vegetation resources was mainly on degradation problems and socio-economic development for rural dwellers, and studying the population status and characteristics of forest trees from other places may be responsible for the poor knowledge of species abundance and characteristics. Therefore, this research was designed to survey the population status, diversity and important value index of trees in Bakin-Dutse district of Ardo-kola Local Government Area (LGA). The community was selected specifically as a representative of all the rural communities around Ardo-kola because of its active use of trees for different purposes, thus covering the socioeconomic spectrum of the communities that rely on their surrounding vegetation as a means or source of their livelihood.

2.0. Methodology

2.1 Study Area:

The study was carried out in Bakin-dutse, one of the twelve districts of Ardo-kola LGA. It's about 12 kilometers north of Jalingo along the Jalingo-Bali road, om latitude 8o40′ - 9o0′N and longitude 11o0′ - 11o30′E. The vegetation of Bakin-Dutse is the Sudan Savannah type, which is characterized by short grass interspersed by trees of average height. Two seasons are experienced yearly in Bakin-Dutse. The rainy season, which commences in April and ends in October, and the dry season which falls between November and March. The map of the study area is in Figure 1.

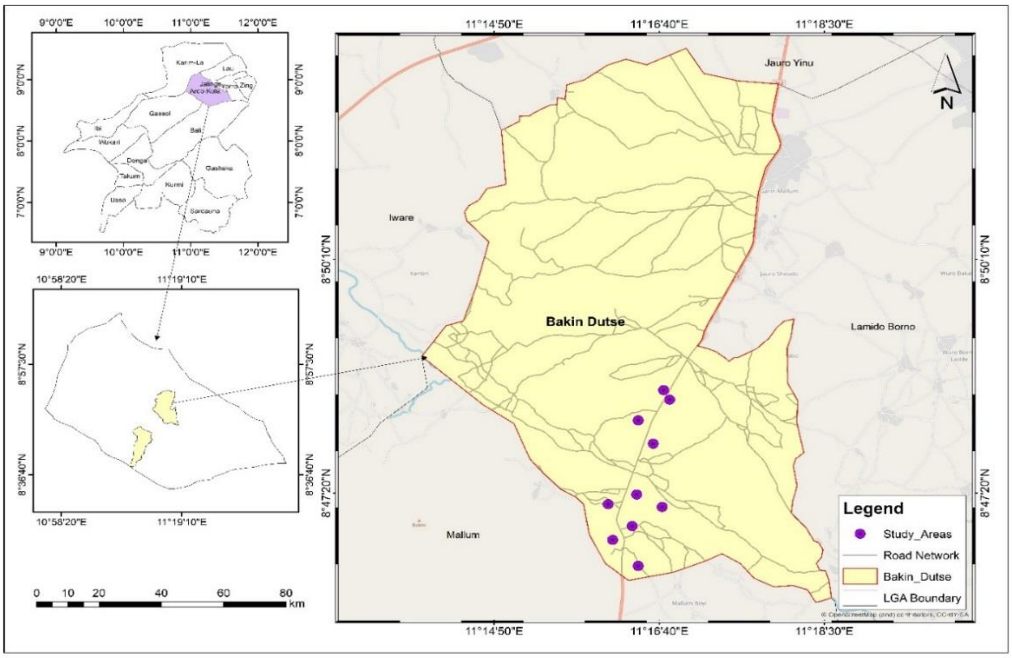

Figure 1: Map of Ardo-Kola Showing the Study Area.

2.2 Data Collection Methods

Data for the study was generated primarily from the field in a selected plot of size 50 km^2. Within the plot, ten (10) line transects were established and studied using the point-centred quadrate (PCQ) method (Cottam and Curtis, 1956). The procedures of Soboola *et al*. (2021) were adopted with some modifications. Five (5) line transects were systematically laid from each side of the road traversing through the community, that is, North and South. The transects were spaced 5 km apart and 150m away from the main road to minimize edge effects. Each transect stretched a distance of 500m, and tree species encountered were assessed using stratified random sampling every 100m from the point. The height was measured using the App arboreal; DBH was measured as the girth of the tree using a tape; and crown cover was measured as the radius from the trunk of the tree to the end of its canopy. The GPS coordinates of each enumerated tree were also recorded.

2.2.2 Identification of Trees:

Tree species encountered in the field were identified using the Field Guide "Common Trees and Shrubs of Africa (2019) Volume I, II & III by Najma Dharani". And where Trees could not be identified in the field, a plant press was prepared and sent to the Herbarium of Ahmadu Bello University (ABU), Zaria for identification.

2.2.3 Data Analysis:

The data collected was analysed using Shannon-Weiner diversity index to determine diversity and evenness of species on each transect, and the Important Value Index (IVI) was also determined:

$$H' = -\sum p_i \ln (p_i) \qquad (1)$$

Where

H' = Diversity Index

P_i = is the total number of individuals of species in a given plot divided by the plots.

$\ln p_i$ = is the natural logarithm of P_i

$\sum$ = is the sum of the calculations.

Species richness (S) $=\sum n$

$$\text{Equitability index} = (H'E) = H'/H_{max} \qquad (2)$$

Where

H' = Diversity Index

$H_{max} = \ln(S)$

$$IVI = Relative\ Frequency\ (RF) + Relative\ Density(RD) + Relative\ Dominance(RDo) \qquad (3)$$

Where:

$$RF = \frac{Frequency}{Total\ Frequency}\ x\ 100 \qquad (4)$$

$$RD = \frac{Density}{Total\ Density}\ x\ 100 \quad (5)$$

$$Density = \frac{n}{2Lw} \quad (6)$$

Where: n = number of trees observed, L = Length of Transect and w = strip width

$$RDo = \frac{Dominance}{Total\ Dominance}\ x\ 100 \quad (7)$$

$$BA = \frac{\pi D^2}{4}\ x\ 100 \quad (8)$$

Where: BA = Basal Area (Dominance); D = Diameter of Tree

3.0. Results and Discussion

3.1 Checklist and Tree Species Composition in Bakin-Dutse Community of Ardo-Kola LGA:
During the period of this study, a total of 200 standing tree biomass were enumerated, which belonged to forty (40) species distributed across fifteen (15) taxa. Figure 2 shows that the family Fabaceae had the highest species representative of 12 (30%), followed by Anacardiaceae and Combretaceae with 4 species each equivalent to 10%; Malvaceae and Moraceae with 3 (7.5%); Arecaceae, Lamiaceae, Myrtaceae, and Rubiaceae with 2 (5.0%) species each, and lastly, the least species abundance of 1 (2.5%) was recorded in Bignoniaceae, Euphorbiaceae, Meliaceae, Meliaceae, Meliaceae, Sapotaceae, Rutaceae and Olecaceae.

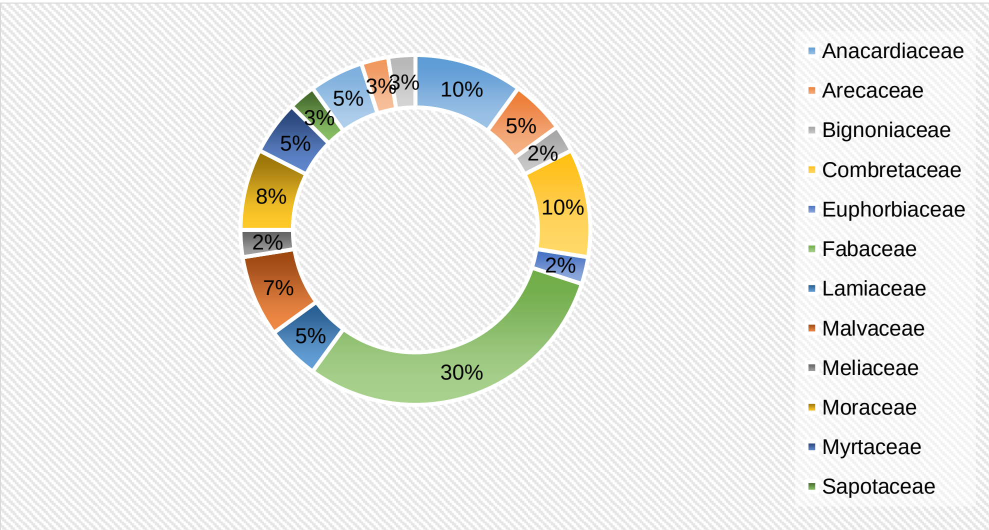

Figure 2: Species Abundance in respect to Families in the Study Area.

Table 1 shows that Parkia biglobosa recorded the maximum abundance of 37 (18.5%) individuals when comparing individual species biomass. Prosopis africana follows, with 29 (14.5%) individuals, followed by Vitellaria paradoxa (26, 13.0%), Burkea africana (16, 8.0%), Sterculia segitera (10, 5.0%), Acacia sieberiana (7.5%), and Combretum glotinosum (7.5%). Pilliostigma thoningii and Terminalia sp recorded 4 individuals with a relative abundance (RA) of 2.0%; Adansonia digitata, Combretum aculeatum, and Erythrophleum africanum recorded species abundance of 3 each with a RA of 1.5%; Ficus sp recorded 6 individuals with a relative abundance (RA) of 3.0%; Daniella oliveri and Eucalyptus africanum recorded 5 (2.5%). Afzelia africana, Albizia lebbeck, Bridelia ferruginea, Borassus aethiopum, Ficus polita, Gmelina arborea, Isobalinia doka, and Vitex doniana all recorded 2 species each with an RA of 1.0%, while the least species abundance of 1 (0.5%) was recorded in Anacardium occidentale, Brachystegia eurycoma, Ceiba pentadra, Cocos nucifera, Combretum molle, Ficus thoninngii, Khaya senegalensis,Haematostaphis barterii, Lannea microcarpa, Limonia acidissima,Mangifera indica, Mitragyna indica, Mitragyna inermis, Nouclea latifolia,Newbouldia laevia, Psidium guajava, and Tamarindus indica.
With forty (40) different species recorded out of the 200 stands enumerated, it might not be an understatement to opine that the study area was once a densely populated forest land that had suffered

environmental disturbance of many kinds. That translated to only a bit of what it used to be, as the community is surrounded by open farmlands that tend to be living evidence of how the vegetation was removed to create space for farming activities.

The findings could also suggest that some tree species encountered during the study might not have occurred in larger populations naturally and, coupled with probable anthropogenic activities, have had some impacts on the composition and availability of the tree stands. This agreed with Dangu (2015), who reported that the fate of seeds during dispersal and regeneration was higher in undisturbed lands than in disturbed lands. Daskalova *et al*. (2021) and Haro-Carrion *et al*. (2021) also reported that species composition and availability are highly affected by the amount of pressure they receive from the environment and human activities.

Table 1: Checklist and Tree Species Composition in Bakin-Dutse

Family	Scientific Name	Common Name (English)	Hausa Name	N
Anacardiaceae	*Anacardium occidentale*	Cashew	Yazawa	1
	Haematostaphis barterii	Blood plum	Jinin kafiri	1
	Lannea microcarpa	African grape	Faaru	1
	Mangifera indica	Mango	Mangoro	1
Arecaceae	*Borassus aethiopum*	Fan, Deleb palm	Giginya	2
	Cocos nucifera	Coco nut Tree	Kwakwa	1
Bignoniaceae	*Newbouldia laevis*	Seem, Boundary Tree	Aduruku	1
Combretaceae	*Combretum aculeatum*		Farar geeza	3
	Combretum glutinosum		Kantakara	7
	Combretum molle	Velvet Bush Willow	Wuyan Damo	1
	Terminalia sp	Damson	Báushé	4
Euphorbiaceae	*Bridelia ferruginea*	Bridelia	Kirni, Kizni, Kimi	2
Fabaceae	*Acacia sieberiana*	Paper Back Acacia, Paper Back Thorn	Farar ƙaya	7
	Afzelia Africana	African Oak	Kawoo	2
	Albizia lebbeck	Lebbeck, Flea Tree, Frywood	Shoni	2
	Brachystegia eurycoma	Naga, Okwen	Taura	1
	Burkea africana	Wild syringe	Karya gatari	16
	Daniella oliveri	African Copaiba, Balsam Tree	Maaje	5
	Erythrophleum africanum	African blackwood	Sambeeruu	3
	Isobalinia doka	Sau	Dooka, Bailleul	2
	Parkia biglobosa	Locust Tree	Doorowa	37
	Pilliostigma thonningii	Camel’s Foot Tree. Monkey Bread, Monkey Biscuit Tree	Kargoo, Kalgoo	4
	Prosopis africana	False Locust	Kirya	29

	Tamarindus indica	Tamarind, Asam, Indian dates	Tsamiya	1
Lamiaceae	*Gmelina arborea*	Beechwood, Gmelina	Malaina	2
	Vitex doniana	Black plum	Dinya	2
Malvaceae	*Adansonia digitata*	Baobab	Kuka	3
	Ceiba pentandra	Kapok Tree	Rimi	1
	Sterculia setigera	Karaya Gum Tree	kʊ̆kkuuki	10
Meliaceae	*Khaya senegalensis*	African Mahogany, Dry Zone Mahogany	Madaci	1
Moraceae	*Ficus polita*	Heart-leaved Fig	Durumi	2
	Ficus sp	Fig	Ɓauréé	6
	Ficus thonningii	Strangler Fig	Chediya	1
Myrtaceae	*Eucalyptus cameldulensis*	Blue gum	Bishiyar Turare	5
	Psidium guajava	Guava	Goiba	1
Sapotaceae	*Vitellaria paradoxa*	Shea butter	Kadanya	26
Rubiaceae	*Mitragyna inermis*	False Abura,	Giyeyya	1
	Nauclea diderrichii	African Peach	Tafaasiyya	1
Rutaceae	*Limonia acidissima*	Wood apple, Thanakha Tree	Kokiya	1
Olacaceae	*Ximenia americana*	Tallow wood, Yellow plum, Sea lemon	Tsada	3
15	**40**			**200**

3.2 *Species Abundance, Diversity and Conservation Status:*

More species abundance depicts the health of a population, its ability to withstand pressure and sustainability. For this study, the results obtained were subjected to the Raunkiers Frequency Distribution Class (1934) and the Braun-Blanquet presence class (1927), which depict the presence and conservation status of the species.

As can be seen in Figure 3, 75% (30) of tree species encountered in the study area are within the Raunkiers' frequency class A, signaling that they have a percentage frequency between 0 – 20%. 15% (6) of them fall into frequency class B, with a 21 - 40% occurrence, and 5% fall into frequency classes D and E, with 61 - 80% and 81 - 100% occurrences, respectively. Overall, it shows that 90% of tree species encountered during the study period are rare, which poses a serious conservation problem while only 10% of the trees are at the safe limit for the mean time.

During the course of this study, different species were enumerated across the study area. From the results in Table 3, it can be deduced that various diversity values were obtained, depicting the effects of many parameters. Diversity parameters were enumerated along two (2) different dimensions; that is, the northern and southern parts of the town and the eastern to western parts of the town along the rural-urban gradient. In the Northern and Southern sections of the town, which were separated by the Jalingo-Bali main road, it was observed that the Northern section (Transects 1, 3, 5, 7 and 9) has more species diversity and evenness (H' = 2.65; E = 0.57) compared to the Southern section (Transects 2, 4, 6, 8, and 10) with species diversity H' = 2.49 and evenness E = 0.54. Although the result was not statistically significant (T-test, p = 0.05). The results showed that the Eastern part of town (Transects 1-5) has more species diversity and evenness, with H' = 2.72 and E = 0.59, than the Western part of town (Transects 6-10), with diversity index H' = 2.37 and evenness E = 0.51. However, this result is statistically significant (T-test; p = 0.05).

Table 2: Diversity Parameters

	Transects			
Diversity Parameters	**North**	**South**	**East**	**West**

H'	2.65	2.49	2.72	2.37
E	0.57	0.54	0.59	0.51
N	100	100	100	100

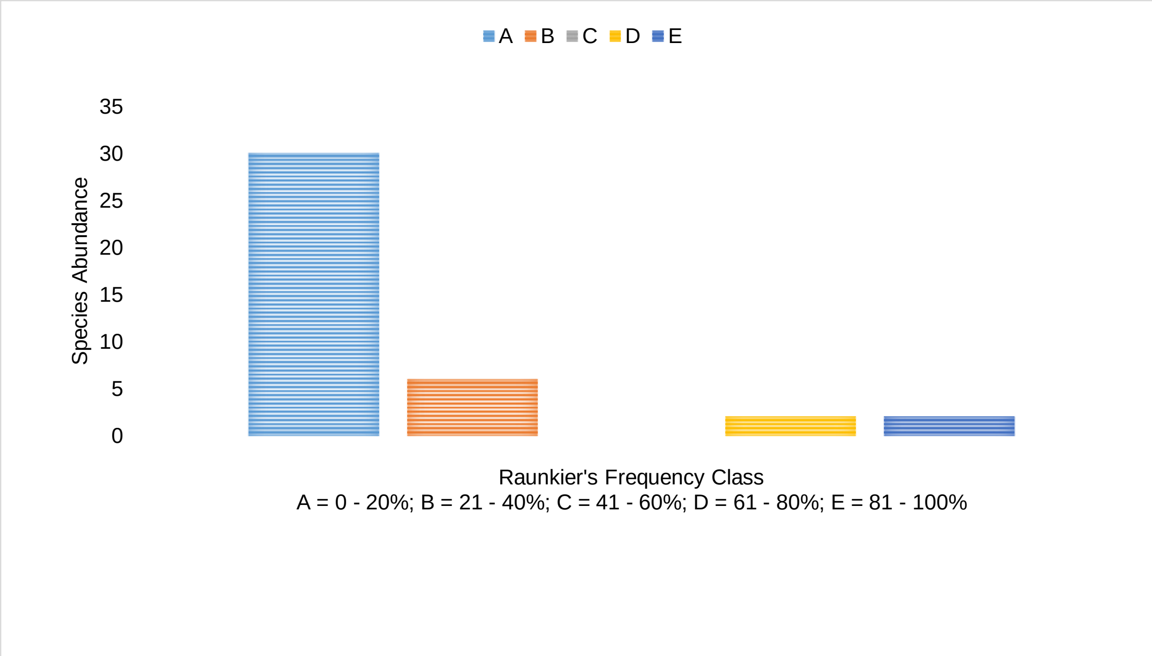

Figure 3: Conservation Status of Tree Species in the Study Area

The Braun-Blanquet presence class was also used and the results showed that 77.5% (31) of the tree species were Rare (R) in the study area, 12.5% (5) were Seldom Present (SP), while only 5% each of the tree species are Mostly Present (MP) and Constantly Present (CP). This also proves that 90% of the tree species are insignificantly abundant, hence the need for conservation interventions to prevent local extinction in the community which might translate to other neighboring communities.

Table 3: Species Abundance and Conservation Status of Tree Species in Bakin-Dutse

Scientific Name	Hausa Names	F	%F	FC	CS
Acacia sieberiana	Farar ƙaya	7	40	B	SP
Adansonia digitata	Kuka	3	30	B	SP
Afzelia Africana	Kawoo	2	20	A	R
Albizia lebbeck	Shoni	2	20	A	R
Anacardium occidentale	Yazawa	1	10	A	R
Borassus aethiopum	Giginya	2	10	A	R
Brachystegia eurycoma	Taura	1	10	A	R
Bridelia ferruginea	Kizni/Kirni	2	20	A	R
Burkea Africana	Karya gatari	16	70	D	MP
Ceiba pentandra	Rimi	1	10	A	R
Cocos nucifera	Kwakwa	1	10	A	R
Combretum aculeatum	Farin geeza	3	20	A	R
Combretum glutinosum	Kantakara	7	40	B	SP
Combretum molle	Wuyan damo	1	10	A	R
Daniella oliveri	Maaje	5	30	B	SP
Erythrophleum africanum	Sambeeruu	3	20	A	R

Eucalyptus africanum	Bishiyar Turare	5	20	A	R
Ficus polita	Durumi	2	10	A	R
Ficus sp	Ɓauréé	6	20	A	R
Ficus thonningii	Chediya	1	10	A	R
Gmelina arborea	Malaina	2	20	A	R
Haematostaphis barterii	Jinin Kafuri	1	10	A	R
Isoberlnia doka	Dooka	2	20	A	R
Khaya senegalensis	Madaci	1	10	A	R
Lannea microcarpa	Faaru	1	10	A	R
Limonia acidissima	Kokiya	1	10	A	R
Mangifera indica	Mangoro	1	10	A	R
Mitragyna inermis	Giyeyya	1	10	A	R
Nauclea diderrichii	Tafaasiyya	1	10	A	R
Newbouldia laevis	Aduruku	1	10	A	R
Parkia biglobosa	Doorowa	37	90	E	CP
Pilliostigma thonningii	Kargoo/Kalgoo	4	30	B	SP
Prosopis Africana	Kirya	29	90	E	CP
Psidium guajava	Goiba	1	10	A	R
Sterculia setigera	kŏkkuuki	10	40	B	R
Tamarindus indica	Tsamiya	1	10	A	R
Terminalia sp	Báushé	4	20	A	R
Vitellaria paradoxa	Kadanya	26	70	D	MP
Vitex doniana	Dinya	2	20	A	R
Ximenia Americana	Tsada	3	10	A	R
	TOTAL	**200**			

F = Frequency; %F = Percentage Frequency; FC = Raunkier's Frequency Class; CS = Conservation Status (R = Rare; SP = Seldom Present; MP = Mostly Present; CP = Constantly Present)

The Braun-Blanquet presence class was also used and the results showed that 77.5% (31) of the tree species were rare (R) in the study area, 12.5% (5) were scarcely present (SP), while only 5% of each of the tree species were Mostly Present (MP) and Constantly Present (CP). This also proves that 90% of the tree species are insignificantly abundant, hence the need for conservation interventions to prevent local extinction in the community, which might translate to other neighboring communities.

The physiognomy of the Bakin-Dutse community can be said to be dominated by three (3) trees, that is, *Parkia biglobosa*, *Prosopis africana,* and *Vitellaria paradoxa*. Although it is a heterogeneous community with varied abundance, the results could be attributed to preferential use or harvesting of some tree species that had affected their natural abundance. Also, stress tolerance and preference for nutrient availability might have played a significant role in the species' abundance.

Hayatu and Abba (2021), had reported a diverse but heterogeneous plant community in the Ledde and Galumji areas of the Wawa-Zange Forest Reserve of Gombe State. Bukar *et al*. (2021) reported high species abundance in the University of Maiduguri campus, although they stressed that most of those species were cultivated. Divakara *et al*. (2021) in the northern part of Bengaluru metropolis in India reported varied species abundance and attributed it to land use pattern, preferential usage, and the ability to withstand environmental stress.

Species diversity assessed across two (2) gradients during this study depicts a decline across the Northern and Southern parts of the community and the Eastern and Western parts, which could not be connected to the more logging activities observed in the Southern part and the transition to urbanization in the Western part. The studies of Divakara *et al*. (2021) have shed more light on the urban-rural gradient effects on tree species diversity. Bukar *et al*. (2021) reported the effects of human beings through their very many developmental activities, which impacted on species diversity. Hayatu and Abba (2021) have attributed low species diversity to low soil and a lack of conservation practice.

The species abundance recorded in this study has shown a poor conservation effort to ensure future availability of the tree species. This is seen clearly in the fact that both the Raunkiers Frequency Class and the Braunn-Blanquet Presence Class showed the need to intensify conservation practices to salvage further decline in population and prevent extirpation, as about 90% of the studied population were classified as rare. This conforms with Akinyemi *et al*. (2021), who reported that 92.19% of tree species in Shasha Rainforest Reserve in Southeastern Nigeria are in need of serious conservation efforts (Endangered = 42.19%; Threatened = 50.0%). Garba *et al*. (2021) also reported that of the studied economic trees in Jigawa State, Nigeria, 90% were endangered. Sobola *et al*. (2021), while studying the composition and diversity of tree species in the northern Guinea-savanna of Taraba State, reported that more than 50% of enumerated trees fall within the rare category, hence, advocates for stricter conservation approaches.

3.3 Important Value Index (IVI):

The Importance Value Index (IVI) of a species shows its overall ecological importance in the plant community, as it relates to dependence on it by the human community. In this study, as shown in the figure below, it was observed that the highest IVI was recorded by *Parkia biglobosa* (46.84, N = 37), while the least was recorded by *Newbouldia laevis* (1.89, N = 1). Other IVI recorded were; *Burkea africana* (20.8, N= 16); *Prosopis africana* (19.02, N= 29); *Vitelleria paradoxa* (17.33, N= 26); *sterculia setigera* (14.64, N= 10); *Ficus sp* (10.8, N= 6); *Acacia sieberiana* (10.19, N= 7); *Combretum glotinosum* (10.14, N= 7); *Adansonia digitat* (8.86, N= 3); *Daniella oliveri* (8.81, N= 5); *Eucalyptus cameldulensis* (7.24, N= 5); *Terminalia sp* (6.94, N= 4); *Khaya senegalensis* (6.51, N= 1); *Pilliostigma thoninngii* (6.05, N= 4); *Ficus polita* (6.02, N= 2); *Borassus aethiopum* (5.87, N= 2); *Combretum aculeatum* (5.66, N= 3); *Mangifera indica* (5.58, N= 1); *Cocos nucifera* (5.35, N= 1); *Erythrophleum africanum* (5.24, N= 3); *Ximerai american* (5.07, N= 3); *Afzelia africana and Isoberlinia doka* (4.91, N = 2); *Gmelina arborea* (4.68, N= 2); *Albizia lebbeck* (3.94, N= 2); *Ficus thoninngii* (3.88, N= 1); *Anacardium occidentale* (3.74, N= 1); *Vitex doniana* (3.75, N= 1); *Lannea microcarpa*(3.71, N= 1); *Tamarindus indica* (3.57, N= 1); *Mitragyna inermis* (3.42, N= 1); *Nauclea dedirrichii* (3.23, N= 1); *Haemotostaphis barterii* (3.18, N= 1); *Limonia acidissima*(3.14, N= 1); *Brigdelia ferruginea* (3.04, N= 1); *Brachystegia eurycoma* (3.01, N= 1); *Combretum molle* (2.99, N= 1); *Ceiba pentandra* (2.42, N= 1) *; Psidium guajava* (2.21, N= 1).

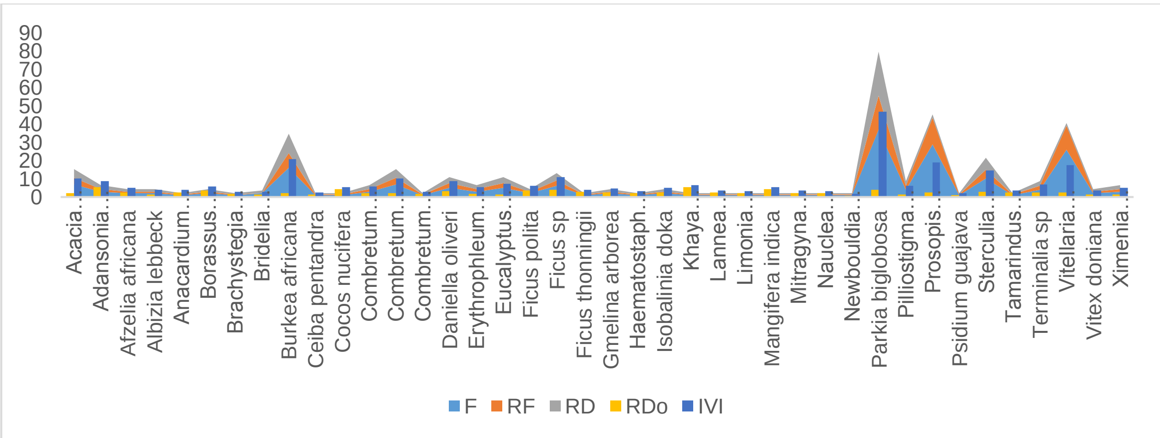

Figure 4: Important Value Index (IVI) of Tree Species in the Study Area.

An Important value index is an ecological tool that reveals the ecological significance of a species and the magnitude of its dominance in the vegetation structure. The knowledge of IVI is vital in making ecosystem service predictions in an area. Low IVI was recorded in over 82.5% (10%) of the enumerated tree species during this study, while only 17.5% (> 10%) of IVI was recorded. Abba and Timothy (2021) have reported that the important values of tree species will depend on their abundance. However, a more diverse community usually has lower IVIs.

4.0. Conclusion

This study has unveiled the current status of woody species in Bakin-Dutse community of Ardo-Kola LGA in terms of population, diversity, and conservation status. The results obtained showed that only four (4) trees species were healthily represented while the remaining thirty-six (36) of the forty (40) species were unhealthily represented, posing serious concerns for future availability and sustainability. Hence, it was recommended that conservation efforts should be advocated and amplified in the ecological region to preserve these resources for future usage. Also, a massive reforestation of the community with indigenous and economic species will go a long way towards mitigating the population decline.

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