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Phytosociological Study At Tundun Wada, A Village Adjoining Wild Life Park Jos, Nigeria

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Abstract: *Phytosociological study of woody vegetation was conducted at Tundun Wada, village adjoining Wild Life Park, Jos, Nigeria to determine the effect of human activities on the vegetation. Two sites were earmarked measuring 100m x 100m (10, 000m^2 = 1ha). One site was close to human settlement (disturbed site) and the other within the park (undisturbed site) which served as control. At each of these sites, phytosociological studies by complete enumeration method was conducted to determine percentage, frequency, density, abundance, girth at breast height, diameter, dominance (Basal Area) and importance value index. The result indicated lower value, species composition and generally lower values of the phytosociological parameters studied at the disturbed site. A factor attributed to human interference. As no buffer zone exists, these human activities constitute a major threat, through encroachment, to the Wild Life Park. Urgent conservation measures are therefore need by the Nigerian National Parks Service.*
Key Words: *Phytosociological, Wild Life*

I. Introduction

Phytosociology is the study of vegetation including its classification, development, distribution, interdependence and organization. It is a general contribution to the knowledge of ecology of plant community. It also gives a comprehensive trend of a particular area.

The plant community alongside animals and the biotic environment makes up an ecosystem (i.e. Wild Life Park) in which interaction of organisms and their environmental factors takes place through flow of energy and cycling of materials. Diamond and Case (1985) reported that community structure and dynamics have been the focus of much present ecological research.

Naturally, the structural characteristics of the ecosystem depend on the spatial distribution of the plants in that ecosystem. There are basically two reasons for analyzing vegetation, for description and mapping and also for ecological purpose (Causton, 1988).

Since the prime objective of ecological enquiry is to determine the factors that control the occurrence and distribution of plant species, ecological purpose here means the use of vegetation analysis to investigate species – species as well as species - environment relationship. However, the various aims of vegetation analysis can conveniently be classified into three categories based on the scale of work in the field.

1. Large scale vegetation survey usually of a new area, for description and mapping.
2. Small scale survey of a restricted areas containing different vegetation types, where the objectives could either be mapping or ecological purpose.
3. More detailed work after small scale survey which might involve comparison between the different vegetation types, or more detailed work on individual species found in the whole area.

Buddle man and Vanderpol (1992) reported that woody plants are one of the essential elements in maintaining the regulatory and buffering capacity of an ecosystem. For this reason, this study has been restricted to woody vegetation only.

II. Wild Life Park

Study Area

The area is located on the Jos Plateau at an elevation of about 1, 217 metres or 4, 062 feet high above sea level. During British colonial rule, Jos was an important centre for tin mining. Jos had become an important national administrative, commercial, and tourist centre. Covering roughly 3square miles (7.8km^2) of savannah bush. The Jos Wild Life Park is popular local attraction and includes animals such as lines, pythons and pygmy hippopotami.

Wild Life Park is the most popular destination for tourists in Nigeria and plays a vital role, therefore, in the development and promotion of tourism and ecotourism in Nigeria.

Statement of the Problem

Wild Life Park is a conservation area and resource base for many people or even the entire state providing economic, aesthetic and ecological benefit. However, Green and Amance (1987) reported that the part has no BUFFER ZONE. Because of this lack of buffer zone, its adjoining habitants are fast losing their vegetational and adaphic values to uncontrolled human activities as the open country and villages that surround the park are populated by farmers and herders.

It is on this background that this research was conducted to quantify the human damage caused on one of the adjoining settlements of Wild Life Park through phytosociological study.

III. Methodology

A preliminary field survey to locate a human disturbed area adjoining the park near Tundun Wada Village was undertaken in 2009. Two sample plots each measuring 100mm x100mm were established. One near human settlement, (unconserved area) and destinated DISTURBED SITE while the other plot was established within the park, (conserved area) and destinated as UNDISTRIBUTED SITE to serve as control plot. At each of the plots, phytosociological study of woody plants of height 1.5m and above (Nanophanerophytes) was conducted by complete enumeration method to determine frequency, density, abundance, GBH, Basal Area and importance value index (IVI).

Calculations

i. Percentage Frequency: This was calculated by dividing the number of quadrants in which the species occurred during sampling by the total number of the quadrants studied and multiplied by one hundred (Raunkier, 1934) i.e.

$$\% \text{ Frequency} = \frac{\text{No of quadrants of occurrence} \times 100}{\text{Total No of quadrants sampled}}$$

ii. Density: This was calculated by dividing the total number of individual trees that occurred by the total area sampled i.e.
10, 000m^2 (Misra, 1968) i.e.

$$\text{Density} = \frac{\text{Total No of individual of each species}}{\text{Total area sampled (10, 000}m^2\text{)}}$$

iii. Abundance: This was calculated by dividing the total number of individual trees of a particular species by the number of quadrants in which the species occurred (Oosting, 1958) i.e.

$$\text{Abundance} = \frac{\text{Total No of Individual of each species}}{\text{No. of quadrants of occurrence}}$$

iv. Girth at Breast Height (GBH): This was determined by measuring the girth of a tree at breast height (approx 1.5m) using a twine and a meter rule (Misra, 1968).

v. Diameter at Breast Height: This was calculated from the circumference by dividing the value of the GBH by pi (TT) which is 3.14 (Friths and Friths, 1965) i.e. Diameter = $^{C}/TT$ where TT = 3.14.

vi. Dominance/Basal Area: This was obtained by dividing the value of the diameter by two (2) to obtain the value of radius (r). The "r" value was then squared and multiplied by pi (TT) (Misra, 1968) i.e. B.A/Dominance = r^2 where "r" = Diameter/$_2$.

vii. Importance Value Index (IVI): This was determined by adding the relative value of frequency, density and dominance (Philips, 1959) i.e. IVI = R.F + R.D + R.
Dominance Trees encountered during the study were identified to species level using the following texts:
   a. Savanna trees of Nigeria by Hopkin and stand field (1966).
   b. Nigerian trees by keay and stand field (1964)
   c. Savanna plants, an illustrated guide by Gazafar (1989).

Statistical Analysis

This statistical tool used in this study is simple percentage.

IV. Result

The phytosociological date obtained is represented in table 1. A total number of 459 individual tress were encountered during the study. Out of this number, 430 were at the undisturbed site while 29 were at the disturbed site.

These tress were found to belong to 17 different species, 15 genera and 10 families High trees number recorded were for *Combretun nigricans (69), Combretun glutinosum (67)* and *Guiera senegalenses (42)* at the undisturbed site while the lowest number of individuals recorded was on *Guinera senegalenses, moringa, oleifera* and *scelerocarya birrea at the disturbed site.*

Frequency

The highest frequency was recorded for *Combretum nigricans, Combretum glutinosum* (100%) at undisturbed site and the lowest on *Guiera senegalenes, ziziphus mauritiana, Lawsoni* and *Moringa oleifera* (25% each) at the disturbed site.

Density

Highest density per unit area was recorded for *Combretun nigricans* (6.9×10^3) at the undisturbed site and the lowest was 1.0×10^4 each for *Guiera, Moringa and scelerocarya* at the disturbed site.

Abundance

Highest abundance value was recorded at the undisturbed site with 19.00 each for *Acacia sieberiana* and *Burkea Africana* and the lowest record of 1.00 each on more than 40% the species of the disturbed site among which includes *Anogeissu leiocarpus, Combretun* Spp etc.

Dominance

Highest value for dominance area was recorded at the undisturbed site with 8, 588.81cm^2 on *Adansonia digitata* and the lowest was at the disturbed site on *Guiera senegalensis* with 5.77m^2.

Girth at Breast Height (GBH)

Adansonia digitata had the highest GBH of 328.45cm at the undisturbed site while the lowest record was on *Guiera senegalensis* at the disturbed site with9.5cm.

Importance Value Index (I.V.I)

The highest IVI of 82.90 was recorded at the undisturbed site on *Adansonia digitata* while the lowest was at the disturbed site for *Guiera senegalensis* (6.14).

Table: Phytosociological Data Of Disturbed And Undisturbed Sites Wild Life Park

		Undisturbed Site			Disturbed Site		
SN	**Name of Specie**	**No of Indiv.**	**No of QT OCC**	**GBH**	**No of Indiv**	**No of QT OCC**	**GBH**
1.	*Acacia sieberiana DC.*	38	2	68.60			
2.	*Adansonia digitata L.*	2	2	328.45	2	1	32.00
3.	*Anogeissus leiocarpus DC.*	36	2	42.00	2	2	48.50
4.	*Balanites Egyptians (L) Del.*	37	3	68.20	2	2	82.50
5.	*Burkea Africana Hook.*	38	2	26.50			
6.	*Combretm glutinsum prrr & DC.*	67	4	98.45	2	2	90.30
7.	*C molle R Br & G Doin.*	12	2	68.50	2	1	67.00
8.	*C Nigrican Guill. & Perr*	69	4	26.50	2	2	18.70
9.	*Detarium microcapum Guill & Perr*	24	2	24.40			
10.	*Guiera senegalensis J.F. Gmel*	42	3	11.20	1	1	8.50
11.	*Lawsonia Alba Lam.*		1		2	1	13.30
12.	*Moringa oleifera Lam.*				1	1	16.00
13.	*Piliostigma ihonningii*				4	1	28.00
14.	*Seelerocarya birrea A. Rich*	24	2	22.00	1	1	15.00
15.	*Tamarindus indica L.*	4	2	62.40	1	1	
16.	*Vitex simplicifolia Oliv.*				4	1	40.50
17.	*Zizipus mauritiana Lam*	37	3	31.00	4	1	30.20

KEY: INDIV. = Individual, QT. OCC. = Quadrant of occurrence, G.B.H. = Girth at breast height (cm)s

TABLE 1 Continued.

		Undisturbed Site				Disturbed Site			
SN	**Name of Specie**	**% FREQ**	**DEN ($x10^3$)**	**ABUN**	**DOM (cm^2)**	**% FRWQ**	**DEN ($x10^3$)**	**ABUN**	**DOM (cm^2)**
1	*Acacia sieberiana*	50	3.8	19.00	374.78				
2.	*Adansonia digitata L.*	50	0.2	1.00	8588.81	15	2.00	2.00	81.51
3.	*Anogeissus leiocarpus DC.*	50	3.6	18.00	104.53	50	2.00	1.00	187.30

4.	*Balanites Egyptians (L) Del.*	75	3.7	12.33	370.33	50	2.00	1.00	582.00
5.	*Burkea Africana Hook.*	50	3.8	19.00	55.92				
6.	*Combretm glutinsum prrr*	100	6.7	16.75	771052.00	50	2.00	1.00	649.30
7.	*C molle R. Br & G Dom.*	50	1.2	6.00	373.52	25	2.00	2.00	257.49
8.	*C nigrian guill. & per*	100	6.9	17.25	55.92	50	2.00	1.00	27.96
9.	*Detarium microcapum Guill & per*	50	2.4	12.00	47.39				
10.	*Guiera senegalensis J.F. Gmel*	75	4.2	14.00	10.00	25	1.00	1.00	5.77
11.	*Lawsonia Alba Lam.*					25	2.00	2.00	14.11
12.	*Moringa oleifera Lam.*					25	1.00	1.00	20.42
13.	*Piliostigma ihonningii*					25	4.00	4.00	62.46
14.	*Seelerocarya birrea A. Rich.*	50	2.4	12.00	38.57	25	1.00	1.00	17.94
15.	*Tamarindus indica L.*	50	0.4	2.00	309.63				
16.	*Vitex simplicifolia Oliv.*					15	4.00	4.00	130.63
17.	*Zizipus mauritiana Lam.*	75	2.7	12.33	76.47	25	4.00	4.00	76.65

TABLE 1 Continued

		Undisturbed Site				**Disturbed Site**			
SN	**Name of Specie**	**% RF**	**%RD ($x10^3$)**	**%R DOM**	**IVI**	**%RF**	**%RD ($x10^3$)**	**%R DOM**	**IVI**
1	*Acacia sieberiana DC*	6.06	8.84	3.35	9.42				
2.	*Adansonia digitata L.*	6.06	0.47	76.84	82.90	5.88	2.00	8.48	9.57
3.	*Anogeissus leiocarpus DC.*	6.06	8.37	0.94	7.00	11.76	2.00	26.34	38.10
4.	*Balanites Egyptians (L) Del.*	9.09	8.6	3.31	12.41	11.76	2.00	26.34	38.10
5.	*Burkea Africana Hook.*	6.06	8.84	0.50	6.57				
6.	*Combretm glutinsum prrr & DC.*	12.12	15.58	6.90	19.04	11.76	2.00	29.38	41.14
7.	*C molle R Br & G Dom.*	6.06	2.79	3.34	9.40	5.88	2.00	16.18	22.06
8.	*C nigrican Guill. & per*	12.12	16.05	0.50	12.64	11.76	2.00	1.27	13.03
9.	*Detarium microcapum Guill & per*	6.06	5.58	0.42	6.49				
10.	*Guiera senegalensis JF. Gmel*	9.09	9.77	0.09	9.19	5.88	1.00	0.26	6.14
11.	*Lawasonia Alba Lam.*					5.88	2.00	6.04	6.52
12.	*Moringa oleifera Lam.*					5.88	1.00	0.91	6.79
13.	*Piliostigma ihonningii*					5.88	4.00	2.83	8.71
14.	*Seelerocarya birrea A. Rich.*	6.06	5.58	0.35	6.42	5.88	1.00	0.81	6.69
15.	*Tamarindus indica L.*	6.06	0.93	2.77	8.83				
16.	*Vitex simplicifolia Oliv.*					5.88	4.00	5.91	11.76
17.	*Zizipus mauritiana Lam.*	9.09	8.6	0.68	9.78	5.88	4.00	3.29	9.17

Key: R.F. = Relative frequency, R.D. = Relative Density, R.DOM. = Relative Dominance, I.V.I. = Importance value index.

V. Discussion

The data obtained from the study indicated higher records of the phytosociological parameters at the undisturbed site than the disturbed one. This trend is not unexpected and can be attributed to the fact that the undisturbed site is enjoying protection from human activities resulted in low records of the studies parameters. Sharma (1981), Abdulhameed (1995), Adeoye (1977), Daddy et al (1992) and Mohammed (1998) conducted similar work and reported similar and higher phytosociological data in an undisturbed site than the disturbed site.

Based on the IVI values, the undisturbed site can be described as being of *Adansonia digitata_- C. glutinosum_ C.Nigerian* complex, while the disturbed site suggests a complex of *combretum_ Balanites* aegyptiaca – C. *molle type.*

VI. Conclusion

Phytosociological study of human disturbed site adjoining Wild Life Park (Jos) has indicated lower records of Phytosociological parameters and lower number of individual plants. A phenomenon that was attributed site was due to protection of the site by the state Park. It is therefore logical to conclude that human activity is one of the devastating factors on vegetation as pointed out by Ewusie (1980) that ecologically man is one of the animal species which operates in an ecosystem and exerts considerable influence on vegetation.

Recommendation

Having studied the effects of human activities on vegetation of Tudun Wada Wild Life Park, it is hereby recommended that:-

a. Urgent conservation measures are needed by the Nigerian National Parks service so as to protect the park from this devasting human influence as no buffer zone exist to the park.
b. Alternative source of fuel to adjoining communities to the park should be provided as against fuel wood.

References

[1]. Costing, H.J. (1958). The Study of Plant Communities. WH. Freeman and Co. Sanfrancisco Inc.
[2]. History of Jos and Political Development of Nigeria, Sen. Luka Gowon Zanaabadt.
[3]. Hopkin . B. & Standfield, D.P. (1966). A fieldto Savana Trees of Nigeria. Ibadan University Press Ltd. Ibadan-Nigeria.
[4]. Misra, R. (1968) Ecology Work Book. Oxford and IBH Publishing Co.Calcutta. Pp 244.
[5]. Philips, E.A. (1959). Methods Vegetation Study. Henry Holt and Co. MC.
[6]. Raunchier, C. (1934). The Life Forms of Plant Stand. Statistical Geography. Gleorandon Press. London. Pp. 12-13.
[7]. Sharma, B.M. (1981). Phytosiological Study of Weed community in Fallow Land in Semi-Arid Zone of India. *Weed Science* 29:290.