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Species Composition And Range Condition of Jibiro Grazing Reserve, Adamawa State, Nigeria

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Abstract - This study assessed the flora species composition and range condition of Jibiro grazing reserve in Song Local Government Area of Adamawa State, Nigeria. Range factors used for the assessment include botanical composition of herbaceous vegetation, ground cover, litter cover, plant vigour, erosion level, and trees/shrubs density on range sites. Plant health (vigour) was rated as stunted, erosion was slight, the mean tree/shrub density per hectare was 475 trees/shrubs and litter cover was 27%. The relative density of the herbaceous species shows that Aristida longiflora had the highest with 24.66% (1953 species) while Cacia obtusifella has the lowest of 0.89% (71 species). The overall results were scored on the range condition score card; giving a total score of 45%. This was then compared to a key for rating condition, which puts the range in a fair condition. Range management and improvement practices such as prescribed burning, range seeding and reseeding, control of rate of grazing and other sustainable management practices that will range trend and improvement within the reserve were recommended.

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Strictly as per the compliance and regulations of :

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I. Introduction

Range condition is the state of health and vigour of a range in relation to its full productive potential. It is one of the important methods of range evaluations that enable judgement to be made of the adequacy of stocking and management practices (Khobe *et al.*, 2009). It has become the basis for the adjustment of stocking figures and revision of management plans. It measures the degree range deterioration and improvement (Akosim *et al.*, 2004).

The purpose of classifying range condition is to measure any deterioration that has taken place in the plant community. It also provides a basis for predicting the degree of improvement that is possible under various management situations. Successful range management depends on establishing and recognising the relationship amongst the resources that make up rangelands. Range professionals and ranchers are recognising the fact that successful range management depends on stocking rangelands, so adequate vegetation residues remain to protect rangeland health, maintain multiple values, and insure economic viability (Khobe *et al.*, 2009).

Most grazing reserves are situated on impoverished lands, with little agronomic potential (Goldschmidt, 1980). A close inspection of many of these sites reveals inferior fodder characterised with protein deficiency. For example, in Borno State, which has the largest population of livestock in Nigeria, there is hardly enough grass for year round grazing. In the early dry season, herds in this State browse on trees, branches and farm residues/wastes (Ismail, 2003). Animals feeding on such herbage suffer hypo-proteinamia and subcutaneous oedema. The required 7.5% crude protein, if not consumed by fire is available for only one-third of the year (Bekure, 1993).

The major attributes that need to be monitored and inventoried to determine the condition of rangelands are vegetation cover, frequency, abundance or density and yield of herbage (Kefa and oche, 1989; Kallah, 1982).

This paper reviews the range condition Jibiro grazing reserve with the aim of ascertaining the possibility of range improvement or deterioration.

II. Materials and Methods

The research was conducted in Jibiro grazing reserve, which lies in Song Local Government Area of Adamawa State, about 32 km north-east of Jimeta town along Jimeta-Gombi Road. A reconnaissance survey was carried out in July, 2010 for the purpose of identifying and delineating major range sites. Five range sites (A, B, C, D, and E) were delineated. A survey of vegetation was conducted where only lower layer cover was considered. This included the grass and forbs as well as shrubs up to a maximum height of one meter.

a) Layout of the study

Permanent vegetation transects were established in the Gongoshi Grazing Reserve following the method outlined by Weeks (1996). This involved division of the study area into large adjacent and parallel strips (each 2 km wide). The strips were further sub-divided along their lengths using natural features such as roads, tracks or trees to give a number of blocks. Each block was sub-divided across its width into ten (10) sections and the central longitudinal axis of each section served as the main transect. The transects were numbered 0 – 9. Using a table of random numbers, two transects were chosen per block and used as the sampling transects. Sampling of the vegetation at the herbaceous layer for yield, botanical composition, litter cover, herbaceous ground cover, plant vigour, was

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carried out in these selected transects. Assessment of the site to determine the extent of erosion was carried out within each block.

b) Assessment of Range Condition

Range condition parameters measured were litter cover, plant vigour, erosion, number of trees/shrubs/ha, cover, relative density of plant species, desirable and undesirable species (Khobe *et al.,* 2009; Akosim *et al*., 2004).

c) Determination of botanical composition

The Step-point method as outlined by Sutherland (1999) and modified by Khobe *et al*. (2009) was used for the determination of the botanical composition of herbaceous vegetation. Sampling was carried out along the permanent transects. Sampling points occurred along the transects at two paces (four strides) intervals. At each point, the researcher places his boot at a 30° angle to the ground, so as not to disturb the plants. The pin was lowered perpendicular to the sole of the boot, at an angle to the ground. The point or the side of the pin either touched an herbaceous plant, or reached bare ground. In the later case, the pin was pushed into the ground and the nearest plant to it in a forward direction (180° arc) was recorded. The plants were classified into desirable and undesirable on the basis of whether they are selected by the livestock for food or not, and the result was expressed in percentage.

d) Determination of herbaceous ground cover

The Step-point method as outlined by Sutherland (1999) was also used to determine herbaceous ground cover. Sampling points occurred along the transects at every 15th pace intervals. A square frame, 30cm x 30xm subdivided internally into four 15cm squared was employed. The frame was located by aligning one of the subdivision crossbars of the frame with the sampling pin, which have been pushed into the ground. Estimate of total herbaceous cover were made in terms of percentage in the area bounded by the frame (all herbaceous material, green or dry, of the current growing season was considered as herbaceous cover).

e) Determination of litter cover

The Step-point method as outlined by Sutherland (1999) was used to determine litter cover. Sampling points occurred along the transects at every one pace (two strides) intervals. At each point, the pin was lowered perpendicular to the sole of the boot, at an angle to the ground. It was then observed and recorded.

f) Determination of plant vigour

Plant vigour was measured using the method by Kershaw (1979). This involved evaluation using the colour of leaf and the general plant appearance.

g) Assessment of range sites for erosion

Assessment of range sites for erosion followed the method outlined by Ola-Adams (1985) and modified by Akosim *et al*. (2004). Assessment for erosion took place within the blocks. Erosion was none, when soil was covered with vegetation or litter and no apparent soil removal; slight, when there was evidence of some soil removal and exposure of rock and pebbles and severe when subsoil was exposed and gullies or sheet erosion was formed or in progress.

h) Determination of tree and shrub density

The point-centred quarter method as outlined by Nigerian Conservation Foundation (NCF)/World Wide Fund (WWF) (1987) for sampling trees and shrubs in the savannah woodland was used because of its rapidity, simplicity and relative accuracy. Sampling points were located along the transects at ten pace intervals. This interval was chosen to ensure that: -

i. An individual plant was located within each quarter of each sampling point.
ii. An individual plant was not measured more than once.

The procedure consists of starting at the transect pole, and proceeding ten paces down the transect and placing the pointer into the ground at the tip of the boot, thus marking the sampling point. One then faces down the transect and spread his arms to the sides, thus marking four quadrants. These were indicated as A, B, C and D respectively, from left front clockwise to left rear. From the sampling point, the closest tree or shrub to the pointer in each quadrant was chosen as the sample. The distance from pointer to plant was measured and the species noted. The density of the woody plant species was calculated from the mean distance (Khobe *et al*., 2009).

1. Determination of Range Condition

A range condition score card as developed by Ola-Adams (1985) was used for quantification and evaluation of range condition. Factors that were used for evaluation included herbaceous cover, species composition, litter cover, plant vigour, erosion and the density of trees and shrubs. Numeral ratings were assigned to each factor to provide a means of aggregating the separate judgments into single overall numeral figure that range from 1% - 100%. These were then compared to a standard range condition class to establish the condition rating of the study area.

2. Relative Density

Relative density of herbaceous species was determined as:

III. Results and Discussion

Assessment of litter cover, plant vigour, erosion and density of trees/shrubs/ha in the range sites .

Results of plant vigour in Table 1 showed that the plants are stunted in all the sites. Erosion observation revealed severity in one of the sites while the others remain slight. The mean percentage litter

cover was 27%. The mean trees/shrubs/ha was 405 trees/shrubs/ha.

Table 1: Assessment of litter cover, plant vigour, erosion and density of trees/shrubs/ha in the range sites

Parameter	Range Sites A	B	C	D	E	Mean
Plant vigour	Stunted	Stunted	Stunted	Stunted	Stunted	
Erosion	Slight	Slight	Severe	Slight	Slight	
No. of trees/ shrubs/ha	451	593	606	245	480	475
% Litter	40	35	15	20	25	27.0

Table 2 : Relative Density of the herbaceous species

S/No.	Species	No. of Species	Relative density (%)
1.	*Chasmopodium candatum*	419	5.29
2.	*Andropogon gayanus*	424	5.35
3.	*Hyparrhenia rufa*	407	5.14
4.	*Pennisetum pedicellatum*	342	4.32
5.	*Zornia latifolia*	351	4.43
6.	*Hyptis suaveolens*	351	4.43
7.	*Cassia obtusifolia*	71	0.89
8.	*Waltheria indica*	113	1.43
9.	*Setaria pallidefusca*	787	9.94
10.	*Eragrostis tremula*	640	8.08
11.	*Loudetia simplex*	43	0.54
12.	*Aristida longiflora*	1953	24.66
13.	*Setaria pallidefusca*	787	9.94
14.	*Hyparrhenia ripens*	1231	15.55

Akosim *et al*. (2004)

Table 3 : Range condition Score Card

Factors	Quantity (%)	Scale of Score	Actual Score
Percentage herbaceous cover	75-100	25-32	
	50-74	19-24	20
	25-49	9-16	
	6-24	2-8	
	0-5	0-2	
Percentage Botanical composition			
Desirable	0-5	0	
	6-25	1-6	
	26-50	7-12	10
	51-75	13-18	
	76-100	19-24	
Undesirable	0-5	16-13	
	6-25	12-9	
	26-50	8-5	
	51-75	4-1	
	76-100	0	
Plant Vigour	Healthy	4-3	
	Stunted	2-1	2
	Weak	0	
Soil Condition (Litter)	20% hits	0	
	20-50% hits	1-2	1.5
	100% hits	3-4	
Erosion:			
None	0-8% slope	4-3	
Slight	8-16% slope	2-1	1.5
Severe	16-100% slope	0	

Severe	16-100% slope	0	
Tree/Shrub Density	1-250/ha	16-13	
	251-500/ha	12-9	
	501-1000/ha	8-5	10
	1001-2000/ha	4-1	
	≥ 2001/ha	0	
Total Score			45%

Table 4 : Key for Rating Condition

S/No.	Range condition class	Total score (%)
1	Excellent	80 – 100
2	Good	60 – 79
3	Fair	40 – 59
4	Poor	20 – 39
5	Very Poor	0 – 19

V. Conclusion

The result of this study showed presented the overall condition of the range to be fair (45%). However, results of the analysis of soil factors such as litter cover and erosion; and plant factor, such as vigour tend to suggest the range to be trend to be tilting towards a poor condition. This implies that the trend of the range depends on how the range is utilised subsequently and on other activities such as burning and farming. Lauvenroth and Laycock (1989) observed that indiscriminate and unplanned use of burning and grazing management have been the principal causes of deterioration in range condition.

VI. Recommendations

Range management and improvement practices such as prescribed burning, range seeding and reseeding, control of rate of grazing and other sustainable management practices that will range trend and improvement within the reserve were recommended.

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