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Effect of Intensive Grazing Around Water Points on Range Condition

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ABSTRACT

This study was conducted in 2005 at Elnuhud locality, Western Kordofan State, Sudan (latitudes 27°-29° north and longitudes 14°-20°East). The study was aimed to compare the effects of grazing intensity within two and six kilometers around permanents water points. Five sites (Elkhuwi, Ankosh, Elrowiana, Khamas Eldonky and Umdefais) were chosen randomly for the study. The results indicated that there were significant differences in plants frequency and density in areas around water points when compared with those far from them. Also the dominant plant species were different according to location. Plants that dominated around water points were *Abutilon figarianum*, *Acanthespermum hespidum*, *Amaranthus grecisans*, *Zornia glochidiata* and *Ruela patula* and their frequencies were 18.2, 17.4, 12.9, 9.8 and 8.9 % respectively. Plants that were dominant on sites far from water points were *Eragrostic tremula*, *Cenchrus biflorus*, *Stylosanthesis flavicans*, *Aristida pallida* and *Fimbristylis dichotomo* where their frequencies were 19, 13, 12, 11.5 and 11.4% respectively. There were significant differences ($p \geq 0.05$) in forage production according to location. Higher biomass of 173kg/hectare was obtained from sites far from water points, while 60.7 kg/hectare in sites around water points. Carrying capacity was 3.6 at sites far from water points and 10.5 hectare/animal unit/year around water points. Range condition was poor around water points and excellent on sites far from water points.

Keywords: Intensive Grazing, Water Points, Range Condition.

INTRODUCTION

Sudan is characterized by its various ecosystems, which led to variation of vegetation. The true desert covers the northern part of the Sudan. Semi-desert, low rain fall savannah and high rain fall savannah are dominated within central area. The range lands cover 279 million feddans from this area an estimated 77.8 million tonnes dry matter is produced per year according to Hall and Prust (1966) and Ali and Suleiman (1988). These range lands provide feed for 85% of the livestock species raised and all wild life of the country (Abdel Moniem *et al*., 2013 and Ebrahiem *et al.*, 2014).

Low rainfall savannah on sand is the most important range zone where cattle herders use vegetation within it during rainy season leaving the area for camel and sheep producers during the dry season (Ali and Suleiman, 1988). It was estimated that this area which is intensively used was subjected to many ecological and human pressures. Rain fluctuation, bush fire, over stocking and desert encroachment were few examples of the factors that affected range lands condition.

As a result of intensive development and uneven distribution of water sources within low rainfall savannah zone (Western Kordofan State) pressure have been excreted on the fragile ecology of the zone. These pressures should have led to changes in range plants composition, plants frequency, density of species and carrying capacities. All these changes that are observed have never been assessed. So this study was designed to investigate the effects of grazing intensity on range condition around water points.

MATERIALS AND METHODS

The Study Area

West Kordofan state is located within latitudes 27°-29° N, and longitude 14°-20° E. The State borders North Kordofan, North Darfur, South Darfur, North Bahr ElGhazal and South Kordofan. The state area is of 14400 kilometer extends from low rainfall savanna to high rainfall and hill catena and its vegetation varies greatly (Alshareef, 1994).

Data and Information

Five sites (Elkhuwi, Ankosh, Elrowiana, Khamas Eldonky and Umdefais) were chosen randomly for the study. The measurements of the study were taken for one season. The parameters studied included: plants frequency, density, forage production per hectare, carrying capacity (hectare per animal unit per year) and range condition around water points as compared to sites chosen far from them. Loop method and Quadrate were used as techniques to measure those parameters according to Brown (1954); Rodoan and Fakhary (1976) and Ali and Sulaiman (1988).

Statistical Analysis

The data were statistically analyses according to Complete Randomized Design (CRD) according to Gomez and Gomez, (1984). Least significant difference tests (LSD) was used for means separation.

RESULTS AND DISCUSSION

The parameter forage production kg /hectare, carrying capacity hectare/animals unit/year, ground cover %, total hits of plants % , bare soil % ,litter % and range condition showed highly significant differences ($p \geq 0.01$) between areas around bore holes and far from water points. The forage production around the water points was 60.7 kg/h compared to 173 kg/h far from the water points. Also the carrying capacity around water points was 10.5 hectare/animal unit/year, while 3.6 hectare/animal unit/year far from bore holes. From the result it was clear that the forage around the water points was lower production and the carrying capacity was higher which led to over stocking, over grazing and conflict on water and forage and land deterioration. This in line with Hooked (1984) who reported that traditionally, the herder favors accumulation of animals in excess as a source of honor and prestige, which eventually results in over stocking and land deterioration .The areas far from water points was higher forage production and the carrying capacity was lower due to shortage of water sources on it. These results were in line with Ali (1996) who reported that, unused grazing areas in Kordofan amounts to 35 % of the total area surveyed. This unstopped grazing resource could be opened for grazing if water shortage is solved .The percent of

ground cover and total hits of plants percent, litter percent, around water points was lower compared to that far from water points, also the percent of bare soil around water points was higher than the percent far from bore holes .This led to poor range condition around the bore holes and excellent range condition far from bore holes. The higher values of different was due to animals allowed in, which in turn accelerated drought resulting in deterioration on the range site .This in line with Skerman (1966) the replacement of perennial by annuals in arid and semi-arid region due to the condition passed by the removal of litter and ground cover by continuous overgrazing and over cultivation. Hooked (1984) the water supply determines to some extend grazing patterns. With wildly space watering points the areas around the supply is seriously trampled and over grazed. While the more distance herbage is not utilized and generally of high quality (Table 1).

Table 1: comparison between areas around water point and far from water point on measured range parameters and range condition

Parameter	Place	No	Mean
Forage production Kg/h	Around water point	5	60.70
	Far from water point	5	173.0
Carrying capacity Hectare/Animal unit/ year	Around water point	5	10.5
	Far from water point	5	3.60
Bare soil %	Around water point	5	27.00
	Far from water point	5	4.50
Litter %	Around water point	5	2.80
	Without water point	5	9.80
Ground cover %	Around water point	5	44.00
	Far from water point	5	69.00
Total hits on plants %	Around water point	5	67.50
	Far from water point	5	5.46
Range condition	Around water point	5	3.60
	Far from water point	5	1.00

No: number of sites where the study was done.
Range condition around water point areas: poor.
Range condition Far from water point areas: excellent.

As it was indicated the density of plants per hectare according to palatability of plants, it was clear that highly different between the densities of species around the bore holes and far from bore holes .The result the palatable species e. g *Cenchrus biflours*, *Eragrositis termula* and *Aristida pallida*, were higher in density far from water points 194712 plant/hectare compared with 9172.8 plant/hectare around the water points. The unpalatable and poisonous plant species that were with higher density amounted to 7.4% and 16.8% compared with 1.6 %, 1.3% respectively far from the boreholes. From the above result the areas far from the water points had high plant densities (palatable species) while the areas around borehole had lower plant densities and higher densities of unpalatable and poisonous species. This situation could be attributed to the large population density of the animals around water points which selected the desirable species and provide chance for the unpalatable species to increase. This is in lined with what was Skerman (1966) who reported that grazing pressure can increase to a point where demand can no longer be met and palatable perennial disappeared leaving the annuals and the unpalatable perennials composition (Table 2).

Table 2: plant density per Hectare, palatable, unpalatable and poisonous species within water points and far from water point areas

Σ	Around water points		Far from water points	
	Mean	No	Mean	No
Palatable	7.2	21.0	20.1	25.1
Unpalatable	7.4	15.1	1.6	7.9
Poisonous	16	4.6	1.3	2.9
Per Hectare				
Palatable	9172.8	21.0	194712	25.2
Unpalatable	9949.7	15.1	5364.2	7.9
Poisonous	19600	4.6	2100	2.9

The comparison between frequencies of plants around water points and far from water points indicated differences ($p \geq 0.05$) as affected by area and species interaction. The higher plant frequencies around water point were *Abutilon figarianum*, *Acanthespermum hespidum*, *Amoranthesis graecisans*, *Zornia glochidiata* and *Rullia patula*. Their frequencies were 18, 17.4, 12, 9.5 and 8.882%. respectively While the highest plant species frequencies in places far from water points were, *Eragrostis termula*, *Cenchrus biflorus*, *Stylosanthus flavicans*, *Aristida pallida*, *Fimbristyls dichotomo*. Their frequencies were 19.5, 13, 12, 11.5 and 11.4% respectively. There were differences in plant species and their frequencies around water points and far from water points due to poor range condition around water points which resulted from higher stocking density and selection of palatable species. Also according to observation there was increasing of *Acanthespermum hespidum* and *Abutilon figarianum* around water points in all site of the study. This in lined with Sampson, (1952) who reported that range in fair to poor condition are dominated by less palatable species and greater number of undesirable plants (Table 3).

Table 3: frequency of the species around water point areas and far from water point areas

Local name	Botanical name	Around water points	Far from water points
Haskaneet Kh	*Cenchrus biflorus*	0.600	13.000
Gew	*Aristida pallida*	0.333	11.500
Gragob	*Oldlandia herbacia*	0.00·	1.5000
Banu	*Eragrostis termula*	2.400	19.500
Shillini	*Zornia glochidiata*	9.500	3.625
Abu asaba	*Dactyloctenum aegyptium*	0.700	5.000
Danbelnaga	*Stenium elegans*	0.500	4.000
Khodra	*Corchorus olitorius*	1.000	5.800
Frisha	*Alysicarpus oralifolius*	0.667	3.667
Liflif	*Maerrimia emaraginata*	6.500	2.000
Omtagtoga	*Rullia patula*	8.882	1.000
Senelkalb	*Cassia senna*	2.000	0.000
Sharia andgoba	*Indigofora hachstatteri*	0.500	2.000
Dahian	*Farsetia longisclisua*	0.000	1.500
Herab hausa	*Acanthespermum hespidum*	17.400	0.000
Mogshasha	*Abutilon angolensis*	0.000	1.000
Haskaneet N	*Cenchrus ciliaris*	0.000	2.500
Umag	*Digitaria sp*	0.000	0.500
Taber ellayt	*Ipomea senna*	0.750	0.250
Raba	*Zelya pentanture*	0.375	2.500
Angrt eluarl	*Ipomea eriocarpa*	1.800	1.400
Homra	*Aristida hordacea*	1.625	3.333
Niada	*Abutilon figariaum*	18.2 00	1.500
Gebin	*Solanum dobium*	6.750	0.250
Defra	*Echinochloa colonum*	0.750	2.000
Omfesisyate	*Fimbristyls dichotomo*	0.000	11.400
Omgal	*Leucas urticifolia*	4.667	0.000
Sanamaka	*Cassia acutifolia*	1.250	0.000
Lisan eltir	*Amaranthus graecisans*	12.000	0.000
Oshar	*Calotropis procera*	4.500	0.000
Garbi	*Sperma coce sp.*	1.250	0.250
Mferyta	*Alysciarpus glumaceas*	0.000	3.333
Idain elfiga	*Brachiaria sp*	2.100	5. 375
Natasha	*Stylosanthes flavicans*	0.000	12.000
Drisa	*Tribulus torrestis*	1.250	0.000

The study was indicated that disappearance of desirable species around the water sources and appearance of undesirable species e .g. *Acanthespermum hesidum* and *Abutilon figarianum*. This in lined with Hooked (1984) who stated that desirable and high nutritious species have disappeared around water points in western Sudan e.g *Aristida papposa* and *Blepharis spp* (Table 4).

Table 4: the palatable and unpalatable species

Local name	Botanical name	Palatability
Bino	*Eragrostis termula*	Palatable
Danab elnaga	*Ctenium elegans*	Palatable
Haskaneet khashin	*Cenchrus biflorus*	Palatable
Gew	*Aristida pallida*	Palatable
Frisha	*Alysicarpus oralifolius*	Palatable
Abuasaba	*Dactyloctenm aegyptiaum*	Palatable
Garagob	*Oldlandia herbacia*	Palatable
Shillini	*Zornia glochidiata*	Poisonous
Engerl elwarl	*Ipomea eriocarpa*	Un palatable
Homra	*Aristida hordacea*	Un palatable
Um ag	*Digitaria sp.*	Palatable
Sharia omgerat	*Mollugo nudicaulis*	Palatable
Raba	*Zelyla pentanture*	Palatable
Dahian	*Farestia longisclisua*	Palatable
Beyad	*Aristida papposa*	Palatable
Umfesisyat	*Fimbristyls dichotomo*	Palatable
Natasha	*Stylosanthes flavicans*	Palatable
Mefirita	*Alysicarpus glumaceas*	Palatable
Haskanit nam	*Cenchrus ciliaris*	Palatable
Defra	*Echinochloa colonum*	Palatable
Lisan Etir	*Amarnthus graecisans*	Unpalatable
Mogshashat elragel	*Abutilon anglensis*	Palatable
Drisa	*Tribulus torrestis*	Unpalatable
Edin elfiga	*Brachiaria sp.*	Palatable
Beghail	*Blepharis linariifolia*	Palatable
Gerin	*Monosania Senegalensis*	Palatable
Tagtaga	*Ruellia patula*	Unpalatable
Khodra	*Crochorus olitorius*	Palatable
Niada	*Abutilon figarianum*	Unpalatable
Ushar	*Calotrapium procera*	Unpalatable
Omgel	*Leucas urticifolia*	Unpalatable
Sen elkalb	*Cassia senna*	Unpalatable
Garbi	*Sperma cocc sp.*	Unpalatable
Taber ellwit	*Ipomea senna*	Unpalatable
Liflif	*Merrimia emarginata*	Poisonous

CONCLUSION

The study concluded that frequencies and densities of plant species were different as an effect of intensive grazing that was a result of setting a round water points without considering carrying capacity. The proper distribution of water sources should be in accordance with carrying capacity. Estimation of the carrying capacity should precede decision on drilling water points. The distribution of animals and their grazing duration should also be determined prior to provision of water. As a temporary measure biomass of forage can be packed from far sites and transported to be used around water points during the dry season .

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