Environmental Factors Effect on Rangeland Plant Diversity in Al Sabaloga Area, Sudan

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Key words: Rangeland, over grazing, expansion of agriculture, drought and desertification,

Abstract:

The study was conducted in AL Elsabaloga area in Sudan in 2017. This study aimed to assess environmental and biotic factor effects on rangeland plant diversity in the study area. A total sample size of 130 was chosen randomly to collect primary data. The data were coded, summarized, tabulated and processed. Analysis was conducted using (SPSS) computer program. The results were presented in the form of a frequency distribution. There were many problem effects on Rangeland plant diversity. Among these were floods ($P<0.01$), expansion of agriculture ($P<0.01$), over grazing ($P<0.01$), drought, sand marching and desertification ($P<0.01$), insect ($P<0.01$). In addition, disappear of some plant and appear invader plant. The study was concluded expansion of agriculture, seasonal fire, overgrazing, drought, sand marching and desertification are important factors that effect on plant diversity in the study area. The study recommended protection of rangeland needs to be by improvement of the extension services, management of rangeland through opening of fire lines. Development and improvement, plant diversity and demarcation of routes relevant ministries is essential.

Introduction:

Sudan's area is about 1,886,000 km^2. It has a population of 41.2 million with a growth rate of 2.41% (WPR, 2018). Sudan is endowed with a wide range of ecosystems and species diversity. The ecological zones extend over a wide range from the desert in the extreme north to the savannah. According to the recently published, Land Cover Atlas of Sudan, FAO (2012), Forests together with Rangeland represent 35.6% of the total country area. Sudan is rich in biodiversity within diverse environmental systems making it endowed with flora and fauna which are being subjected to a number of threats as a result of natural factors and human activities.

The starting point for most range management decisions is knowing range plants by name and knowing their growth habits, response to grazing, and other characteristics. Plants can be classified and grouped in many different ways. The major types of range plants are grasses which are plants with jointed stems. The stems are normally hollow between the joints (nodes). Leaves are in two rows on the stem. Veins in the leaves are parallel. Grasses are generally the most important and abundant kind of range plant, Forbs are broad-leaved plants with above-ground growth that dies back each year. Most forbs have net veins in the leaves, but a few, such as wild onion, have parallel veins. Broadleaf weeds and wild flowers are kinds of forbs. Grass-like plants look like grasses, but have solid stems (not hollow) without joints. Stems are often triangular. Veins in the leaves are parallel. Sedges and rushes are in this group of plants. Trees and shrubs are plants with stems that live from one year to the next. Shrubs have stems branching from near the base. Trees have a definite trunk and are usually bigger than shrubs. Some plants can take on a shrub or tree growth form depending on environmental conditions (Nichols, et al. 1987).

This study was aimed to assess environmental and biotic factor effects on rangeland plant diversity in the study area.

Methods and Study Site:

Al Sabaloga Reserve declared in 1946 with a total area of 116000 hectares. It lies on the western bank of River Nile, at the 6th cataract, about 150 km from Khartoum, the Capital of Sudan. It is located in the semi-arid climatic zone at latitude N31- 17 and E 33- 16 and longitude. The topography is hilly with undulated valleys. The valleys covered with scattered Acacia's species in addition to dense seasonal grasses during the raining season. The rainy season begins in July this period normally lasts until the end of September. The dry season begins in December lasting until May

A total sample size of 131 was chosen randomly to collect primary data. The data were coded, summarized, tabulated and processed. Analysis was conducted using (SPSS) computer program. The results were presented in the form of a frequency distribution.

Results:

Table (1): Distribution of respondents according to sex

	Frequency	**Percent**
Male	95	72.5
Female	36	27.5
Total	131	100.0

Table (2): The risks faced rangeland plant diversity

		Frequency	**Percent**	**Chi- Square**	**DF**	**Sig**
Insect and pests	Agree	118	90.1	190.092	2	.000
	Neutral	9	6.9			
	Disagree	4	3.1			
Rodents and rats/ mice	Agree	123	93.9	216.198	2	.000
	Neutral	4	3.1			
	Disagree	4	3.1			
Over grazing	Agree	102	77.9	121.939	2	.000
	Neutral	25	19.1			
	Disagree	4	3.1			
Seasonal fire	Agree	14	10.7	81.634	2	.000
	Neutral	25	19.1			
	Disagree	92	70.2			
Deforestation	Agree	93	71.0	88.183	2	.000
	Neutral	29	22.1			
	Disagree	9	6.9			
Floods	Agree	99	75.6	112.916	2	.000
	Neutral	29	22.1			
	Disagree	3	2.3			
Expansion of agriculture	Agree	99	75.6	108.107	2	.000
	Neutral	24	18.3			
	Disagree	8	6.1			
Hadam (complete change in the Nile area)	Agree	114	87.0	170.489	2	.000
	Neutral	12	9.2			
	Disagree	5	3.8			
Drought, sand marching and desertification	Agree	124	94.7	221.786	2	.000
	Neutral	5	3.8			
	Disagree	2	1.5			
Sign	***					

NS = insignificant (p>0.5). *= significant (<0.01). **= highly significant (p<0.001). ***= very highly

significant ($p<0.0001$).

Discussion:

The result in table (1) shows most of the respondents (72.5%) according to sex were male, (27.5%) female. The result in table (2) shows the risks faced rangeland plant diversity. About (94.7%) of the respondents agrees drought, sand marching and desertification, (93.9%) Rodents and rats/ mice, (90.1%) insect, (87%) *hadam*, (77.9%) over grazing, (75.6%) expansion of agricultural, (75.6%) flood, (71%) deforestation and (10.2%) seasonal fire.

Insufficient and highly variable annual precipitation is a defining feature of the climate of most of Sudan . Tambel et al (2014). changing to environmental condition may predispose the landscape to threats from new exotic pestes (Pautasso et a., 2012). Many studies on rangeland have indicated that the effect of grazing on vegetation generally leads to a decrease in forage resources, mainly due to change desired plants to undesired plant species (Odo et al., (2001); Todd, (2006); Cordon, (2007). According to Oztas et al., (2003) said that heavy grazing in semi-arid lead to soil erosion. Grazing animals change their preferences with differences in temperature and rainfall Corbett, (1953).

Conclusions:

Protection of rangeland needs to be by improvement of the extension services, Management of rangeland through opening of firelines. Development and improvement, plant diversity and demarcation of routes relevant ministries is essential.

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