CURRENT STUDY OF SPECIES COMPOSITION IN AL SABALOGA, SUDAN

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Abstract. The study was conducted in Al Sabaloga Biosphere conservation area in 2017. The objectives of this study were to classify the status of species composition. In addition, to investigate some factors effect of plant disappearing. A total sample size of 131 from responded. 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. The results of this study (79.4%) of the respondents disagree about increase new type of species composition. Also, 85.5% of respondents agree change in in shrubs and 79.4% agree change in all plant composition. The study recommended preventing species composition from drought, sand marching, desertification, expansion of agriculture, Hadam deforestation and over grazing.
Keywords: *current flora, environmental factors, disappearance plants, preventing species*

Introduction

Semi-arid areas cover a large part of the Earth's surface, characterized by low and highly variable precipitation (Sullivan and Rohde, 2002; Behnke and Scoones, 1992).The variations of rainfall coupled with differences in soil types are responsible for the diversity of vegetation cover (Harrison and Jackson, 1958). Plant conservation and biodiversity is important means for ganders (Kew, 2016; Dodd and Jones, 2010; Maunder et al, 2001b). Large proportion of extinction with the magnitude of risk varying by region of the world (Thomas et al., 2004), which are more than 30% of all species will face serious extinction risk by 2050. Concerns about present and future loss of plant species are considerable. By some estimates, the world could be losing 25-50 taxa per year, or about 100 times the background rate of one extinction per million species per year (Pimm et al., 2014); Sutherland (2003) documented threats to birds, mammals and 24 % of mammals worldwide are at risk. The conservation of plant diversity has received considerably less attention than the conservation of animals, perhaps because plants lack the popular appeal of many animal groups (Goettsch et al., 2015). As a result, plan conservation is greatly under resourced in with animal conservation (Havens et al., 2014). Botanic gardens exert greater social and scientific relevance than ever (Heywood, 2011; Alberch, 1933) by making major contributions to informal science education, plant genetic conservation (Maunder et al, 2001a), and to studies of climate change (Miller-Rushing et al., 2006), invasive plants and other environmental issues.

The impacts of environmental and land use change the most severe (Sommer et al., 2010; Coreau et al, 2009; Thomas et al., 2004). The objectives of this study were to classify status of species composition. In addition, to investigate some factors effect of plant disappearing. Biodiversity is a widely used term having no unified definition. It is an issue which is defined globally by different authors. It is a short form for biological diversity which is to describe the total number, variety and variability of living organisms as well as the diversity of the ecosystem they are living in .In this definition diversity can be assessed at three levels: Genetic variation which encompasses genetic variability among the populations and the individuals of the same species. Species variation this encompasses variability among species at plot or field levels. It is one of the important specifications of bio-societies that are measured in different ways. Ecosystem variation within an area, biome, or planet this encompasses diversity at a higher level of organization. At this level the indicator of diversity is species dominance.

The concept of biodiversity is considered to be the integration of biological variability across the above mentioned three scales to the landscapes that they form, or are part of, and the ecological processes that support them .Generally, biodiversity measurement focuses on the species level and species diversity is one of the most important indices which are used for the evaluation of ecosystems at different scales. The ecosystem approach is described as a strategy for management of land, water and living resources that promote conservation and sustainable use in an equitable way. It is based on the application of appropriate scientific methodologies focused on levels of biological organization, which encompass the essential processes, functions and interactions among organisms and their environment, and among ecosystems. The assessment of biodiversity should include identification and monitoring of ecosystems and habitats as well as identification, monitoring and assessment of species. The consequences may take many forms but at its most fundamental and irreversible, it involves the extinction. Some factors like intensive deforestation and unlimited expansion of urban areas have considerably reduced the extent of plant communities' world over. The plant communities are also losing their species richness at high rate due to clear cutting and extensive exploitation of grasslands for raring animal herds. Deteriorating environmental conditions such as aridity, soil salinity, soil erosion and acid rain in different parts of the world had forced the ecologists to devise suitable measures for the conservation of highly endangered plant communities. Diversity of organisms, measurement of diversity and examination of some hypothesis about reasons of diversity are some cases that have been favoured by ecologists for a long time. Researchers have applied different indices in order to achieve measurement of diversity. Understanding of necessity of species diversity that has happened recently has caused to concentrate on the quality of measurement of biodiversity in plants and animals a lot.

Materials and Methods

The study was conducted in the Al Sabaloga area in 2017. Al Sabaloga Reserve was 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 at the semi-arid climatic zone at latitude N31-17 and E 33-16 and longitude. In this study a total sample size of 131 was chosen randomly to collect primary data. These data documented through structured questionnaire, observation. A sample size of 60 is

generally regarded as the minimum requirement for larger population that will yield a sufficient level of certainty for decision-making (Poate and Daplyn, 1993). Community is considered appropriate as (Hinton, 1995) reported that a minimum sample size of 25 is acceptable for social survey studies. The questionnaire analyzed SPSS software. The Chi-square test was used for testing the significant differences between the respondents. Descriptive statistics were also used to present to present the data.

Direct observations and primary surveying were to classify status of species composition. Also, to investigate some factors effect of plant disappearing. Plant specimens were collected from different sites of the study area at different times. The collection procedure followed the methods described. The whole plant was collected in the case of herbs and twigs with leaves and flowers and /or fruits in case of shrubs and trees. The specimens collected were stretched to dry between newspapers and firmly pressed inside a herbarium press. Newspapers were continuously changed during drying to avoid rottening of material. Specimens were identified and verified using keys in the taxonomic references, namely: El Amin (1990); Andrews (1956) as well as Broun and Massey (1929). The specimens were mounted, labeled and deposited at the herbarium of the Environmental and Natural Resources and Desertification Research Institute (ENRDRI), National Centre for Research (NCR), Khartoum. Field observations were recorded including, habit, habitat, distribution and colors of flowers during the collection trips. In the herbarium further classification analysis and /or identification were carried out initially by examining the various parts of the specimens collected using a hand-lens. Fine floral characters were examined under Mbc-10 dissection microscope. Preliminary species identification was carried out using a set of keys (Braun et al., 1991; Hutchinson and Dalziel, 1963; Andrews, 1956). Specimens were matched with identified and authenticated herbarium specimens in the herbarium of ENRDRI and the Herbarium catalogue of the Royal Botanic Gardens, Kew (Royal Botanic Gardens, 2022) for confirmation. The synonyms of the identified species were extracted from many references such as from Jackson (1999); El Amin (1990); Elghazali (1985); Wickens (1976); Sahni (1968); and Hutchinson et al. (1963).

Updating of plant names was taken into account according to recent literature namely: The Plant List (2022) and Herbarium catalogue, Royal Botanic Gardens, Kew (Royal Botanic Gardens, 2022). The list of clades and orders covered in this study was arranged according to the Linear Angiosperm Phylogeny Group (LAPG) III while subfamilies, genera and species are arranged alphabetically. The vernacular names of species were recorded from local inhabitants within the study area and also extracted from Broun and Massey (1929) as well as Andrews (1948), for citation of species only the oldest reference cited was (Sp. Pl. in most cases), in addition to Andrews (1956).

Results and Discussion

The study area belongs to semi-desert scrub and grass land, with an average annual rainfall 75- 250mm. The flora of Alsabloga was selected for investigation in the present study for a number of reasons; firstly, few numbers of specimens previously collected from the study area weren’t encountered in various herbaria that need to be updated and incorporated in the main flora of Sudan. Secondly, the last few years witnessed the prevalence of good rain seasons which would support the actual flora of the area. The main factor which determines the distribution of the vegetation is the rainfall. The threatened and endangered species have been presented; some species have completely

disappeared from the study area, while others are now threatened. The main causes of these vegetation changes can be summarized as follows: Drought spells, multiple-uses of these species, excessive felling of woody species of satisfy human needs, over-grazing, increased shifting cultivation, climatic changes, increased human and animal population, voluntary or compulsory settlement of the nomads whose mode of life adversely affects vegetation cover. During the drought spells of 1980, there was as severe shortage of food and hence the locals had to find alternative plant sources for food, such alternative plant species are currently referred to as famine foods these species supported the locals during the period of drought and bridged the gap in food supplies. Herbage availability can be affected by stocking rates. At lower pasture densities animals need to walk more to meet their nutrient requirements. Energy expenditure might thus offset the advantage of selecting higher quality forage (Akapali, 2018).

Questioners were collected in especial target groups in the age from 45 to 65 ages. The result in *Table 1* shows that about 72.5% of the respondents in the surveyed sample were male while 27.5% were female. Also, about 40% of respondent are primary, secondary (32%), Kahlwa (18%) and illiterate (9%). About occupation are farmer (48.9%), herders (21.4%), free business (13.7%), trader (11.5%) and officer (4.6%). According to *Table 2* shows 79.4% of the respondents disagree about increase new type of species composition. While 88.5% agree decrease type of species composition in previous years. In addition, 85.5% of respondents agree change in in shrubs. Also, 91.6% agree increase and decrease type of plant. And 79.4% agree change in all plant composition. The result in *Table 3* show there are causes for decrease type of species composition. About 41.2% of respondents said drought, sand marching, desertification and low rainfall. Also, 23.7% agree expansion of agriculture. In addition, Hadam (10.7%) as well as deforestation and over grazing (.8%) are recorded for their own outcome. Vegetation cover of the ecological zones has changed qualitatively and quantitatively due to many factors such as low rainfall, overstocking, improper agricultural practices, seasonal fire outbreaks, frequent droughts, and wind and water erosion (Ahmed et al., 2004). The majority of the respondents (84%) in *Table 4* mentioned that found decrease in shrubs. While 80.2% said Increase and decrease type of plants and 77.9% found decrease in all plant composition. *Figure 1*, *Figure 2*, *Figure 3*, *Figure 4*, and *Figure 5* shows current species composition for example Fediaherbia albida, Acacia tortlis sp rabianna, Memosapigra, Tamarix nilotica and Cirtullus conocynthus.

Table 1. *Characteristics of respondent in the study area.*

Category	Frequency (N)	Percentage (%)
Gender		
Male	95	72.5
Female	36	27.5
Education		
Illiterate	12	9.2
Kahlwa	24	18.3
Primary	53	40.5
Secondary	42	32.0
Occupation		
Farmer	64	48.9
Herder	28	21.4

Trader	15	11.4
Officer	6	4.6
Free business	18	13.7

***Table 2**. Current of species composition.*

Category	Frequency, N (Percentage, %)			Chi-square	dF	Sig.
	Disagree	Neutral	Agree			
Increase new plants	104 (79.4)	18 (13.7)	9 (6.9)	125.969	2	.000
Decrease plants	11 (8.4)	4 (3.1)	116 (88.5)	180.290	2	.000
Change in shrubs	19 (14.5)	0 (0)	112 (85.5)	66.023	1	.000
Increase and decrease types of plant	6 (4.6)	5 (3.8)	120 (91.6)	200.168	2	.000
Change in all type of plants species	5 (3.8)	22 (16.8)	104 (79.4)	128.351	2	.000

***Table 3**. Causes decrease type of species composition.*

Category	Frequency (N)	Percentage (%)
Hadam	14	10.7
Expansion of agriculture	31	23.7
Deforestation and overgrazing	1	0.8
Drought, sand marching, desertification and low rainfall	54	42.1
All mentioned wright	31	22.7

***Table 4**. A change in current species composition.*

Category	Frequency, N (Percentage, %)			Chi-square	dF	Sig.
	Increase	Decrease	Change in distribution			
Change in shrubs	15 (11.5)	110 (84.0)	6 (4.6)	152.07	2	.000
Increase and decrease type of plants	10 (7.6)	105 (80.2)	16 (12.2)	129.634	2	.000
Change in plant composition	5 (3.8)	102 (77.9)	24 (18.3)	121.023	2	.000

Figure 1. *Fediaherbia albida.*

Figure 2. *Acacia tortlis sp rabianna.*

Figure 3. *Memosa pigra.*

Figure 4. *Tamarix nilotica.*

Figure 5. *Cirtullus conocynthus.*

Comparing the results of the present study with those of Harrison and Jackson (1958), it can be seen thatCymbopagon promimus and Blepharis linarrifolia had completely disappeared from the study area. This probably happen due to fluctuations of rainfall, sand drifts, over-grazing and excessive of land use. The present study reported similar findings to those of Wicknes (1976), except that Salvadora persica has

become a rare species. This may be due to the demand and heavy use of this tree as a source of income through marketing its branches as a substitute for tooth brushes. The present study reported the same findings of Van Noordwijk (1984) for the species Acacia tortilis and Maerua crassifolia but has noted that Acacia mellifera and Commiphora Africana were very small in numbers. This may be due to the felling for charcoal production and building construction by locals.

Conclusion

It is important to emphasize the link between species diversity and genetic diversity, making species level indicators relevant to genetic diversity. However, the correlation is true only up to a certain point. Thus, to effectively conserve the genetic diversity of a species, this diversity should be known. For most species, though, knowledge of genetic variation is minimal, pointing to the central dilemma of gene resource conservation: a recognized need for conservation without knowing exactly what to conserve. Knowledge of genetic variation will therefore, to a large extent, have to be derived from such surrogates as the species' ecological diversity (e.g. habitat diversity, diversity of ecological requirements). Although considered unrealistic 20 years ago, a number of state indicators can now be proposed for (immediate) implementation because of scientific advances such as in geographical information systems, high throughput molecular genotyping techniques and the ability to handle large amounts of data (e.g., presence/absence species data). Concurrently, ecological monitoring and sustainable management (including management for genetic resources) have made significant progress. From this study, it could be concluded that there are many constraints that affect species composition in the study area such as sand marching, desertification, expansion of agriculture, Hadam,climatic phenomena, deforestation and over grazing. It is better to clear demarcation of routes by coordination between relevant ministries. In addition, protect of species composition to be by improvement of the extension services

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Conflict of interest

The authors declare that there is no conflict of interest involve in this research study.

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