Assessment of Woody Species Diversity in ElAin Natural Reserved Forest, North Kordofan, Sudan

Muneer E. S. Eltahir[1], Kamal F.E.Elkhalifa[2], Tarig E. Mahmoud[3]
[1]Institute of Forest Management and Forest Products TU- Dresden, Germany
[2]Faculty of Forestry, University of Khartoum, Sudan
[3]Gum Arabic Research Center, University of Kordofan, Sudan

Introduction:

The vegetation cover and natural forests in the subtropical arid and semi-arid regions are changing and losing their capacities for natural regeneration (Elobeid, 2000). This increases the importance of conserving biodiversity for obtaining new highly resistant clones and genotypes. Some rare pastoral species suffer from over-utilization or exploitation that eventually leads to destruction which impedes germination and propagation (AOAD, 1999).The significance of the relationship between human beings and the forest reserves has been increasing under the conflict of tremendous increase of population and crucial pressure on natural resources. This conflict negatively affected the natural resources. Therefore intervention is highly recommended to maintain the balance of the ecosystem. Forest reserves contribute to environmental stability and sustainability through conservation of ecological processes that link the continuity of life and humans, and conservation of biodiversity and genetic sources which both animal and agricultural production depend on. This necessitates the importance of inventorying and assessment of forest biodiversity.

The study aimed specifically to identify and describe woody plant species and to assess the current status of woody species diversity based on different sites in the area.

Materials and Methods:

Data were collected from El Ain Narural Reserved Forest, Nortrh Kordofan State, Sudan (12˚ 52´ -13˚ 04´ N and 30˚ 10´ - 24˚E). The falls under semi-arid and receives annual rain fall between 200-250mm. The mean annual temperature is 27˚ C. Soil is non cracking, locally known gardud, of poor Acacia woody vegetations namely *Acacia nilotica, Terminalia brownii, Balanites aegyptiaca* and *Adansonia digitata* are also found.

The parameters densities, abundance, frequency of woody species were studied and the relations between them were determined. Associations, Degree of association between dominant woody species was determined using chi-squire (χ^2), similarity, dissimilarity and diversity between dominant woody species were also studied. The nature of association was determined by calculating the expected frequency of the joint occurrence (Sargent, 1984 and Kent &Coker, 1992). Simpson's Index (Kent &Coker, 1992) is calculated. The floristic composition of the plant communities mainly trees. Some scientific references were reviewed for taxa citation and synonym. The species were identified, using reference material, recent scientific publications and floristic studies with assistance of the field experts.

Results:

Figure (1) Density of woody plant species in El Ain area affected by soil type and topography
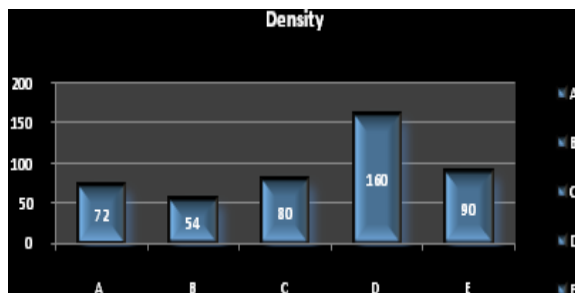
The highest density was found in *Mayaa* area followed by *Khor* and *Wadis* area then basement complex area respectively, however, the lowest density was found in Gardud area with water catchments (Fig.1), the method of plantation in *Mayaa* is direct broadcasting but in *Gardud* seedlings are used. *Khor* and *Wadis* can reserve moisture for a long time after the rainy season and so does the basement complex area.

Table (1) Simpson Diversity Index

Site	n	N	Number of individuals/ ha	Diversity Index
A	10	36	360	0.23
B	10	27	270	0.11
C	15	40	400	0.14
D	2	80	800	0.82
E	20	45	450	0.04

n = number of species/quadrate; N = total of individuals/site
Where A: Gardud soil with no water catchments, B: Gardud with water catchments, C: Basement complex area, D: Mayaa area, E: Khor and Wadis area

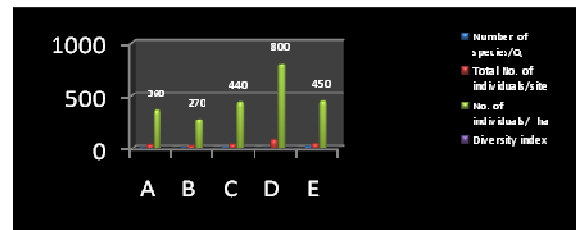### Figure (2) Richness and Evenness of woody plant species

Figure (9) shows that the highest value of richness, it was reported in site D, followed by site E and C then site A, while site B shows the lowest value. This clearly indicates abundance of trees in *Mayaa* area which contains only two species as plantation (*Acacia nilotica & Tamarix aphylla*). However some species in Gardud areas were planted while others were naturally grown as in *Khor* area

Table (2) The nature of association between dominant woody species as determined by observed cell (a) values and expected J.O

Species	observed value	expected value	association
A.mellifera and *Boscia senegalensis*	14	13.09	Nuetal
A.mellifera and *A. Laeta*	12	8.32	Positive
A. mellifera and *Balanites aegyptiaca*	4	3.80	Nuetal
A.mellifera and *terminalia brownii*	2	2.00	Nuetal
A.mellifera and *A. nubica*	2	3.20	Nuetal
Adansonia digitata and *Terminalia brownii*	5	0.76	Nuetal

Notice: χ^2 tabulated value is 6.64 under 0.05 significant level.

The study identified 50 plant species which belonged to 37 genera, 3 subfamilies and 20 families. The identified species were grouped according to their growth habits into 35 trees, 13 shrubs and 2 woody climbers.The study reported for the first time the presence of five woody species which hadn't been reported in the study area before. These species were (*Ficus salicifolia*) family *Moracea*. (*Cordia africana*) family *Boraginaceae*, two shrubs (*Boscia salicifolia*), family Capparaceae, (*Ximenia americana*) family oleaceae, in addition to one woody climbers (*Capparis tomentosa*) family Capparaceae. There are four exotic species in the area (*Ailanthus excelsa, Azadirachta indica, Conocarpus lancifolius and Cassia siamea,*). The updated names for the families were used, Capparaceae instead of Capparidaceae, and Fabaceae instead of leguminosa. Furthermore, the updated subfamilies Mimosoideae, Casealpinioideae and Faboideae were used instead of Mimosaceae, Caesalpinaceae and Papilionidea respectively.