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## Implications of Site Characteristics and Herding Practices on Rangelands Management in Semi-Arid Areas of Sudan

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### Abstract

This study was conducted in the northwestern part of White Nile State of central Sudan in an area West of the white Nile bank (13° 59' N and 32° 18' E). The objective was to study the means of participatory and sustainable rangeland management that involves herding practices of the pastoralists' communities entering the area and the rangelands' site characteristics. The area represents the repeated pattern of the typical semi-arid natural rangelands that are ecologically heterogeneous at different spatial scales dictated by variable rainfall, different terrain and different soil types. Irrational land-use, excessive utilisation levels, in addition to climatic factors, led to the deterioration of rangelands resources and disturbances of the pastoralist's livelihood and herding pattern that used to be environmentally friendly.

Three sites representing the main range types were selected to study the spatial heterogeneity of vegetation (sandy rangelands, flat (clay/sandy) and depressed sites). Vegetation measurements mainly herbaceous cover, composition and trees density were measured. Information on herding practices were collected using PRA. Remote sensing data (MODIS/TEERA (MOD13Q1) NDVI 250 m.16 days' image product) was used to study variations between different sites over the years, using the Normalized Difference Vegetation Index (NDVI).

The study results showed variations in vegetation composition, plant cover and biomass, in addition to patterns of utilisation among the different rangeland types as indicated by different species and different herding periods and practices adopted by the pastoralists. This will have implications on management prescriptions to be adopted. Values of Normalized Vegetation Index (NDVI) for the herbaceous density as indicated by phenological stages of the plants growing at each site, showed changes in NDVI values within each season. Based on the results range management may favour the use of clay/sandy sites earlier than the use of sandy rangelands as related to time of use by pastoralists. Understanding and characterisation of different range types help for better identification of sustainable and participatory rangeland management prescriptions.

**Keywords:** Natural rangeland, NDVI, semi-arid areas, soil types