Assessment of Rangeland Degradation by a Hybrid Model using GIS and Remote Sensing

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The Upper Ewaso Ngiro River Basin (UENRB) is one of Kenya's basins with a large extent of its portion covered by rangelands. However, increasing climate variability and anthropogenic activities affect these rangelands rendering them unproductive. This leads to negative impacts in pastoralism, tourism, agriculture and ranching which are the main sources of livelihoods in UENRB. The main aim of this study was to assess the extent of degradation severity scale caused by biophysical, climatic and anthropogenic variables for the years 1986 to 2021. The variables were derived from remotely sensed satellite images and other ancillary data. They included; vegetation health index, soil moisture index, bareness index, surface albedo, topographical wetness index, soil erodibility factor, slope, reconnaissance drought index, land use land cover and population density. They were selected based on the previous researches which haven't incorporated both human and natural factors in rangeland degradation assessment. The weights of the variables were calculated through Analytical Hierarchical Process and Principal Component Analysis and were combined using a geometric mean in order to obtain weights for the assessment. The weights were subjected into a GIS system resulting to degradation maps. The results showed that the major degradation hotspots identified from the modelling were Longopito, kirimon and Archers Post in Isiolo and Samburu counties. The results also indicated that 28.6% of the UENRB experienced high degradation, 41.8% experienced moderate degradation, 20.7% experienced low degradation while 8.9% were non-rangeland zones. Through the learned experiences, studying patterns and consequences in the context of rangeland degradation effects due to their wild coverages may aid in the control of negative impacts on the environment, the economy and general disruptions of human living conditions.