



Tropentag, September 19-21, 2012, Göttingen -  
Kassel/Witzenhausen

“Resilience of agricultural systems against crises”

## Mapping Land Degradation Patterns Using NDVI as a Proxy: A Case Study of Kenya

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### Abstract

Land degradation remains a major challenge to food production and environmental integrity particularly for sub-Saharan Africa. Once productive soils have been ruined due to human and natural degradation processes, the mapping of the patterns of degradation in order to propose intervention approaches is a challenge. This study employed the use of Normalized Difference Vegetation Index (NDVI) as a proxy to assess land degradation patterns in Kenya. The study employed the use of 500 m, Moderate Resolution Imaging Spectroradiometer Normalized Difference Vegetation Index (MODIS/NDVI) and the gridded climate CRU TS 3.1 ( $0.5^\circ \times 0.5^\circ$ ) data for the period (2000–2009). The relationship between annual green biomass (as reflected by NDVI) and mean annual precipitation (MAP) dynamics was computed using Pearson's correlation coefficient while linear regression was performed to determine the magnitude of change of the NDVI over time (inter-annual change in NDVI). All computations were done in a GIS environment using ArcGIS 9.2. Mean precipitation over the 10 year period ranged between 550 and 870 mm at national level. There was relatively reduced precipitation in years 2000, 2003, 2005 and 2008. Despite the annual fluctuations, there was a general increase in mean precipitation at national level over the period of assessment. Correlation between NDVI and MAP at national and regional levels revealed clear patterns of NDVI change and hence potential for degradation or improvement. The degrading areas span across different agroecological zones humid (Kakamega, Kisii) to arid (Kitui, Narok, Turkana, Garissa) lands suggesting that there are various drivers of degradation in these respective regions. Positive and significant changes in the NDVI slope were observed for some selected locations such as Wajir and Baringo that are located in the dryland areas implying the 'greening' of the drylands. Despite the assessment showing solid visual extent of the land degradation problem, assessments using NDVI do not identify the actual causes of degradation or improvements. There is need to follow up such assessments with detailed field observations at selected georeferenced sites to ascertain the causes of the patterns observed.

**Keywords:** Food production, Kenya, land degradation, mean annual precipitation, normalized difference vegetation index