



Land degradation and Poverty in maize producing areas of Kenya – Development of an interdisciplinary analysis framework using GIS and remote sensing

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Land degradation causes poverty and vice versa. But both processes are highly complex, hard to predict and to mitigate, and need insights from different perspectives. Therefore an interdisciplinary framework for the understanding of land degradation processes by linking biophysical data with socio-economic trends is necessary. Agricultural systems in Kenya are affected by land degradation and especially recent developments such as agricultural innovations including the use of hybrid seeds and chemical fertilizer have an impact on the environment. Vegetation analysis, used as a proxy indicator for the status of land is carried out to monitor environmental changes in maize producing areas of western Kenya. One of the methods used in this study includes time series analysis of vegetation data from 2001 to 2010 based on MODIS NDVI data with 250m and 500m resolution. Occurring trends are linked to rainfall estimation data and annually classified land use cover data with 500m resolution based on MODIS within the same time period. Analysis of significant trends in combination with land cover information show recent land change dynamics. As these changes are not solely biophysically driven, socio-economic variables representing marginality - defined as the root cause of poverty- are also considered. The most poor are primarily facing the most vulnerable and thereby less fertile soils. Moreover they are lacking access to information to eventually use existing potential. This makes the analysis of changing environmental processes and household characteristics in the interplay important to understand in order to highlight the most influencing variables.

Within the new interdisciplinary analysis framework the concept of marginality includes different dimensions referring to certain livelihood characteristics such as health and education which describe a more diverse picture of poverty than the known economic perspective. Household surveys and census data from different time periods allow the analysis of socio-economic trends and link this information to biophysical factors. If relationships between certain variables are understood, adapted land management strategies can be developed. This study aims at linking pixel-level information with established remote sensing methods to the socio-economic concept of marginality based on household surveys and census data on administrative levels. Besides remote sensing and statistical analysis of socio-economic data a GIS is used for geospatial analysis. As most studies on land degradation focus on biophysical aspects such as vegetation or soil degradation this study uses an innovative approach by integrating biophysical analysis without neglecting a human oriented approach which plays a key role in environmental systems nowadays. This interdisciplinary research helps to get closer to the right and adapted policies and land management strategies as land degradation processes do not stick to administrative boundaries but policy advice does.