



Tropentag, October 11-13, 2006, Bonn

“Prosperity and Poverty in a Globalised World—  
Challenges for Agricultural Research”

## Indicators for Land Use in Savannahs — Solutions for Detecting and Describing Land Use Intensity

ANJA LINSTÄDTER

*Savanna Range Management - Ecological and Economic Sustainability, University of Cologne, Germany*

### Abstract

Tropical savannahs like other arid to semiarid environments are characterised by a high temporal and spatial variability of rainfall. For understanding crucial aspects of any land management adapted to these conditions, we need to consider the full spatio-temporal dynamics of natural resources such as water availability and biomass production. A major challenge here are feedbacks between land use and spatial and temporal gradients. These feedbacks address thresholds, spatial and temporal scaling (including ecological and socio-economic memory), and both local and scientific perception of land use intensity. For detecting and describing land use intensity on a local and regional level, natural indicators are needed. They are necessary for a standardisation of different types of human impact such as grazing, browsing, or woodcutting; and for a standardisation of human impact on natural resources such as water and biomass.

Such indicators are classified and described for land management in arid and semi-arid environments, distinguishing between **(i)** direct indicators for the current state of a natural resource (e.g. available biomass, species composition), **(ii)** indirect indicators for the current state of natural resources (e.g. milk yield, calving rates), and **(iii)** direct indicators for an ecosystem memory (e.g. the population structure of key species, or the vitality of fodder species). For the case of the savannah biome, we give regional examples for the indicative value of vegetation and soil. In particular, we present the value of plant functional types (PFTs) and their abundance along land use gradients. We link existing conceptual approaches such as the concept of increaser/decreaser species to the functional concept of Response Groups, i.e. species with the same answer to disturbances. The significance of indicative functional groups in the tree and grass layer is discussed for the savannah biome in general.

**Keywords:** Africa, indicators, land management, land use gradients, Namibia, range ecology