

LCLUC Abstract

Coupling Land Use and Land Cover Changes and Ecosystem Processes in Miombo Woodlands

IGBP/LUCC Miombo Home Page <<http://miombo.gecp.virginia.edu/>>

Paul V. Desanker

The overall goal of this project is to develop a better understanding of the patterns and causes of change in land use and land cover in the miombo ecosystems of central Africa; their impacts on the functioning of these systems, and the longer-term consequences of these changes on ecological functioning and socio-economic conditions in the region. The study aims to combine remote sensing, ground data collection, and



ecological modeling to document and interpret the patterns and trends in land use and associated land cover in miombo and consider their consequences. Miombo ecosystems comprise mainly tropical woodlands dominated by trees of the genera *Brachystegia*, *Julbernardia* and *Isoberrinia*, occurring on infertile soils under seasonal subhumid climate. They cover almost 3 million km² of southern central Africa from Zimbabwe to Tanzania, and constitute the largest more-or-less contiguous block of deciduous tropical woodlands and dry forests in the world. They have the potential to be a significant source or sink for carbon within the global cycle, depending on land use and management.

The proposed activities will be centred on six study areas in Zimbabwe, Malawi and Zambia, arranged variously along gradients of increasing rainfall and increasing land-use intensity. Each study area comprises one Landsat TM scene. Land use and associated land-cover attributes will be sampled within a number of broadly representative land-cover types in each area, as determined from initial analyses of Landsat TM imagery. Multi-temporal imagery will be used to map and track changes in land cover over the past 20 years. Information on land-use changes will be obtained from local key informants, archival material, where it exists, and interpretations of aerial photographs. The choice of study areas is related in part to the presence of other studies that can provide data on socio-economic circumstances that, together with additional information obtained during field surveys, can be used as preliminary inputs to understanding the human-induced drivers behind changes in land use and land cover. Tree data will be collected for development of patch dynamics models, and a soil-biophysics model for quantifying site potential productivity. A land use change model (LUCM) will be adapted to the miombo environment. Modeling will be used to integrate the information obtained, to assess the impacts of the changes that have occurred over the past 20 years particularly in relation to changes in carbon pools in the vegetation and soils, and to project likely future trends in land use, land cover, and the availability

of key natural resources. The project is designed to be an initiating activity of the Miombo Network, a proposed intercore activity of the IGBP/IHDP Land-Use and Land-Cover Change core project/research programme.