

**Title:** Integrating remote sensing and field data to estimate forest attributes in miombo woodlands in Zambia

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**Project Description:** Information on forest resources in tropical developing countries is challenging to acquire due to financial and logistical constraints. Yet, improved forest monitoring is a key component of enhancing management capability as well as for engagement in emerging international initiatives such as Reducing Emissions from Deforestation and forest Degradation, or REDD+. Development of multi-source inventories to model forest attributes at relevant spatial and temporal scales by integrating forest inventory data with remotely sensed variables has shown increasing promise. However, modeling efforts are often confronted with high heterogeneity in forest structure and nonlinear relationships between forest attributes and predictor variables. Forest monitoring in the miombo ecoregion of southern Africa is a challenging endeavor. Forests in this ecoregion are dynamic ecosystems, subjected to frequent disturbance from fire, clearing for agriculture, and unmanaged harvesting for timber and non-timber forest products. The long history of human activity coupled with interactions of wildlife and fire has created a heterogeneous landscape that possibly functions in a state of fundamental disequilibrium. This state of continual disturbance gives rise to a patch mosaic of forest structure that is challenging to monitor at across spatial scales. The main goal of my research is to contribute to the development of methods and approaches to examine baseline conditions and changes over time in forest attributes at a sub-national level in Zambia. Specific objectives include: 1) develop methods for model-based assessment of canopy cover, forest area, and biomass using readily available spatial data; 2) assess model-based estimates and uncertainties versus model-assisted and design-based procedures; and 3) develop methodologies for estimating change in these attributes over time. I focus on the use of freely available data and open-source software, so that methods may be more readily available to practitioners.

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