



Tropentag, September 17-19, 2014, Prague, Czech Republic

“Bridging the gap between increasing knowledge and decreasing resources”

## Dynamics and Drivers of Land Use Changes in Southwestern Madagascar During the Past 60 Years

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### Abstract

Southwestern Madagascar is dominated by dry spiny forests representing a unique and highly diverse ecosystem with an exceptionally high number of endemic species. However, land cover changes and deforestation processes rapidly changed the natural environment during the past decades, especially on the semi-arid Mahafaly plateau, where the local population depends on the exploitation of local forest resources and slash and burn agriculture to meet their basic needs.

Historical aerial photographs of the national map service from 1949 and 1966, Google Earth satellite images from 2004 and Pléiades satellite images from 2012 were used to detect land use and land cover changes (LULCC) based on a supervised classification using the Sequential Maximum A Posteriori Classifier (SMAPC) and additional visual image interpretation. To understand the settlement and migration history of the villages and the historical changes in the use of ecosystem services, focus group discussions (2 per village) and semi-structured interviews with elder members of the village were conducted (10 per village). The resulting land-use history narratives were compared with the remote sensing results.

Main drivers of deforestation processes in the studied villages were slash and burn ‘maize’ agriculture and bushfires combined with an extension of permanent agricultural fields. From 1949 to 1966 the cropland increased up to 40 % in the villages. Since then pressure on available land resources and ecosystem services increased drastically with highest deforestation rates on the plateau site, where most woodlands were transformed to savannah. To improve people’s livelihood and sustain ecosystem services, alternative land management strategies such as the cultivation of drought resistant crop varieties or measures to enhance soil fertility are needed.

**Keywords:** Ecosystem services, Mahafaly plateau, satellite image classification, slash and burn agriculture, SMAPC