

"Investigating the dynamics of subsistence cultivation in the tree savanna of North-East Namibia by means of remote sensing"

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Master Thesis (Jahr: 2009): Investigating the dynamics of subsistence cultivation in the tree savanna of North-East Namibia by means of remote sensing

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Summary

The Master thesis focuses on the mapping of the dynamics of subsistence cultivation in the tree savanna of North-East Namibia, as part of the remote sensing activities within the BIOTA Southern Africa research project and in the context of interdisciplinary approaches aiming at a more sustainable land management at the Kavango site. Main data basis are six LANDSAT images from a period between 1984 and 2008 to map land cover changes resulting from subsistence farming. This data is further supported by RADAR imagery from the Japanese ALOS PALSAR L-band microwave system, especially concerning the status of biomass on former cleared areas.

First, based on the LANDSAT data the clearings and cultivations had been separated from the natural vegetation in order to classify land cover and land use individually. For this purpose a box-classification based on the first and second principal components was performed. Slightly higher accuracies were yielded by means of the grey-level-thresholding method, which makes use of the TM/ETM+ bands 5 and 7. The workflow included also the manual erasing of misclassified pixels by means of visual interpretation. Based on these datasets two time-series maps have been created. They show the land use expansion as well as the proportions of land use at a certain time-step. Furthermore, a maximum likelihood classification based on three categories was performed to classify the area of clearings, cultivations, fallows and secondary vegetation. For one time-step the secondary vegetation is further classified using the RADAR data. Before again a maximum likelihood classification distinguishing three classes was performed the speckle was suppressed by means of a 7x7 Frost filter. The reflectance characteristics of the natural vegetation categories are highly correlated to the bush fire dynamics. However, the natural vegetation could be set into relation with the clearing dynamics. Finally, an exemplary verification of the classification results based on a Quickbird scene and on aerial photographs was carried out using the stratified random sampling with 50 points for each class.

The mapping products show that the land use expansion is steadily increasing. So, there is a need for proper land use planning.

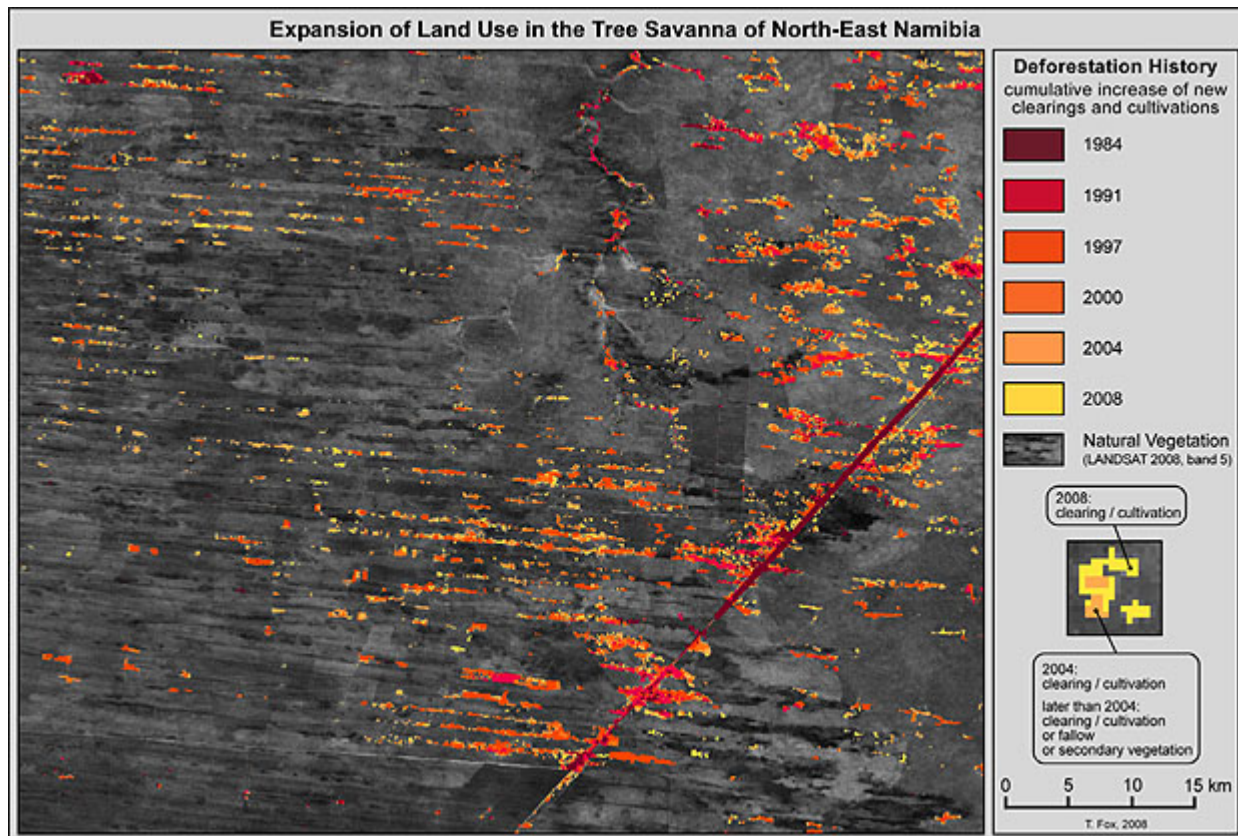


Fig.: Expansion of land use in the tree savanna of North-East Namibia as derived from a change detection analysis of LANDSAT time-series data.