LAND COVER CHANGE IMPACTS ON BIODIVERSITY IN MT. KILIMANJARO SAVANNA ZONE

P. Hurskainen*[a], A. Hemp[b], P.K.E. Pellikka[a], M. Pfeifer[c]

[a] University of Helsinki, Department of Geosciences and Geography, Gustaf Hällströmin katu 2, FI-00014 Helsinki, Finland – pekka.hurskainen@helsinki.fi
[b] University of Bayreuth, Department of Plant Systematics, Universitätsstr. 30-31, 95440 Bayreuth, Germany – andreas.hemp@uni-bayreuth.de
[c] Imperial College London, Department of Life Sciences, Buckhurst Road, Ascot, Berks, SL5 7PY, United Kingdom – marion.pfeifer@gmail.com

* Corresponding author – pekka.hurskainen@helsinki.fi

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ABSTRACT:

Kilimanjaro in Tanzania is one of the world’s biodiversity hotspots. The upper part of the mountain (above 1800 m a.s.l.) is protected; the middle zone (1100 - 1800 m a.s.l.) is densely populated and cultivated due to climatically favourable conditions with little space to expand. A dry and hot savanna zone extends below the middle zone but has become under increasing land use pressures, driven by human population growth, expansion and intensification of agriculture, urbanization, and grazing.

In this study, we focused on the southern savanna zone, covering an area of 1300 km^2. We aim to (1) quantify dynamics of land cover change in the study area over the past 20 years, and to (2) to predict spatiotemporal patterns of biodiversity from patterns of land cover change.

Satellite data used in the study include multi-spectral satellite imagery from 1991, 2000 and 2012 (SPOT-2, SPOT-4, and Formosat-2, respectively). All images were geometrically co-registered, calibrated and atmospherically corrected. We used vegetation assessments (plant species, community composition, and vegetation structure) that have been collected since 1996 from 132 plots following Braun-Blanquet. For each image date, we classified land cover using multi-scale segmentation/object relationship modelling. We used ground reference data from 2012 and 2014 for defining land cover classes and for training and validation during the classification process following the LCCS protocol. We employed post-classification change detection to derive from-to change classes. We subsequently used classified habitat patches as *a priori* information for species diversity estimations. For each patch and each date, we calculated spectral, textural and topographic variables from satellite data and SRTM digital elevation model data. We used these variables to predict species diversity from the plots via multivariate regression kriging, Finally, we estimated patterns of biodiversity change between the three dates in relation to patterns of land cover change.