



Tropentag, September 16-18, 2015, Berlin, Germany

“Management of land use systems for enhanced food security:
conflicts, controversies and resolutions”

Interactive Effects of Altitude and Management on Coffee Agro- Ecosystems Along a Transect on Mount Elgon, Uganda

ERIC RAHN¹, THERESA LIEBIG², LAURENCE JASSOGNE³, PETER LÄDERACH⁴, PIET VAN ASTEN³,
PHILIPPE VAAST⁵, CLAUDE GARCIA⁶, JABOURY GHAZOU⁶

¹*ETH Zurich, Institute of Terrestrial Ecosystems, Switzerland*

²*International Center for Tropical Agriculture (CIAT), Colombia*

³*International Institute of Tropical Agriculture (IITA), Uganda*

⁴*International Center for Tropical Agriculture (CIAT), Nicaragua*

⁵*CIRAD Montpellier, France & ICRAF Nairobi, Kenya*

⁶*ETH Zurich, Environmental Systems Science - Group of Forest Management and Development, Switzerland*

Abstract

Coffee intensification and its environmental impact has been documented extensively in the last two decades, particularly in South and Central America. Coffee systems of East Africa on the other hand are still under researched, despite their socio-economic and environmental importance in the region. Arabica coffee systems predominate on many East African mountains and constitute a mayor land-use type bordering the remaining tropical montane forest cover. Depending on how coffee is managed it can retain substantial biodiversity and provide many other essential ecosystem services particularly relevant for vulnerable montane slopes. The multifunctional role of shade trees contributes in sustaining coffee production and improving farmers' livelihoods, if managed appropriately.

In this study we assessed the range of Arabica coffee systems along an altitudinal gradient on Mount Elgon, Uganda. A typology of coffee systems was derived based on an extensive field work on 150 coffee plots related to vegetation structure. Productivity, management intensity, labour intensity, severity of pest and disease incidence, soil health, and tree species diversity were compared between the systems and along the altitudinal gradient. Determinants of adoption of different coffee systems were investigated.

The results serve as a basis for studying the trade-offs inherent in and between the systems regarding a diverse set of ecosystem services. Furthermore, the altitudinal range enables to explore the diverse effects of temperature (and precipitation) on coffee productivity and other ecosystem services among the identified systems and its interactive effects. This is particularly relevant to study the possible impacts of climate change and the relevant measures for adaptation.

Keywords: Altitudinal transect, coffee agro-ecosystems, ecosystem services, system comparison, trade-offs