



Tropentag, September 20-22, 2017, Bonn

“Future Agriculture:
Socio-ecological transitions and bio-cultural shifts”

Farmers Intensification Decisions under Fragile and Unpredictable Environment in Kilombero Valley Floodplain: A Bayesian Belief Network Approach

BISRAT HAILE GEBREKIDAN¹, THOMAS HECKELEI², SEBASTIAN RASCH³

¹University of Bonn, Institute of Food and Resource Economics, Germany

²University of Bonn, Institute of Food and Resource Economics, Germany

³University of Bonn, Institute of Food and Resource Economics,

Abstract

Like Most of the countries in Sub-Saharan Africa, Tanzania have continued facing the challenges of feeding their growing population coupled with increasingly degrading environment and uncertainties resulting from climate change. Based on this revelation, the government of Tanzania and different international and local NGOs are embarked on a strategy that increase in food production and poverty reduction should come from development of the agricultural sector through “sustainable” agricultural intensification in selected targeted clusters of potential agriculture hotspots across the country.

The Kilombero Floodplain is endowed with a productive natural resource base, fertile land, reliable water availability and extensive pastures to small holder farmers in Kilombero and Ulanga districts. However, the supply of productive land is increasingly constrained by population pressure, competition from commercial ventures and institutional land tenure restrictions. These forces farmers who intent to increase production quantities to adopt different agricultural intensification strategies. A range of intensification pathways including use of improved/hybrid seed variety, increase frequency of cropping, small-scale irrigation, and agro-chemical input use are identified in the area.

Aimed at identifying appropriate pathways to intensification strategies which overlaps with their livelihood strategies by farmers, this study dissects an important question of which strategies do the farmers uptake and how are these decisions made. By combining statistical tools from machine learning [multivariate cluster analysis and Decision tree algorithm] and probabilistic graphical models [Bayesian Belief Network] under uncertainty, we empirically examined the decision making process of farmers in KVFP.

The preliminary result shows the relative importance of different external factors and regional settings [biophysical characteristics of their farm plot, access to input and output market, credit access, and off-farm livelihood opportunity] and internal characteristics of the farmer [age household size, farmer type, household commercialisation index, capital endowment] were found to be the main factors that farmers consider in their choice intensification strategies. In addition, farming practices, intensification strategies in particular, in the floodplain are associated with trade-off between increased food productions and sustaining the ecosystem services provided by the floodplain.

Keywords: Agriculture, Bayesian Belief Network, floodplain, food productions , intensification, Tanzania

Contact Address: Bisrat Haile Gebrekidan, University of Bonn, Institute of Food and Resource Economics, Nussale 21, 53115 Bonn, Germany, e-mail: bisrat.gebrekidan@ilr.uni-bonn.de