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Analysing Nutrient Flows in Mixed Crop-Livestock Systems to Identify Efficient Practices in Western Kenya

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Abstract

Depleted soils and low resource efficiency are a risk for smallholders' food and financial security in East Africa. Soil fertility is affected by management decisions which depend on biophysical and socio-economic factors. Aiming at finding options to increasing farmers' efficiency in nutrient use, this study analyses the nutrient management and flows within mixed crop-livestock systems. Carried out within the Mau-Mara-Serengeti (MaMaSe) Sustainable Water Initiative, which aims at improving water safety and security in the Mara River Basin, we focused on the upper Mara River basin in Western Kenya. We used the MonQI Toolbox, which together with its predecessor has been thoroughly tested in Africa, designed to monitor and evaluate the performance of smallholder farms. A typology was constructed to take into account the diversity of farming systems in the area. All details about farm management, inputs and outputs were quantified for three farm types: 1) dairy production strategy in a mixed system 2) cash crop strategy through coffee or tea production 3) staple crops in semi-arid conditions. Our findings showed that big losses occur within farm nutrient flows. Due to a lack of water, plants couldn't uptake applied nutrients efficiently and yields remained low. Farmers who adopted agroforestry practices, a diversified intercropping system and soil and water conservation measures showed better performance. We discussed that implementation of these practices have an advantage regarding nutrient balance, yields and income. Looking at the high frequency of droughts and intensity of rainfall, implementation of soil and water conservation measures is a first necessity for the future of this area.

Keywords: Food security, Mara River Basin, mixed crop-livestock systems, monQI, nutrient flows, soil and water conservation, soil fertility, western Kenya