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Dynamics of Resource and Labour Allocation in Smallholder Farms of the Western Kenya Highlands

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Abstract

In many highland areas of Africa population growth has led to farm sizes smaller than 1 ha and to the (virtual) extinction of communal land. In spite of the agroecological potential of these areas, food security is often achieved by less than 20% of the households. This is caused by multiple factors; soil fertility depletion due to continuous cultivation, soil water erosion, and limited nutrient inputs to the farm system. A range of nutrient management technologies have been proposed to counterbalance these problems. However, their adoption is restricted by lack of land, financial resources and labour. The latter is counter-intuitive, as one may assume that labour is amply available in highly populated regions; however, labour demands for different activities take place at peak periods during which farmers need to hire external labour. Thus, any strategy to increase food production, improve resource use efficiency and/or maintain the resource base should be designed by considering the dynamics of labour allocation to competing farm (and non-farm) activities. We developed a modelling framework that includes the spatial and temporal dimensions of smallholder farming systems to be able to analyse these issues. By using summary models that describe the short- and long-term dynamics of the major components of the farming systems (livestock, crop/soil, labour/finance) we are able to synthesize knowledge and analyse trade-offs of implementing different management technologies. Analysis using the model framework showed how different labour and cash constraints limit the possibilities for intensification of the farming system for farmers of different resource endowment.

Keywords: FARMSIM, household modelling, nutrient management, soil fertility, sub-Saharan Africa