Characterisation and Classification of Agricultural Land Use Systems in Kakamega, Kenya: Implications on Soil Fertility, Productivity and Biodiversity

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Abstract

The Kakamega forest in Western Kenya is surrounded by diverse agricultural land use systems, ranging from small-scale subsistence over mixed subsistence and cash cropping, to industrial monocropping systems. The diversity of field, home garden and tree crops and of auxiliary plant species is large but varies both spatially (climate, soil type, market access, forest proximity) and with the production system. A high population growth rate has led to an unprecedented land use intensification and land fragmentation. A low external input use combined with near permanent cropping has resulted locally in severe soil fertility depletion, a reduced production potential and low yields. With declining resource base quality the growing pressure on the forest for land and other resources is posing a threat to its existence. The desired conservation of this forest requires protective policies but also technical options for farmers that increase production and income levels and improve rural livelihood. Any such strategy needs to be based on a quantitative understanding of the changes in land use and resource base quality and their underlying processes and driving forces. In a first step to provide such information and in view of developing land use planning and decision tools, we established a typology of agricultural land and resource use systems. This typology is based on information about demography, climate, soils, crops, productivity and resource management practices as well as the changes in these parameters along biophysical and socioeconomic gradients (agroecological zone, forest proximity, population density). A total of eight administrative units were covered, 159 household interviews were conducted and observations on crop performance and plant diversity were complemented by some 200 soil samples that were analysed for a range of soil quality indicators. Questionnaire data are being analysed using principle component and cluster analyses and the results will be correlated with soil and production data. The identification of distinct clusters of farm and land use types will be used to project future land use changes and to identify pilot farms for the development and testing of site and system specific technology options.

Keywords: Crop production, resource management, soil fertility, typology