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Potential of Smallholder Farmers in Mau Forest, Kenya to Adopt Land Use Based Clean Development for Climate Change Mitigation

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Abstract

Land use change linked to climate change could be the cause of drought and food shortages in Kenya in the last decade. Smallholder farmers around Mau forest-Kenya?s biggest water tower; compensate for the declining land productivity by opening new agricultural sites in the forest reserve. Reforestation efforts so far have not adequately integrated onfarm practices with the forest management leaving the riparian farmers with no incentives to avoid deforestation. The community Based Integrated Forest Resource Management (COMIFORM) project coordinated by the UNEP Nairobi, Kenya through which this study was undertaken targets carbon offset scheme to integrate farmers livelihood needs, forest restoration and climate change mitigation and adaptation. To provide a scientific basis for such initiative we attempted to establish the potential of the smallholder farmers in Maasai Mau catchment (MMC); part of the wider Mau complex to participate in the voluntary land use carbon offset (LU-Co) scheme. We identified present land use types and allocations in thirty (30) representatives plots of size 2-6 ha located in 3 socio-ecologically representative administrative locations of the MMC. We then measured aboveground carbon stored in each using the multipurpose survey technique recommended by IPCC greenhouse gas inventory and Winrock-bio-carbon guidelines. Based on the guidelines, diameter at breast height (D) was measured for all the tree species of various age-sets in a plot. The tropical (East Africa) based regression equation; Y(Biomass) =42.69-12.800(D) +1.242(D^2) was applied to calculate the biomass as a baseline. Herbaceous samples mainly from the croplands in each farm were oven dried at 70°C and weighed at the National Agricultural Research Laboratories in Nairobi, Kenya. Using the carbon baseline, a conjoint valuation was undertaken with the same farmers plus 20 others (50 cases in total) who were asked to choose and rank hypothetical land use and policy options that make up a carbon offset scheme to model carbon offset scenario. Results show that smallholder farmers in MMC allocate an average of 52 % of farmland to food crops and 19.5 % for cash crop (wheat) and the rest left for grazing with scattered indigenous trees left from initial forest cover. Based on ranking correlation, farmlevel aboveground carbon varied more with land use type ($p** = 0.05$) than area allocated. Carbon amounts ranged from highest (40.5 t C ha^{-1}) in onfarm forest to lowest (10.2 t C ha^{-1}) in annual croplands. Results of conjoint analysis shows that size of land to be committed for a carbon offset project, waiting period for the benefits and certainty of livelihood were the strongest determinant of farmers acceptance for LU-Co options (each at $p*** = 0.01$). Based on prospective carbon scenarios derived from the baseline and farmers choices in the conjoint analysis, a high potential for carbon offsetting by individual farmers in MMC can be reported. The potential can be enhanced

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by technical support of the farmers on land use designs that incorporate onfarm forestry as part of cash crop for carbon sales promoted through creating awareness on LU-Co and the co-benefits.

Keywords: Acceptance, carbon offsetting, farm-level, livelihood, mitigation