Lushoto & Hoima: Soil Health Baseline Assessment

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Understanding Landscape-scale Variability of Soil Health Indicators: Assessing the Effects of Cultivation on Soil Organic Carbon

Soil organic carbon (SOC) is an important indicator of soil health because it integrates both inherent properties of soil as well as anthropogenic activities, including land-use change and land management, while contributing to the overall fertility of the soil. Biophysical field surveys were conducted using the Land Degradation Surveillance Framework (LDSF) in Hoima and Lushoto as part of the "Playing out transformative adaptation in CCAFS benchmark sites in East Africa: When, where, how and with whom?" project. Each LDSF site had 160 sampling plots where field observations and samples were collected, including soil samples (0-20 cm and 20-50 cm), erosion assessments, tree and shrub measurements, as well as current and historic land use. LDSF sampling plots were co-located with the 140 CCAFS Household surveys in order to conduct interdisciplinary analysis on land health, gender and social-economic datasets.

The objective was to provide a biophysical baseline of key soil and land health metrics across the landscape in order to understand variability and effects of land use. Another key objective was to identify opportunities for strategic land management interventions that can improve soil health and overall productivity. There is high spatial variability in topsoil OC across the Lushoto landscape, as shown in the map on the right (Figure 1). In Hoima, there is less variability in SOC (Figure 2) overall. Both sites have less topsoil OC in cultivated areas than in semi-natural areas, with the strongest effects of cultivation in Lushoto (Figure 2). Overall, cultivation also leads to less variability in SOC.

The results highlighted here show that current cultivation practices are leading to sharp declines in SOC in Lushoto, and interventions need to focus on practices that stabilize or increase SOC in order to increase the capacity of the soil to enhance productivity and the adaptive capacity of the farming system in general. We aim to link these datasets with existing surveys (HH Baseline, IMPACT Lite, gender, etc.) to further understand the different management strategies and socio-economic factors that contribute to the variability in SOC under cultivated area.

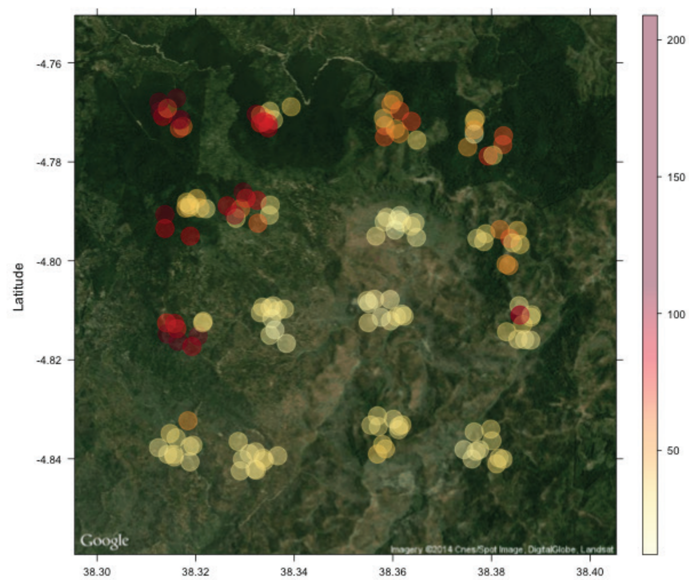

Figure 1. Topsoil organic carbon values (g kg^{-1}) for each of the 160 LDSF sampling plots in Lushoto.

Figure 3. Landscape photo from Lushoto illustrating the complexity of land uses across the site.

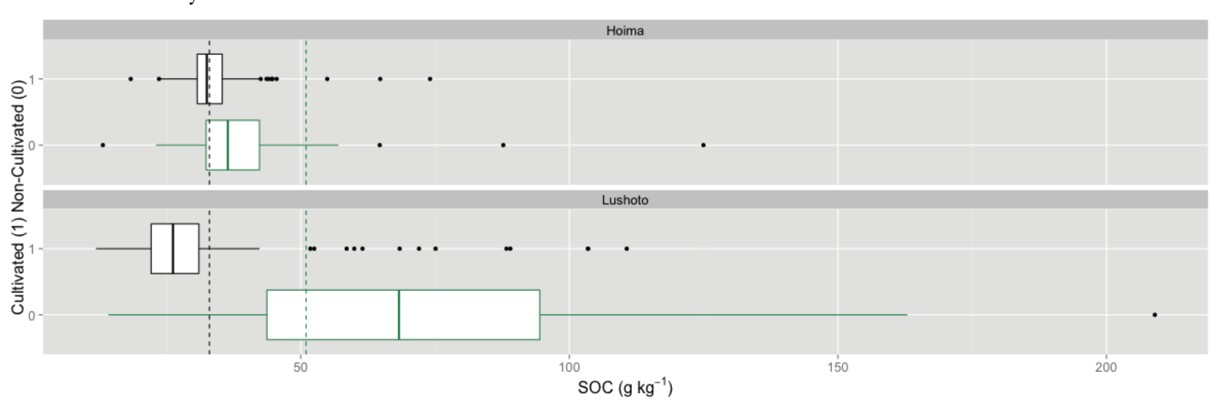

Figure 2. Boxplots of topsoil organic carbon (g kg^{-1}) for cultivated (1) and non-cultivated (0) plots in Lushoto (n= 104 and n=53, respectively) and Hoima (n= 65 and n=95, respectively). The vertical lines show overall means for cultivated and non-cultivated plots (33 and 51 g kg^{-1}) .