The impact of certification on carbon stocks and biodiversity in smallholder coffee systems: A case study in the Mt Elgon region, Uganda

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**Introduction**

In the Mount Elgon region in Eastern-Uganda the major cash crop for smallholder farmers is coffee (Coffee arabica L.). A lot of farmers are contracted with private export companies who sell the coffee under certain certification schemes. Certification is seen as a way to stimulate the implementation of agroforestry, which can provide several ecosystem services among which biodiversity conservation and carbon sequestration. This research focuses on coffee gardens from two export companies and a control group:

- Non-organic certified
- Organic certified
- Non-certified

**Research questions**

Do certified coffee systems have an impact on the provision of ecosystem services?

- Do certified coffee gardens sequester more carbon and have a higher biodiversity?
- Are there differences between the organic and non-organic certificated gardens?

**Materials and Methodology**

**Sampling design**

- Treatment groups: stratified random sampling
  - 18 organic + 19 non-organic certified gardens
- Control group: matching procedure
  - 37 non-certified gardens

**Carbon stocks**

- Above-ground biomass
- Below-ground biomass
- Litter biomass
- Deadwood
- Soil organic carbon

**Preliminary results**

**Biodiversity**

- Environmental variables
- Crops, shrubs and trees
- Ants

**Species Richness**

**Species Diversity**

**Community analysis**

**Discussion and Conclusion**

Organic certified coffee gardens contain the highest amount of carbon, surprisingly followed by non-certified gardens and then by non-organic certified coffee gardens. However, differences are not significant. This might be attributable to the limited dataset and the high variability in carbon stocks between plots. A more in-depth study with more replications will clarify if these management effects through certification are significant or not. Based on field observations we expect that the measurements of biodiversity will give a clearer signal on differences between certified and non-certified coffee gardens.

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