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 (*Coffea 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:

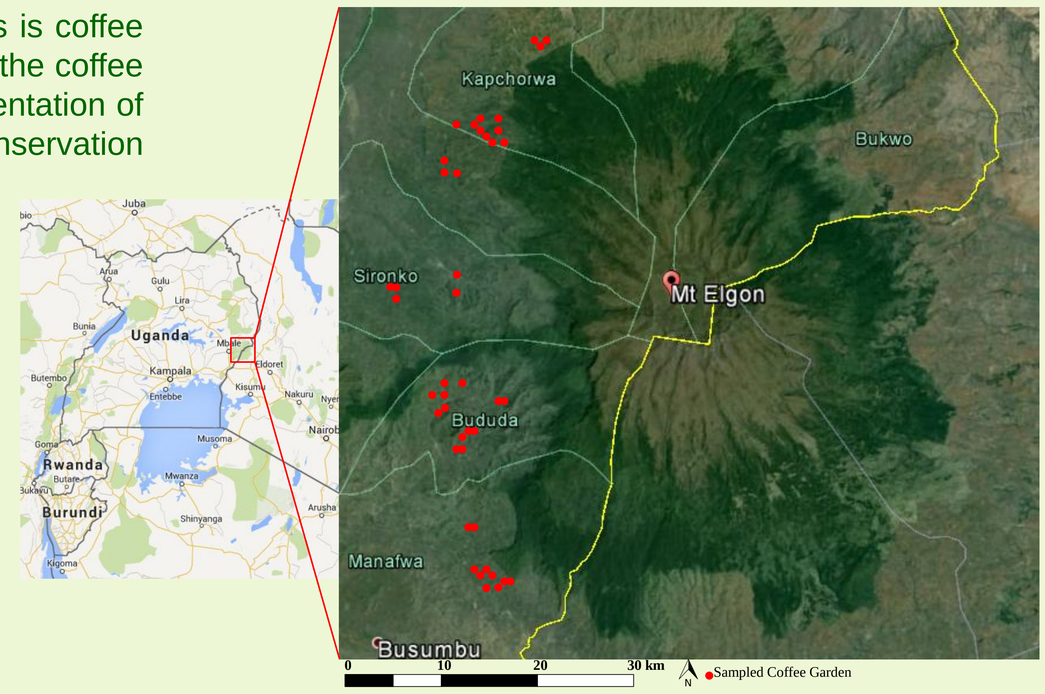
Kyagalanyi Ltd

Non- organic certified

Gumutindo Ltd

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

Biodiversity

• Environmental variables
• Crops, shrubs and trees
• Ants

Species Richness

Species Diversity

Community analysis

Baits

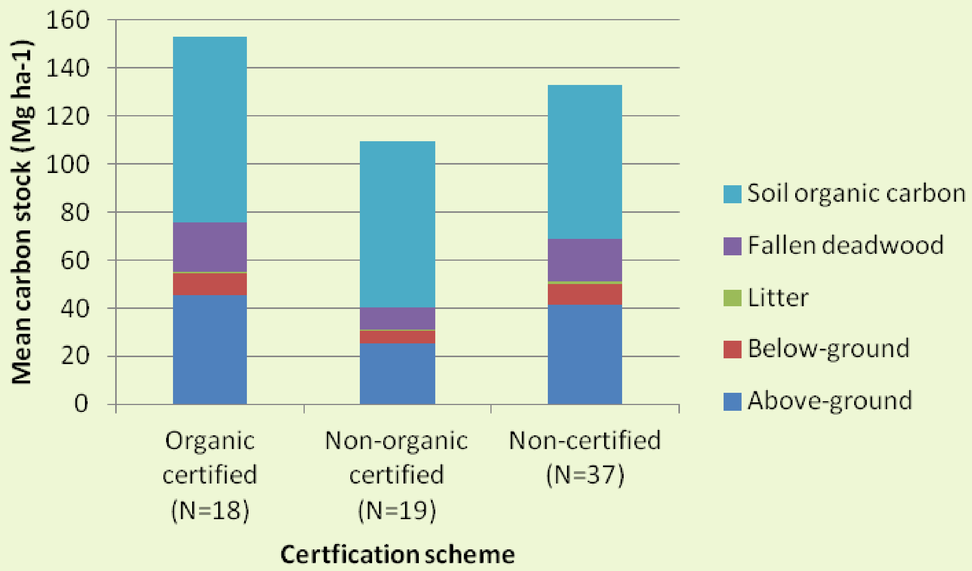
Pitfall

Litter

Winkler

Preliminary results

Carbon stocks



• Paired t-test: no significant difference in the mean total carbon stock between Organic certified and Non-certified gardens and between Non-organic certified and Non-certified gardens

Biodiversity

• **Trees**: 47 species in total
  • Most abundant species

Cordia africana

Persea americana

Markhamia lutea

Grevillea robusta

• **Ants**: 38 225 counted individuals, estimated >100 species
  • Recurring genera

Pheodole

Myrmicaria

Crematogaster

Camponotus

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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