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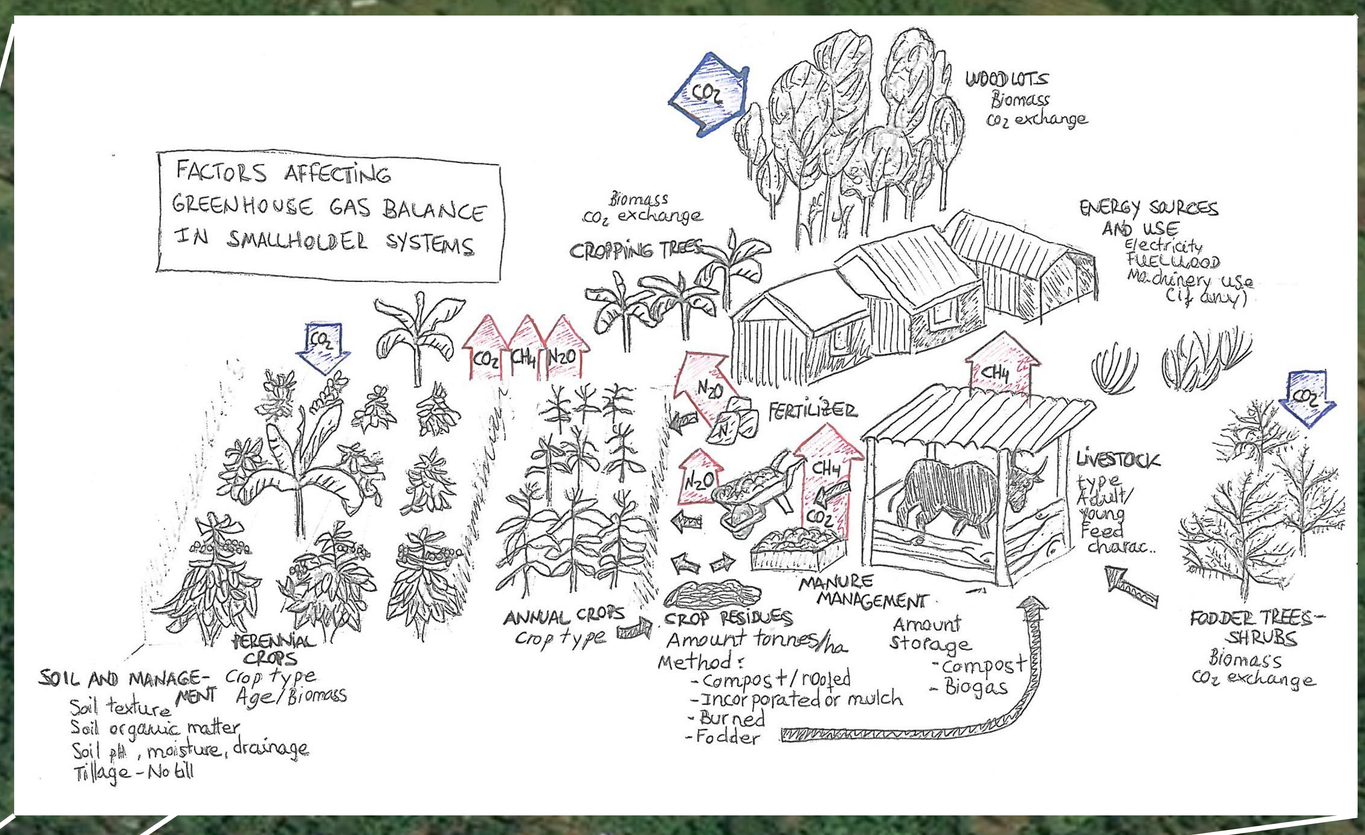
Enhancing livelihoods through climate change mitigation and adaptation practices in smallholder crop-livestock systems in Kenya

Introduction

Although manure is still considered as a problematic waste in occidental countries such as Spain, for smallholder systems in developing countries it is a key resource to maintain soil fertility. Especially in sub-Saharan Africa (SSA), where land degradation factors combined to a chronic lack of access to inputs has leaded to nutrient depletion in many areas. Concretely in the Kenyan highlands, under a situation of rapid population growth the pressure on land increases, and nutrient recycling is critical to maintain or improve the farms productivity. Processes as leaching and gaseous losses may reduce farm nutrient cycling efficiencies (NCE). Addressing this problem, some agricultural practices not only can prevent high loss of nutrients but also meet global objectives reducing greenhouse gas (GHGs) emissions.

Practices such as agroforestry, legumes integration, soil conservation, cover cropping or improved livestock practices take part of the concept of climate-smart agriculture (CSA) which promotes production systems that sustainably increase production, farm resilience (adaptation), reduce and remove GHGs (mitigation), and enhance the achievement of food security goals. Some of the gains may result in increased above ground biomass and soil carbon sequestration, higher yields and improving farm resilience to climate change. However, there may be also some trade-offs between different practices, making necessary a holistic and integrated understanding of the socioeconomic and biophysical factors.



General objetives

The main objective is to explore the potential of different agricultural practices to mitigate climate change, increase farm resilience and improve livelihoods in smallholder crop-livestock systems in the highlands of Kenya. Some sub-goals:

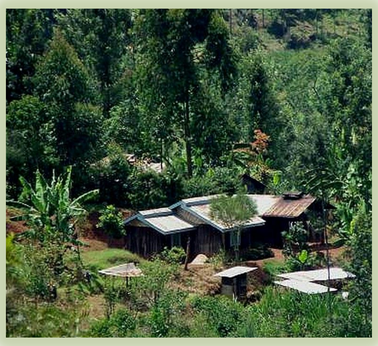
- Characterizing farms according to different levels of intensification and identification of GHGs hotspots.
- Quantifying GHGs emissions and removals at field level in mixed crop-livestock production systems by different methods.
- Upscaling measurements to farm and landscape level by empirical and process-based models.
- Identifying pro-poor mitigation and adaptation options for smallholders (practices that improve farm resilience and livelihoods reducing GHGs emissions).
- Analysing the trade-offs between practices using a range of modelling approaches.

Some research questions

- Which are sinks and the sources of GHGs in the different farm typologies?
- How to quantify accurately fluxes at field level?
- How to upscale point measurements to farm and landscape levels?
- What practices produce the highest opportunities to enhance livelihoods and decrease climate impacts?
- Which are the trade-offs between the different practices?

Methods

The study area is located in the Kenyan highlands, at the foot of Mount Kenya and the Aberdare Range, in the districts of Murang'a and Nyeri. Methods will combine participatory research (semi-structured interviews and questionaries), analytical techniques (spectroscopy, gas chromatografy, mas spectrometry, etc.) and modelling (empirical and process-based models).



About AgTraIn

Agricultural Transformation by Innovation (AgTraIn) is a three-year world-class Joint Doctoral Programme, part of the Erasmus Mundus programme initiated by the European Commission. The main objective of AgTraIn is to develop an elite European school within the topic of successful development and transformation of farming systems in the developing world. The programme is jointly developed and delivered by a six-university consortium consisting of:

- University of Copenhagen, Denmark
- Universidad Politecnica de Madrid, Spain
- Montpellier SupAgro, France
- Wageningen University, The Netherlands
- Universita degli Studi di Catania, Italy
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