Rapid ex-ante environmental impact assessment of livestock intensification strategies on mixed crop-livestock and agro-pastoralist farmers in Tanga region, Tanzania

Background

- Livestock production supports around 600 Mio. smallholders in the developing world
- Environmental impacts include water pollution, global warming, soil degradation, water use and pollution, and biodiversity loss
- Long-term sustainability needs to be assessed before designing large-scale livestock development projects, but data is sparse and quick results needed
- Therefore, a quick ex-ante environmental impact assessment tool was developed, focusing on soil nutrient balances and greenhouse gas emissions

Materials and Methods

- A participatory GIS exercise in June 2014 in Lushoto, Tanga region, Tanzania, resulted in two types of farming systems: intensive mixed crop-livestock systems and extensive agro-pastoral systems (Figure 1 and 2)
- Representative farms of both types were visited and interviewed in May 2015 in Lushoto (mixed crop-livestock) and Handeni (agro-pastoral). Data was complemented with a previously conducted feed assessment in the area. Data described agro-ecology, crops, land use, inputs, livestock herd, manure, and livestock feeding
- Intervention scenarios were based on village development plans from both sites: improved breeds, improved feeding, and increased animal health
- Modeling of farm-level GHG emissions was based on IPCC tier 2 guidelines
- Nutrient balances were calculated using the NUTMON method

Results

- Figure 3: Baseline GHG per farm type in per area and milk basis (left); baseline sources of GHG emissions in % for the different farm types (right)
- Figure 4: Livestock kraal in agro-pastoral system (left); changes in GHG emission intensity Nutrient balances of baseline and scenarios (right)
- Figure 5: Nitrogen balances for baseline and scenarios (left); cropping system diversity in mixed crop-livestock system (right)

Results and discussion

- Enteric fermentation is the largest contributor to GHG emissions
- Emission intensities are higher for mixed crop-livestock systems when measured per area, but lower per liter milk produced
- N balances are negative for mixed farming, and positive for agro-pastoralists due to the manure produced by the relatively big herd
- Livestock intensification strategies result in almost all cases in lower emission intensities, especially in the agro-pastoral system
- Further work: outlining to regional level, flagging risks into low/medium/high, feeding results into regional/national dairy platforms

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