Leibniz Centre for **Agricultural Landscape Research** (ZALF)

Landscape Functioning | Land Use & Governance | Agricultural Landscape Systems

Landscape-level sustainable land use optimization of Lake Chamo catchment, southern Ethiopia

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Introduction

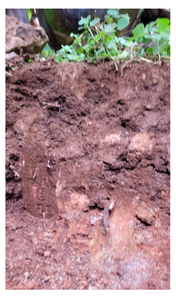
- Forest Landscape Restoration (FLR) doesn't take place only on degraded landscape but also on mosaic agricultural landscape.
- Investigating which FLR options is economically feasible, environmentally viable and socially acceptable to Implement FLR on mosaic landscape.

Objective

- This study optimizes the land uses in order to maximize the economic benefit without compromising the carbon storage and employment potential.

Methodology

- 228 household interviews: Economic and social analysis



- Soil Carbon analysis

- 102 plots: DBH, DSH and height measured: Carbon analysis

Analytical framework

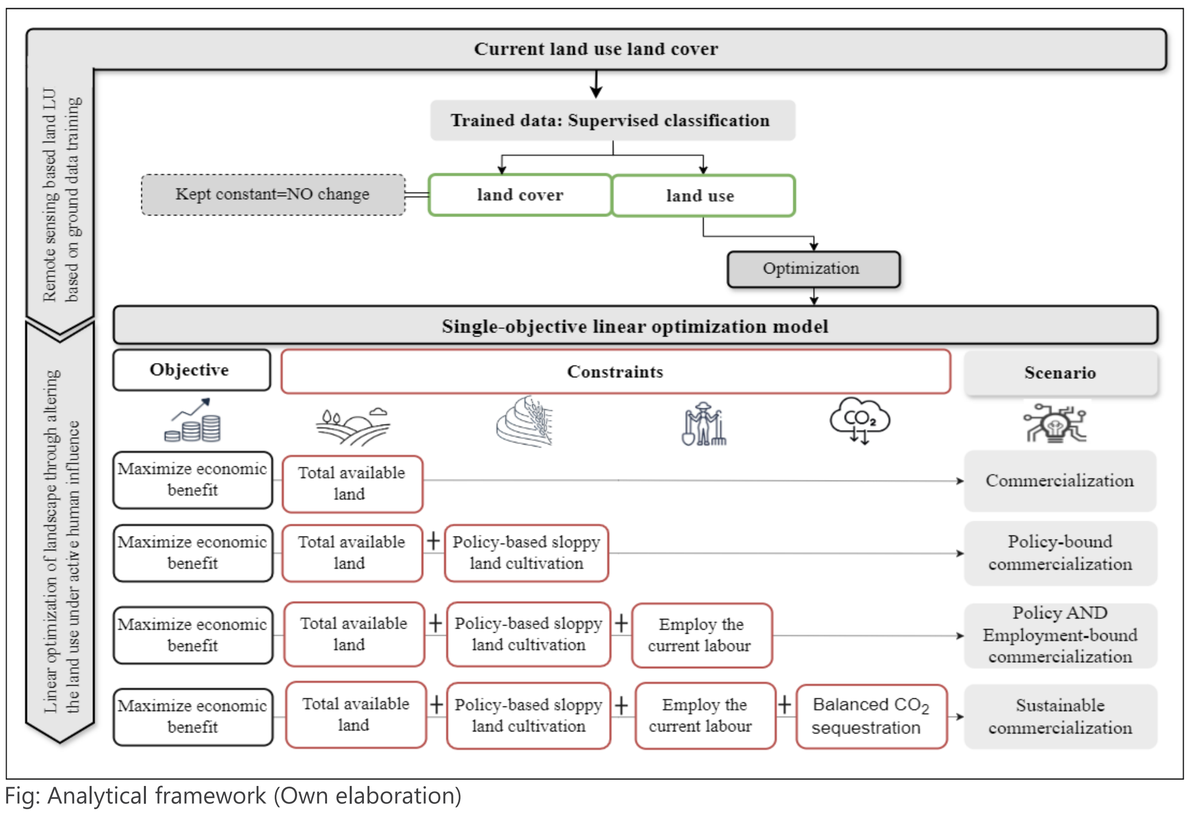
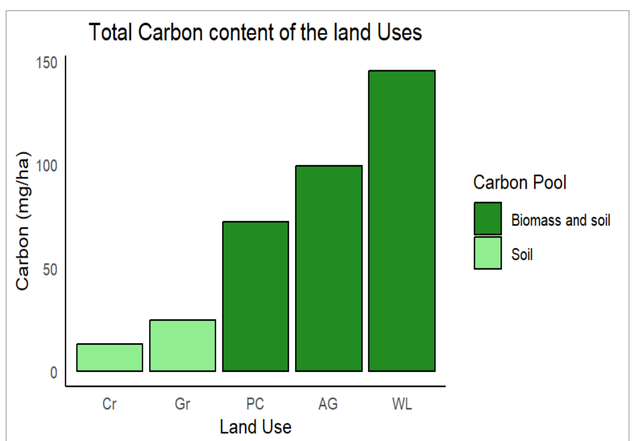


Fig: Analytical framework (Own elaboration)

Results

Carbon storage potential of the land uses



- Agroforestry practices store more soil carbon followed by Woodlot, grazing land, Perennial crop and annual crop respectively.

Economic and social benefits

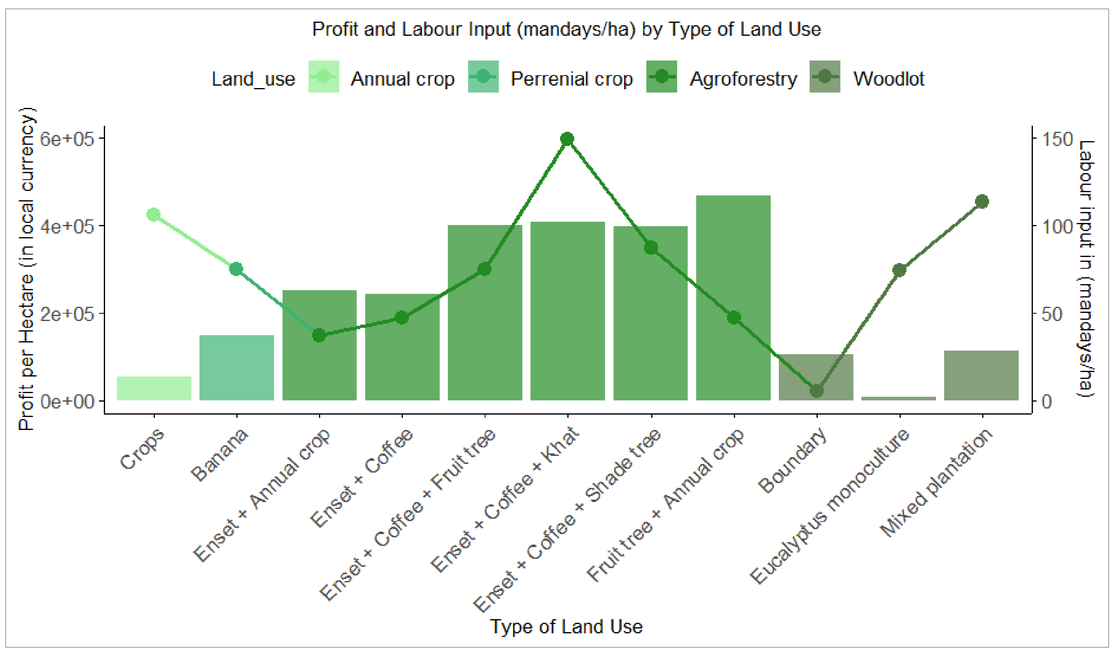


Fig: Average economic profit obtained and average labor employing capacity in mandays

Landscape level optimization of land uses

- Commercialization approach to maximize economic profit allocated 100% of the available land to agroforestry.
- Integration of ecological and social aspects to constrain the commercialization scenario:
  - Reduces the existing land annual crop 21%, Perennial crop production by 2.7%, and
  - Increase allocation for woodlots by 26%.

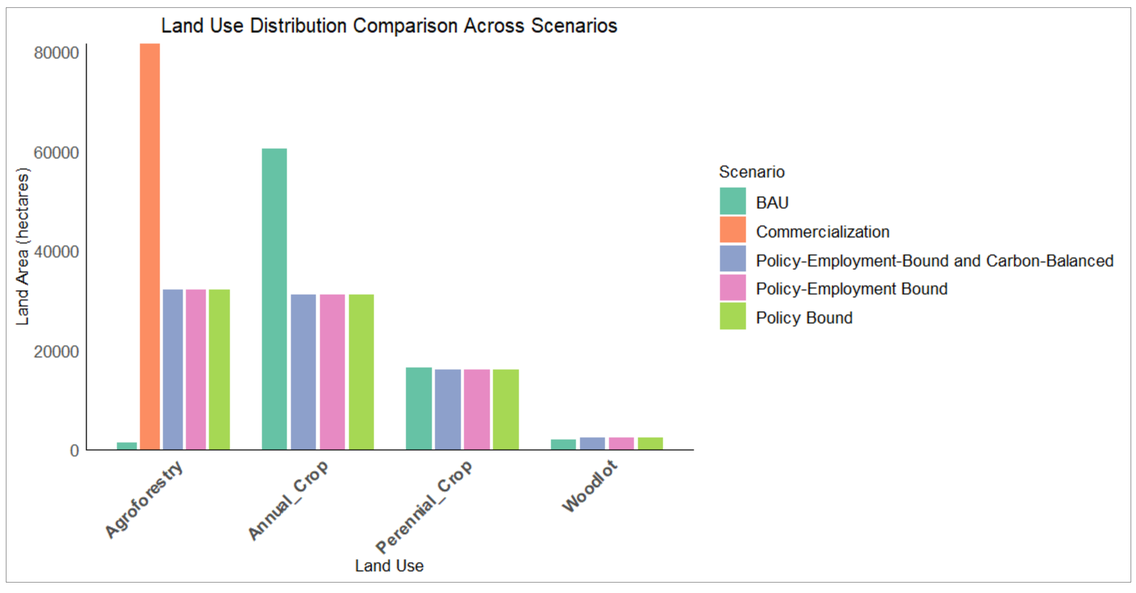


Fig: Optimization of the land uses following sustainability principle

Conclusion and outlook

- Restoring degraded agricultural landscape using agroforestry practice is a feasible FLR strategy where smallholder farmers are engaged.
- Agroforestry practice showed the most suitable land use in the landscape that satisfies all the sustainability principle.
- Applying the optimization result on the landscape redistributes the land uses based on the financial profit while employing the working task force of the landscape and store more carbon.

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