Timber-based Agroforestry Options for Upland Farmers on Degraded Soils in the Philippines

World Agroforestry Centre
TRANSFORMING LIVES AND LANDSCAPES

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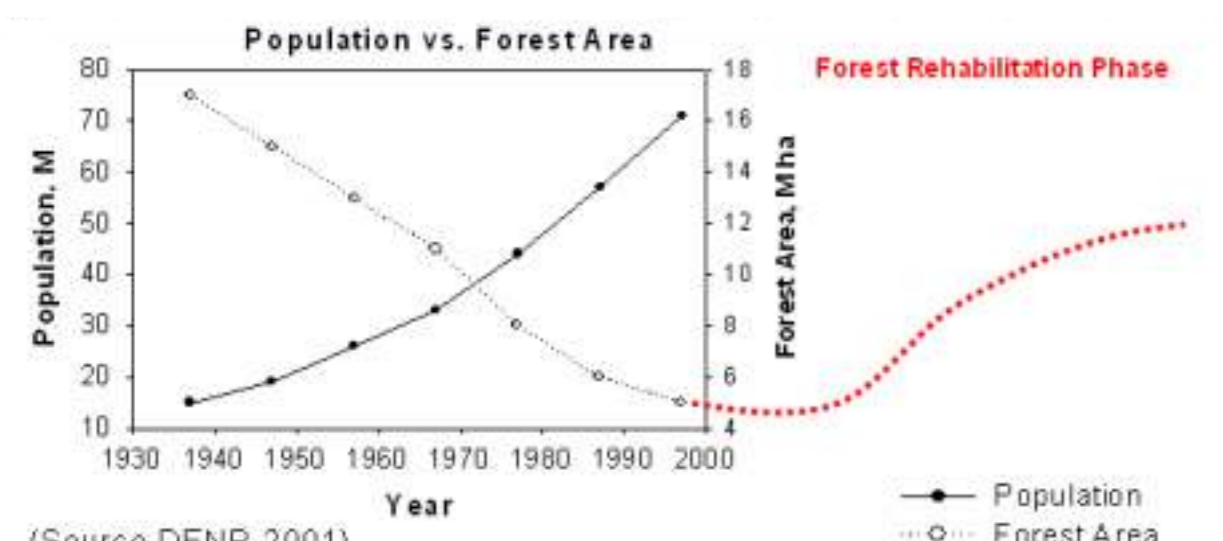Second best PhD-thesis of 2007 Spanish National Contest for Excellence in Research on International Cooperation for Human Development
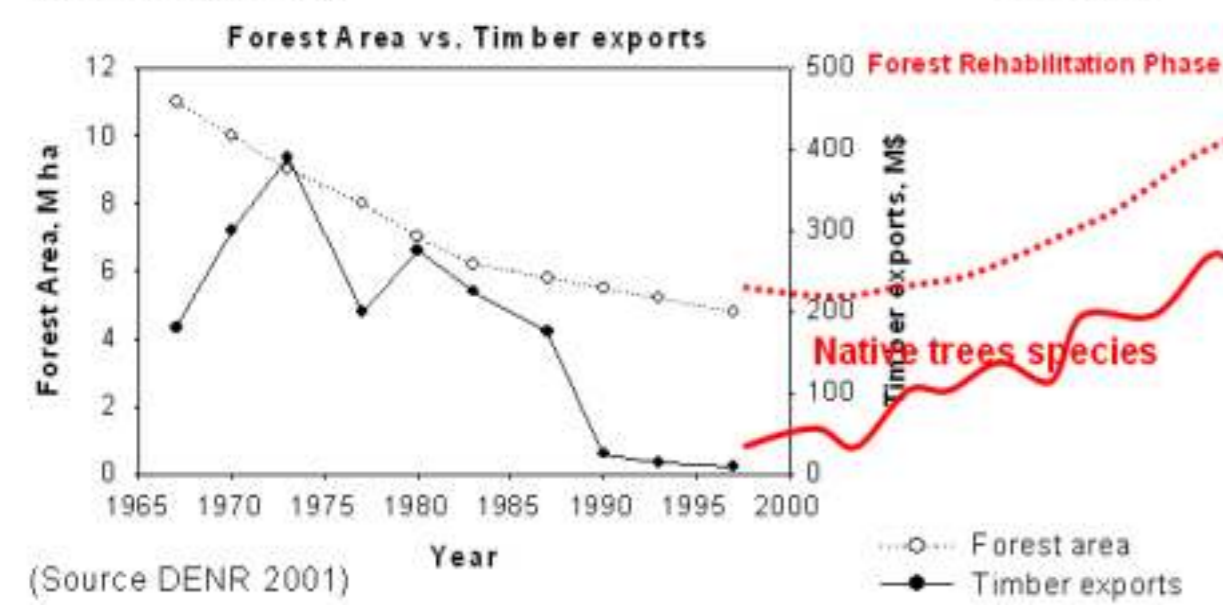
Overall SAFODS Hypothesis. "In tree-depleted tropical landscapes with poor soils farming systems purely based on annual food crops are not sustainable, but a transition into tree-based farming is feasible and offers better prospects"


Population vs. Forest Area — Forest Rehabilitation Phase
(Source DENR 2001)
- Population
- Forest Area

Forest Area vs. Timber exports — Forest Rehabilitation Phase
(Source DENR 2001)
- Forest area
- Timber exports

Farmers
Trees
Systems
Native trees species

Hypothesis	Objectives
I. The transition into tree-based farming systems has to be gradual and based on farmers priorities. Intercrop system with local timber trees species will allow for such transition and are compatible with farmers livelihood strategies;	1. Establish a farm typology for tree management activity identifies main constraints to agroforestation
II. A quantitative system for tree-by-site matching can be developed to assist farmer-specific choices from an array local trees options;	2. Test a simple set of indicators of suitable site quality that will help to better recognize and utilize landscape niches for selected trees species;
III. Tree-soil-crop simulation model allow the generation of a large number of site-specific hypotheses and farmer management strategies that allow more rapid progress in on-farm trials	3. Estimation and validation of aboveground biomass and tree architecture of most preferred indigenous timber species will allow and improve model simulation; 4. Develop an improved array of management options for transitions years that matches biophysical options to household level labor and capital constraints and management goals.
IV. Farmers management choices in agroforestry can be assisted by simplified representations of profitability and risk of a wide array of options	5. Analize profitability and risk (economical) for realistic farm situations.

Study Area: Province of Leyte, Central Philippines

Republic of the Philippines
Province of Leyte
Municipality of Baybay
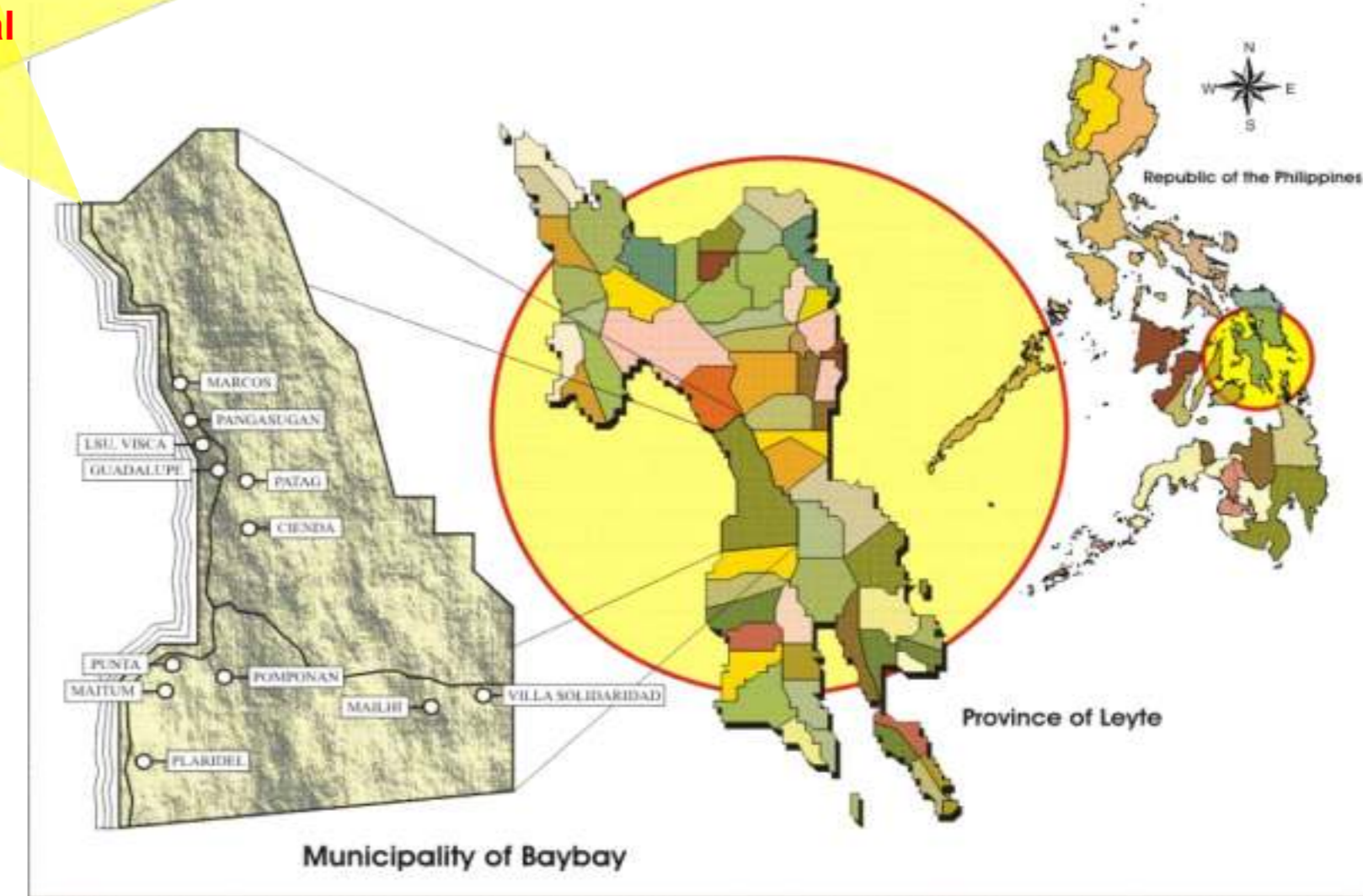
- 149 farmer interviewed
- Data was recorded into 4 layers of information:
  - Site description
  - Demographic and Cultural
  - Household physical resources
  - Economic situation

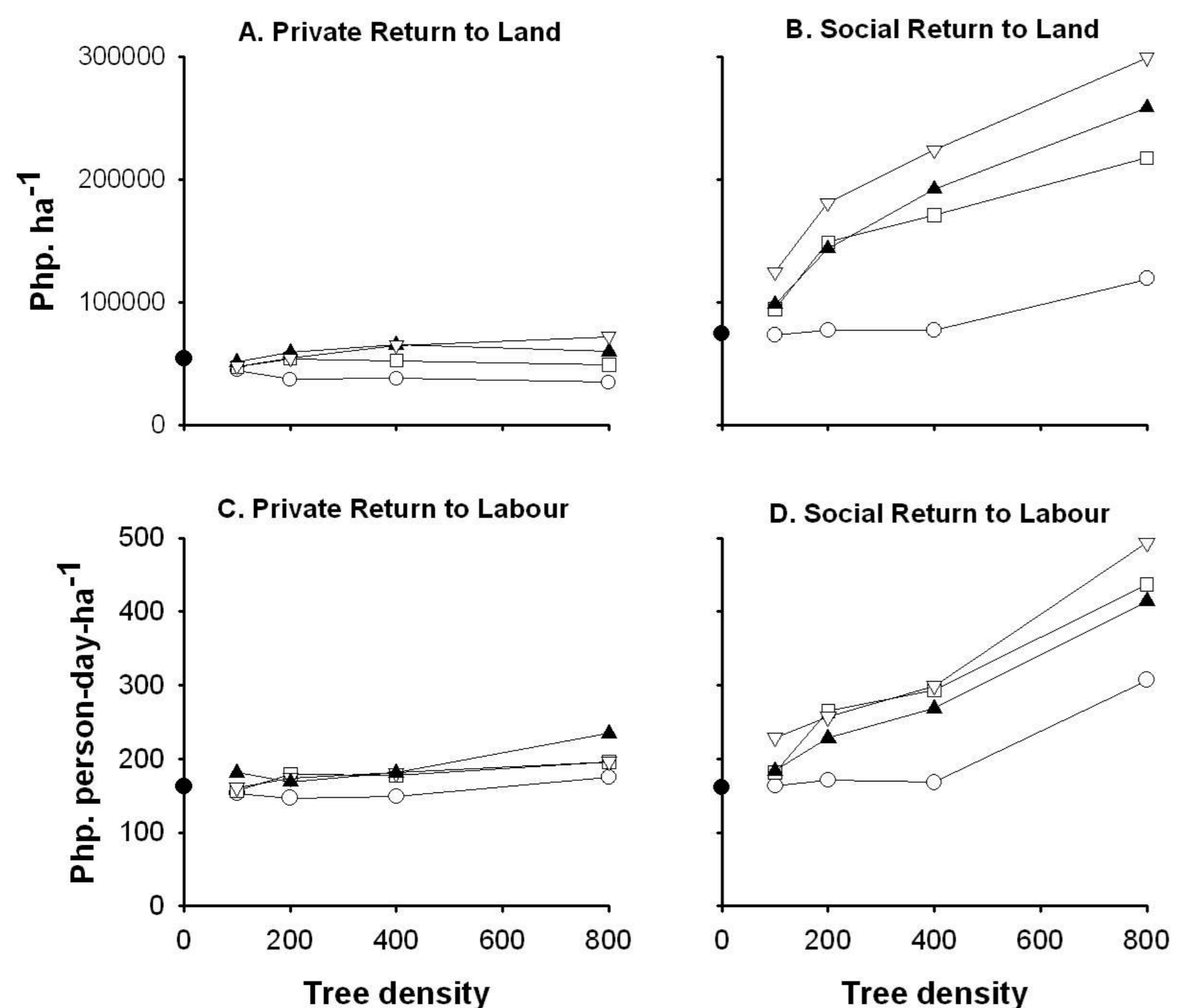| Tree Species	Number
Shorea contorta, White lauan (Dipterocarpaceae)	132
Vitex parviflora, Molave (Verbenaceae)	143
Pterocarpus indicus, Narra (Fabaceae)	127
Artocarpus heterophyllus, Nangka (Moraceae)	115
Dracontomelon dao, Dao (Anacardiaceae)	85
Afzelia rhomboidea, Tindalo (Caesalpiniaceae)	72

Local Knowledge on Indigenous Trees in Central Philippines
TSDBASE
- Input/Edit Farmer's Data
- Input/Edit Processor's Data
- Reports
- Queries
- Exit Database
Supported by: AECI EU
Fernando Santos, Marlon Natividad, Florante Sabejon

WHERE to plant timber trees across the agricultural Landscape?

A. Private Return to Land
Php. ha⁻¹

B. Social Return to Land

C. Private Return to Labour
Php. person-day-ha⁻¹

D. Social Return to Labour

Tree density

- ● Maize Monocropping
- ○ S. contorta intercrop
- □ V. parviflora intercrop
- ▲ P. indicus intercrop
- ▽ S. macrophylla intercrop

For the Philippines national economy, with its tax on wood, subsidy on maize and lower discount rate than smallholders experience, a gradual or drastic shift of the maize-based farming systems towards one based on high-value timber will substantially increase the expected net revenue flow

CONCLUSION OF THE THESIS

- If open-access forest still remains in the area, farmers don't plant timber trees.
- Land tenure, the level of land fragmentation and the total area managed have strong effects on farmers' attitude to plant timber trees. Cultural, demographic, labor availability and economic considerations didn't show a significant effect in the model.
- The three indigenous tree species differ in their growth performance and respond to "site" properties. Four site descriptors (land position, soil type, soil texture and soil chemistry) could account for 14-74% of variation in tree performance depending on the tree species.
- Substantial variation in tree performance could not be explained by the biophysical indicators, implicating that farmers take considerable risk in planting trees on the basis of current 'scientific' knowledge.
- The WanFBA model can be used as non-destructive tool to predicting above-ground tree biomass and its components (Wood and Leaves). The "b" factor of the tree biomass allometric equation has a substantial variation among tree species around the claims of a universal value of 8/3.
- According to WaNuLCAS scenarios there is considerable scope for intercroping with "slow" growing timber trees, with systems that yield about half of the maximum tree biomass still allowing 70% of monoculture maize yield.
- Higher tree densities will lead to a loss of maize yield that is proportional to the gain in wood volume opportunities. Trees directly benefit in an intercrop system from the input (i.e. fertilizer) that are applied to the crops.
- Pterocarpus indicus and Vitex parviflora stood out as promising "agroforestry" timber tree at intermediate densities. In a non-fertilization scenario intercropping or monocropping systems with Maize are not sustainable.
- Timber-based systems offer better returns to land and labor than monocropping activities, up to discount rates of at least 15%. Intercrop systems are well buffered from economic risk.
- Thus, a gradual transition from an annual food crop system to timber-based production systems adapted to the soil conditions can be attractive for farmers even at current prices

At current price levels and with the discount rate that smallholders experience, a gradual or drastic shift of the maize-based farming systems towards one based on high-value timber is just about neutral for the expected revenue flow

Policy failure...