

Saving the forest and small-holder farmers through income from yerba mate agroforestry?

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Yerba mate (*Ilex paraguariensis*)



Background

Small-holder farmers often rely on unstable cash flows to complement the household diet based on their subsistence crops. Agricultural activities which provide cash vary in their social and environmental consequences. Here we study whether yerba mate agroforestry can contribute a stable cash income while maintaining forest cover and associated ecosystem services.

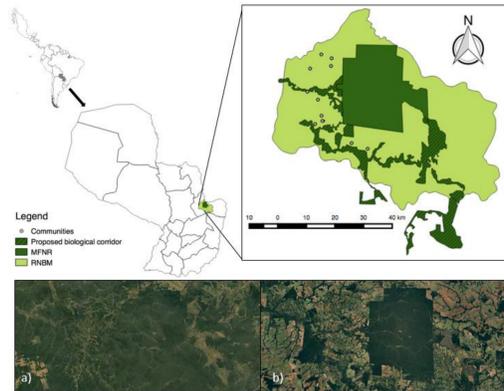


Figure 1. Location of the study site and deforestation process. The Mbaracayu Forest Nature Reserve (MFNR) is within the Mbaracayu Biosphere Reserve (RNBM); satellite images of the area covering the Mbaracayu Biosphere Reserve, a) 1984 and b) 2016.

Case study

An NGO has helped local communities establish a yerba mate AFS to prevent further deforestation and maintain biological corridors between forest patches in the Atlantic Rainforest of Paraguay.

Interactions

Due to labour, money and land constraints, farmers see land use diversification as the best strategy to manage their land. Farmer's imbalances include AFS as part of their diversification strategy. Farmers the limited economic benefit of the AFS with alternative land uses.

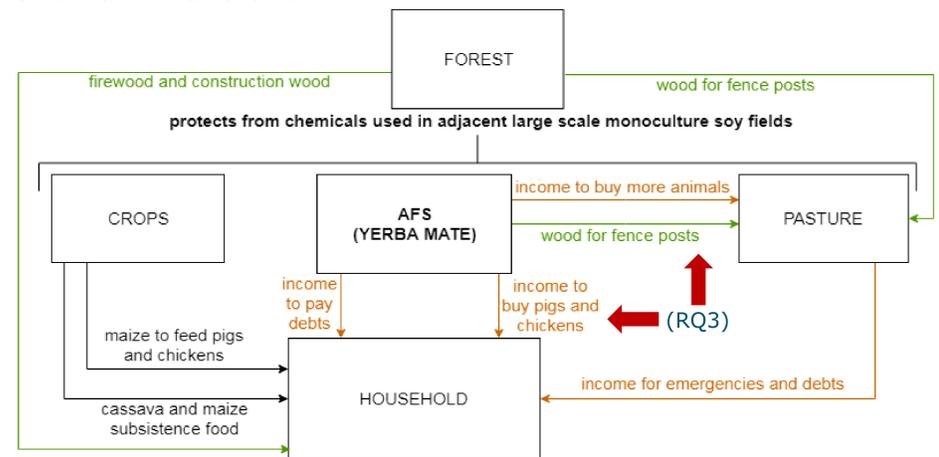
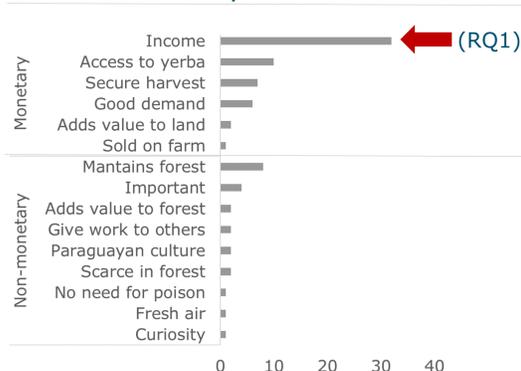


Figure 3. Interactions between small-holder land uses. Green= interactions between forests assets. Orange= interactions between cash income producing activities. Black= interactions between assets used for subsistence.

Research question	Data source
1) What are the motivations for farmers to adopt a yerba mate AFS? (RQ1)	Semi-structured interviews (n=35)
2) What are the motivations for farmers to maintain forest cover? (RQ2)	Semi-structured interviews (n= 35)
3) How are interactions between land uses perceived by farmers? (RQ3)	Semi-structured interviews (n= 35) Workshop (n= 9)

Results

Reasons to adopt



Reasons to not adopt

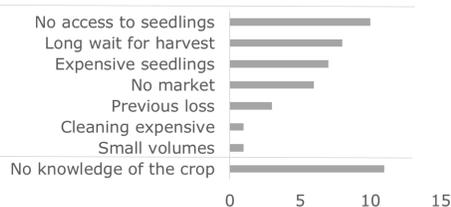
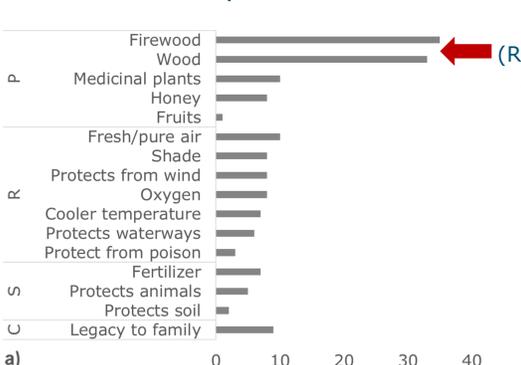


Figure 1. Motivations and reasons to not adopt yerba mate before the FMB project. Farmer's refer to agrochemical control against biological threats as poison. (n=35; open questions, multiple answers possible).

Reasons to keep forest



Reasons to clear forest

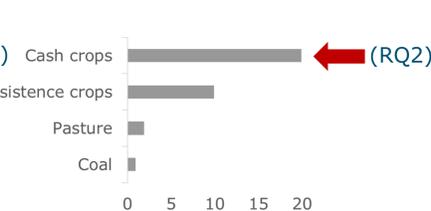


Figure 2. Farmer's motivations to clear and keep forest. a) Benefits from the forest perceived by producers arranged based on TEEB (2018) framework for ecosystem services. Poison refers to agrochemical control used in adjacent soy fields. P=provisioning, R=regulating, S=supporting, C=culture, b) Farmer's reasons to clear forest; (n=35; open questions, multiple answers possible).

Conclusions

- RQ1-Adoption:** Farmers adopted the yerba mate AFS mainly because of economic incentives. Monetary constraints for establishment of yerba and lack of knowledge were the main reason to not adopt yerba AFS. Farmers not necessarily comply with the NGO AFS project and have also chosen to grow yerba under non-shaded cultivation systems (intercrop YM and crops).
- RQ2-Forest maintenance:** Provision of wood and firewood are the main incentives for farmers to keep forest in their land. The main reason for forest clearance is to free land for cash crop production. Although farmers do recognize some regulating, supporting and cultural ecosystem services, they are not a priority in decision over land use.
- RQ3-Interactions:** Farmers value the interactions between tree-based systems (AFS and forest) and animal raising activities. Forest is as a source of wood for fences and income from AFS can be invested in expanding animal raising activities. Tree-based systems are also seen as protection against agrochemicals and the expansion of soy.
- Management implications:** The vegetation complexity and ecological integrity of the AFS depends on price differentiation of the yerba mate AFS product because, under their current socio-economic context, farmers search to maximize profit at the cost of maintaining non-provisioning ecosystem services. However, farmers do acknowledge the need for tree cover in their land. Thus, for nature conservation goals, it is more suitable to use AFS for degraded land restoration than to transform forests into AFS.

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References

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