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Biodiversity Conservation in Agroforestry Land-Use Systems: Combining Environmental and Development Goals

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Abstract

Establishing protected areas often generates high opportunity costs for the people living in these areas and, thus, leads to conflicts that impede the successful conservation of biological diversity. The integration of conservation aspects and poverty alleviation seems a promising strategy to reach environmental and development aims at the same time. Here, sustainable management of private-owned land becomes more and more important because of its potential to provide a variety of ecological goods and services for society. However, without payments for these services environmentally friendly land use often remains economically unattractive. Financial incentives might serve as a tool to achieve sustainable land-use management.

Our study focused on an economic comparison of different land-uses systems. A cost-benefit analysis of coffee, rice, maize, and pasture land use was conducted and farmers´ land allocation problems were studied in detail considering that net revenues and risks are major determinants for land-use decisions. Risk analysis techniques included Monte Carlo simulations and Stochastic Dominance. In this framework, we calculated opportunity costs of different land-use systems and analyse the impact of payments for environmental services in order to find minimum compensation payments for achieving pre-defined biodiversity targets. In case of legal conservation measures, such as the establishment of bio-corridors, opportunity costs of land-use restrictions can be compared.

When determining compensation payments that provide an incentive to maintain coffee production in biodiversity-rich systems, we found that the amount to be paid depends substantially on the production and income risk related to the respective land uses and on the 'portfolio' of different land uses a farmer holds.

The production of certified organic coffee in biodiversity-rich agroforestry systems is a promising way to improve the situation of small farmers in the region because **(i)** organised growers can achieve a more powerful position on the product market, **(ii)** the direct distribution channel avoids the participation of trading middlemen, and **(iii)** organic products have a higher price on international markets. This price could contain a 'biodiversity premium', and thereby finance the compensation payments required for maintaining biodiversity-rich land-use systems.

Keywords: Agroforestry land use, bio-corridors, biodiversity conservation, certified organic coffee

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