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Diversity, synergies and trade-offs between stakeholders' demands towards tree-related ecosystemic services

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Abstract

Agroforestry is widely promoted as a land-use option that can alleviate the environmental pressures of agriculture while enhancing the livelihoods of vulnerable rural households through the development of multifunctional landscapes. While a significant body of literature reveals existing ecosystemic services (ES) and disservices related to agroforestry practices, fewer studies explore the diversity of tree-provided ES demands among stakeholders. Understanding this diversity of demand and the potential synergies and trade-offs that may appear between diverging stakeholders is crucial for assessing tree-based practices attractiveness and designing multifunctional landscapes. This study aims to enhance the state of knowledge on local demands related to trees and their translation into land management within a case study in semi-arid zone of Embu County in Kenya.

We conducted 80 surveys with a panel of stakeholders to examine, the relationship between (i) stakeholders' demands for ecosystem services supplied by trees (e.g., soil fertility, water regulation, fuelwood, fruit production), (ii) their opportunities and constraints related to their socio-economic and agro-environmental characteristics, and (iii) their current agroforestry practices. Using cluster analysis, respondents are grouped according to their ecosystemic-service-demand profiles to generate a typology. These profiles reveal that stakeholders with similar characteristics may prioritise different ecosystem services, leading to divergent strategies concerning trees, and resultant trade-offs across space (plot, farm, landscape) and time (short- vs. long-term) scales.

The results highlight that the perceived importance of specific ES is central in shaping agroforestry decisions, potentially outweighing conventional socio-economic predictors. A multiscale, systems-based approach that adapts incentives, technical assistance, and institutional support to diverse demand-type groups is required to reconcile competing interests and promote AF uptake across heterogeneous rural landscapes.

Keywords: Agroforestry, ecosystemic services, multifunctional landscape, stakeholders demands, trade-offs

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