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Unveiling drivers of cocoa agroforestry adoption intensity and ecological and socio-economic outcomes in West Africa

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Abstract

To address climate change, biodiversity loss and social inequities in rural areas, transitions toward sustainable agricultural practices are urgently needed. In the West African cocoa sector, efforts to promote cocoa agroforestry, the integration of trees on farms, often assume that the factors motivating farmers to adopt agroforestry are the same as those shaping the extent to which they integrate shade trees into their farms. However, policy debates rarely interrogate these distinctions or the ecological and socio-economic trade-offs that arise once farmers move beyond initial adoption. Drawing on 305 household-level data from smallholder cocoa producers and 122 biomass plot surveys, this study investigates whether the drivers of agroforestry adoption are similar to the drivers of agroforestry adoption intensity and subsequently assesses how the socio-economic and ecological outcomes are affected by these adoption decisions within existing complex agroforestry systems in South-east Côte d'Ivoire. The findings reveal that distinct processes drive adoption and adoption intensity. Labour availability and perceived agroforestry knowledge encourage farmers to adopt agroforestry practices in the first place. However, the degree to which farmers subsequently increase shade levels is shaped primarily by the household head's education and perceived environmental benefits. These results underscore that initial uptake does not necessarily translate into deeper engagement with agroforestry, and that different capabilities, knowledges, and expectations influence farmers' decisions across adoption stages. The analysis also demonstrates that adoption intensity produces both synergies and trade-offs. High shade cover can reduce cocoa revenues, revealing the economic constraints farmers face when pursuing ecologically beneficial outcomes. However, higher adoption intensity simultaneously yields substantial carbon and biodiversity benefits, showing that cocoa agroforestry holds considerable potential for broader environmental governance agendas. Despite these ecological gains, the contribution of shade-tree product sales to household incomes remains marginal, pointing to underdeveloped markets and the suboptimal configuration of existing agroforestry systems for income diversification. Taken together, the results highlight the need for policies that move beyond recommendations limited to shade cover and instead support diversification of shade species, development of high-value tree markets, and integration of smallholders into emerging climate and biodiversity market schemes, such as carbon markets and payment for ecosystem services.

Keywords: Adoption, agroforestry, cocoa, Cote d'Ivoire, intensity, trade-offs

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