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Do trees grow better on certified land? evidence from a smallholder programme in Madagascar

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Abstract

This paper examines whether land rights formalisation enhances the effectiveness of reforestation programs. Specifically, we ask whether securing a land certificate (i) improves tree growth on reforested plots and (ii) affects associated socio-economic outcomes. We study the Programme de Lutte Anti-Érosive (PLAE), a smallholder forest restoration initiative implemented in northern and northwestern Madagascar between 2014 and 2019. Drawing on primary household data collected in 2024 and combined with geospatial and administrative data, we employ a quasi-experimental approach to estimate the program's medium-term effects. For our identification strategy, we exploit the fact that due to a lack of transparent land tenure system neither programme implementers nor programme participants were systematically aware of the presence and extent of overlapping historical land titles at programme onset. These titles were issued during the colonial and early post-colonial periods and reflect the legacy of successive land tenure reforms implemented in Madagascar since the colonial era. Combined with other legally obsolete land statuses, these historical titles now present a significant barrier to land certification. We use the share of reforested plots overlapping with these historical titles at the fokontany—or Madagascar's lowest administrative subdivision—level as an instrument for individual land certification success.

Our instrumental variable estimates show that land certification substantially improves tree growth outcomes on reforested plots: at the fokontany level, a 10-percentage point increase in the share of beneficiaries with land certificates is associated with around three percentage point increase in the tree canopy cover change as captured by remotely sensed data. In parallel, we observe increases in self-reported tree growth among households that managed to obtain a land certificate for their reforested area. However, certification is also associated with a higher incidence of tree theft, potentially reflecting heightened social tensions. Beyond these environmental impacts, we find weak evidence of certification's effects on household socio-economic outcomes, including the wealth index and access to formal banking. Overall, our results underscore the potential of land certification to incentivize long-term reforestation investments, while also highlighting its limitations in improving broader socio-economic outcomes without complementary interventions.

Keywords: Land certification, reforestation, smallholders, tenure reform

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