



## GENDER AND FOREST RESOURCE MANAGEMENT: A COMPARATIVE STUDY IN SELECTED AREAS OF ASIA AND AFRICA

POLICY BRIEF

### LAND TENURE AND FARM MANAGEMENT EFFICIENCY: THE CASE OF PADDY AND CINNAMON PRODUCTION IN CUSTOMARY LAND AREAS OF SUMATRA

*S. Suyanto, Thomas P. Tomich, and Keijiro Otsuka*

This study attempts to identify the impacts of land tenure institutions on the efficiency of farm management based on a case study of lowland paddy rice and upland cinnamon production in the Kerinci Valley in West Sumatra, where most of Indonesia's cinnamon is produced. The attractiveness of cinnamon as a commercial crop has implications for forest preservation. Kerinci Valley is an enclave surrounded by the Kerinci Seblat National Park, one of the largest parks in Sumatra. The highest plant biodiversity richness measured to date *anywhere in the world* recently was recorded in areas surrounding this park. Expansion of cinnamon area by clearing forest land therefore occurs at the expense of forest and biodiversity conservation.

*Land tenure institutions.* Our study was conducted in two typical cinnamon-growing villages in Kerinci District in Jambi Province. Farming households in these areas cultivated paddy rice and upland cinnamon fields, a considerable number of which were intercropped with coffee. Bush-fallow fields, which accounted for a small proportion of area, were generally located in areas far from village centers and were planted to food crops in the distant past. There were a variety of land tenure institutions in lowland paddy fields, ranging from joint-family ownership to private tenure and to share and fixed-rent tenancy. The traditional matrilineal inheritance system (joint family tenure, with inheritance by daughters) has almost completely given way to inheritance by daughters and sons alike, in both joint-family and single-family ownership systems. In contrast, land tenure institutions of cinnamon fields were much more individualized. Individual land rights on upland fields were strong because the effort to plant and grow trees traditionally has been rewarded by strong individual land rights in Sumatra.

*Comparing cinnamon and paddy rice.* In order to analyze how the prevailing land tenure institutions affect the profitability of cinnamon and paddy production, we estimated residual profit, defined as gross revenue minus

both actual and imputed costs of hired and family labor, and current and capital inputs. Gross value of output, total cost, and residual profit in paddy production do not differ significantly across land tenure types. Consistent with findings that land tenure institutions do not affect crop yields in customary land areas of some Sub-Saharan African countries, prevailing land tenure institutions do not affect farm management efficiency. Neither do land tenancy contracts distort work incentives. Households' endowments of land and labor do not affect profitability, indicating that factor markets, including land rental and hired labor markets, function well. That is, a household with more labor or less land could easily hire labor out or enter into a share-tenancy contract to acquire land for cultivation.

Gross revenue, costs and residual profit for young cinnamon are highly dependent on the age of trees. For productive cinnamon fields, potential value and profit decline with altitude since trees grow less well and water content of bark tends to be higher at higher altitudes within the Kerinci Valley. Neither the factor endowment variables nor private land tenure, share tenancy, or borrowing arrangements have significant effects on potential value, total cost, and potential profit. Thus, we conclude that customary land tenure institutions have been sufficiently individualized to ensure tenure security and that factor markets work well in customary land areas.

*Internal rate of return.* In order to assess the profitability of investments in cinnamon trees, we computed the internal rate of return by land tenure type. The estimates of internal rates of return are 42 percent for single-family ownership, 29 percent for private ownership through purchase, and 31 percent for private ownership through clearance of forest. While these estimates are not significantly different from each other, their magnitude is quite large, which indicates that cinnamon is quite profitable. The high profitability of cinnamon production is consistent not only with the expansion of cinnamon areas in Kerinci,

S. Suyanto and Thomas P. Tomich are with the International Centre for Research in Agroforestry and Keijiro Otsuka is with Tokyo Metropolitan University and the International Food Policy Research Institute. This policy brief is from one of six papers prepared by the International Food Policy Research Institute for a research project on "Gender and Forest Resource Management: A Comparative Study in Selected Areas of Asia and Africa" submitted to the United Kingdom Department for International Development. Copies of the paper and additional briefs are available from Cristina A. Quintos at [c.abad@cgiar.org](mailto:c.abad@cgiar.org).

but also with the transformation of the customary land tenure system towards individualization, which is conducive to investment in trees. These high rates of return on investment may be partly due to lack of access to credit since the lack of land titles makes it difficult to use land for collateral when applying for loans. However, the most likely explanation is restricted access to new land for cinnamon planting.

*Policy Implications.* Traditional land tenure institutions in customary land areas of Sumatra have evolved to achieve farm management efficiency comparable to private ownership in both lowland paddy and upland cinnamon production. The efficient management of cinnamon fields under single-family ownership suggests that sufficiently strong incentives to invest in management of agroforestry are provided under this newly emerging ownership system. Furthermore, the estimated internal rates of return to investment in cinnamon trees indicate that investment in cinnamon trees has high payoffs. Thus, uncultivated bush-fallow land has largely disappeared and has been replaced by more intensive use of land through tree planting in our study sites. Moreover, the conversion of bush-fallow land to cinnamon fields was facilitated by the individualization of customary land tenure systems.

Land rental and labor markets effectively allocate resources efficiently among households endowed with different proportions of land and labor. Tenure security established under the prevailing land tenure institutions is likely to have contributed to the formation of smoothly functioning factor markets because security of ownership is a prerequisite for efficient factor market transactions.

In sum, the evolution of customary tenure institutions and factor markets seems effective in achieving a financially efficient allocation of resources in the short run and accumulation of investments in agroforestry trees over time. At present, property rights in land (and trees) are well recognized and respected among community members, so that there does not seem to be much room for improving investment incentives by strengthening individual rights within these indigenous societies. However, in the long run, a land titling program may be necessary to further enhance management efficiency. Due to the lack of official titles, land cannot be used as collateral for credit from formal financial institutions. But there also are important questions about the administrative feasibility and cost effectiveness of formal land titling at this time in Indonesia. Moreover, expansion of formal credit institutions into these relatively remote areas is likely to be a slow process, which further undermines the urgency of efforts to establish formal land titles.

The high rates of return to investment in cinnamon production in the study area result from efforts by the Forestry Department to restrict conversion of natural forest in the park combined with the significant share of world cinnamon supply produced in the study area. Restriction of expansion of cinnamon production in the Kerinci Valley, which accounts for roughly a third of world supply of the spice, and growing world demand have increased prices. In turn, higher prices have caused farmers to experiment with planting cinnamon in other parts of Sumatra and Borneo, often at elevations much lower than the Kerinci Valley and sometimes converting forestland that is not as suited to cinnamon production. It is possible that efforts to save

forestland in the Kerinci Seblat National Park may be offset (at least partly) by forest conversion elsewhere in Indonesia.

Institutional innovation by local communities can establish efficient incentives for production and investment from a private, financial perspective. But it is unrealistic to expect local communities also to supply substitutes for natural forests' many ecological and environmental services, including abatement of negative environmental externalities of land use change (flooding, siltation, and smoke that impedes aviation and harms public health) and global public goods (carbon sequestration and biodiversity conservation). In this case, local farmers' opportunity costs of leaving forests untouched are extremely high. Moreover, no effective mechanism yet exists to compensate these farmers directly for production and investment opportunities foregone in favor of natural forest conservation. The search for workable, incentive-compatible institutional mechanisms that can clarify, monitor, enforce, and compensate for a more socially optimal mix of agricultural production and environmental services should thus be a high priority of policymakers.

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