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On the palm oil-biodiversity trade-off: Environmental performance of smallholder producers*

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Abstract

Oil palm remains an important source of rural income in South East Asia. At the same time, Indonesia has become a hotspot for large-scale species extinction and a loss of biodiversity in favour of agricultural production. The present study sets out to assess the environmental performance of smallholder oil palm production with respect to biodiversity. Using a panel dataset that combines conventional farm data together with an account of plant diversity, we estimate a restricted hyperbolic environmental distance function. We integrate loss of biodiversity as an undesirable output into the production model which allows explaining shortfalls in environmental performance and the derivation of shadow prices of biodiversity conservation. We find a substantial environmental inefficiency, which is partly explained by both chemical and manual weeding practices, highlighting the potential for improvements in both the environmental and the economic dimension. Moreover, the value for conserving one species of the average biodiversity on a farmers plantation was 340 USD in 2018. Payments for ecosystem services schemes could be a viable policy response to conserve meaningful levels of biodiversity while simultaneously allowing smallholders to increase palm oil output. In general, addressing drivers of environmental performance in PES designs amplifies its effect without reducing production levels.

Keywords: Palm oil, Biodiversity, Environmental performance, Shadow price, Hyperbolic distance function

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