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Articles

LINKING DEFORESTATION SCENARIOS TO POLLINATION SERVICES AND ECONOMIC RETURNS IN COFFEE AGROFORESTRY SYSTEMS

J. A. Priess^{1,4}, M. Mimler¹, A.-M. Klein², S. Schwarze³, T. Tschardtke², and I. Steffan-Dewenter²

¹Center for Environmental Systems Research, Kassel University, Kurt-Wolters-Strasse 3, 34109 Kassel, Germany

²Department of Crop Science, Agroecology, Georg-August University, Waldweg 26, 37073 Göttingen, Germany

³Institute of Rural Development, Georg-August University, Waldweg 26, 37073 Göttingen, Germany

The ecological and economic consequences of rain forest conversion and fragmentation for biodiversity, ecosystem functioning, and ecosystem services like protection of soils, water retention, pollination, or biocontrol are poorly understood. In human-dominated tropical landscapes, forest remnants may provide ecosystem services and act as a source for beneficial organisms immigrating into adjacent annual and perennial agro-ecosystems. In this study, we use empirical data on the negative effects of increasing forest distance on both pollinator diversity and fruit set of coffee to estimate future changes in pollination services for different land use scenarios in Sulawesi, Indonesia. Spatially explicit land use simulations demonstrate that depending on the magnitude and location of ongoing forest conversion, pollination services are expected to decline continuously and thus directly reduce coffee yields by up to 18%, and net revenues per hectare up to 14% within the next two decades (compared to average yields of the year 2001). Currently, forests in the study area annually provide pollination services worth 46 Euros per hectare. However, our simulations also revealed a potential win-win constellation, in which ecological and economic values can be preserved, if patches of forests (or other natural vegetation) are maintained in the agricultural landscape, which could be a viable near future option for local farmers and regional land use planners.

Keywords: [bee diversity](#), [Coffea arabica L.](#), [crop yield](#), [ecosystem service](#), [forest margin areas](#), [land use and land cover change \(LUCC\) model](#), [net revenues](#), [policy scenario](#), [rain forest](#), [spatial modeling](#)

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