

Cleary K, Shaver I, Chain-Guadarrama A, Sanfioenzo A, Santiago-García R, Finegan B, Hormel L, Sibelet N, Vierling LA, Bosque-Pérez N, DeClerck F, Fagan M, Waits L, 2017. Coupled social and ecological systems in tropical agricultural regions: quantifying linked outcomes of agricultural intensification. In. *American Association of Geographers, 5-9 April 2017*, 5-9 April 2017, Boston, MA, USA. <http://meridian.aag.org/callforpapers/program/AbstractDetail.cfm?AbstractID=82914>

Title:

Coupled social and ecological systems in tropical agricultural regions: describing and quantifying linked outcomes of agricultural intensification

is part of the Paper Session:

Dynamics of Coupled Natural and Human Systems Panels: Models, Feedback, Analyses, and Outcomes (IV)

on Wednesday, 4/5/2017 at 14:40 PM.

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Abstract:

Conversion of tropical ecosystems to agriculture over the past century has created patchwork landscapes of agriculture and remnant forest where stakeholders struggle to balance production and conservation. Recently, agricultural intensification in these landscapes has been replacing heterogeneous mixtures of smallholder crops with intensive, large-scale monoculture plantations of export crops such as oil palm, soybeans, and pineapple. We develop an interdisciplinary approach to examine the coupled social and ecological implications of this process in an agricultural landscape in Costa Rica, with broader application to regions experiencing similar patterns of intensification. We hypothesize that the spread of intensive monoculture pineapple plantations is driving demographic and economic change in local communities, affecting the structure and function of remnant forest, and contributing to the decoupling of social and ecological resilience. To test these hypotheses, we develop a conceptual model linking social and ecological systems, and identify qualitative and quantitative measures to characterize the strength and resilience of these links. We employ methods from political and landscape ecology to collect empirical field data for each measure, and integrate

these data to: (1) describe social and economic implications of pineapple expansion, (2) quantify the spatial characteristics of pineapple cultivation, (3) assess the effects of pineapple expansion on biodiversity conservation. Findings are presented back to stakeholders in a series of workshops to strengthen the weak but critical feedback from ecological to social systems. This research answers the urgent call to develop interdisciplinary approaches to understand the complex patterns and processes that drive coupled social and ecological systems.

Keywords:

[social-ecological systems](#), [agricultural intensification](#), [tropical agriculture](#), [conceptual model](#)