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"Reconcile land system changes
with planetary health"

Conciliating agriculture and biodiversity conservation in mozambican sky islands: do farming systems matter?

Vera Soares[1], José Lima Santos[2], Paulo Flores Ribeiro[3]

[1]*School of agriculture, University of Lisbon, Forest Research Center, Portugal*
[2]*School of agriculture, University of Lisbon, Forest Research Center,*
[3]*School of agriculture, University of Lisbon, Forest Research Center,*

Abstract

Mount Namuli, a sky island in Mozambique is a biodiversity hotspot, home to a rich variety of plant and bird species and surrounded by diverse farming systems that interact closely with its natural landscapes. This study investigates how farming systems affect biodiversity, with a particular focus on plants and birds, using nation-wide data and data collected during 2023 fieldwork in Mount Namuli.

At both national and local levels, farming system types show no clear differences in land-use characteristics, such as chemical inputs, that would make some inherently more wildlife-friendly under a land-sharing model. However, biodiversity declines sharply along the deforestation gradient, suggesting that promoting farming systems with the highest land productivity could help limit farmland expansion and support conservation through a land-sparing approach.

Notably, the most productive farming systems - such as potato producers in Mount Namuli - are associated with better food security and poverty outcomes, though these improvements still hover just above the extreme poverty line. Paradoxically, these same systems are also most strongly linked to deforestation in biodiversity-rich ecosystems, as their productivity often depends on recently cleared land.

Importantly, we also found that farming systems with tree crops increase the proportion of tree-dependent bird species, suggesting that some systems can offer biodiversity benefits, including ecosystem services such as pest predation, even if their overall contribution to conservation remains limited. Therefore, it is crucial to develop indicators that capture multiple dimensions of biodiversity, as these dimensions respond differently to farmland expansion and farming system types.

Overall, our findings indicate that none of the existing farming systems successfully balance food security and biodiversity conservation. Developing more sustainable compromise systems will require site-specific agronomic research and active participation from local farmers to ensure both ecological and livelihood benefits. While landscape structure emerges as a dominant factor shaping biodiversity patterns, understanding the nuanced and context-dependent roles of farming systems is crucial for certain species groups and ecosystem services. These insights provide valuable guidance for designing agricultural strategies that can reconcile food production with long-term biodiversity conservation, not only in Mount Namuli but also in other developing regions facing similar challenges.

Contact Address: Vera Soares, School of agriculture, University of Lisbon, Forest Research Center, Travessa das necessidades 8a, 1350-221 Lisbon, Portugal, e-mail: vera.f.soares@hotmail.com

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