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## Agroforestry Systems for Improved Food Production and the Restoration of Other Ecosystems Services in the Dry Corridor in Nicaragua

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### Abstract

The provision of food and other key ecosystem services in the rural landscapes of the dry corridor in Central America are increasingly at risk as a result of unsustainable management practices, high potential of soil degradation and a changing climate. A promising farming strategy to restore the provision of ecosystem services is the use of agroforestry systems (AFS) that combines crops/pastures and trees to improve the functioning of agroecosystems (e.g. biomass production, soil and water retention, biodiversity). It remains difficult to adopt AFS in the field because they can generate trade-offs between ecosystem services, as well as between limiting resources including labour, water and nutrients at plot and farm levels. The objective of this study was to design, implement and monitor with farmers and other partner the impact of AFS on food production and the provision of other key ecosystems services in two sites in the dry corridor of Nicaragua. On-going research shows that combining AFS with crops and pastures can maintain or even improve food ( 20% more for bean production) and livestock production ( 30% more milk production), while maintaining landscape tree biodiversity, C sequestration (between 5–20 t ha<sup>-1</sup>) and soil retention. The magnitude of these results depends on the degree of agricultural intensification of farming systems related to their agroecology and market integration. Close interaction with farmers and other partners in the implementation and monitoring of more sustainable farming systems is essential for building common knowledge on social-ecological systems, as well as for facilitating the adoption and adaptation of technologies by farmers. A major challenge remains concerning how farmers could benefit from ecosystem services that have advantages for a larger population in emerging economies, where payment for ecosystems services is rare.

**Keywords:** Biodiversity, livestock production, smallholder farming, soil degradation, sub-humid tropics