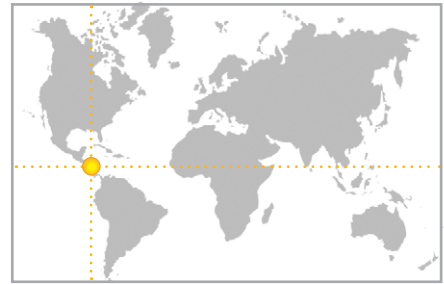


The Ecoagriculture Snapshots series highlights the work of different organizations around the world to implement ecoagriculture landscape management approaches.

Paying for Silvopastoral Systems in Matiguás, Nicaragua



The conversion of natural forests to pasture is a major driver of biodiversity loss and land degradation in Latin America. Expansion of livestock production continues to put pressure on remaining forested areas while decreasing the productive capacity of these landscapes.

The Matiguás–Río Blanco area in Nicaragua is located in a biological corridor. It harbors several threatened tree species, as well as mixed vegetation from the Atlantic and Pacific regions. The area is relatively dry, hilly, and is dominated by pasture land. The rest is heavily fragmented secondary forest, “charrales” (shrublands), and crop lands with annual crops, semi-permanent crops, fruits and monoculture tree plantations.

About half of the area’s 42,000 inhabitants are rural, depending primarily on livestock and dairy production. Most land holdings are small and medium-sized, ranging from 10–30 hectares. Almost all households are poor, and 71% of the local population falls below the poverty line, with an average per capita income of US \$340. Land degradation from unsustainable cattle ranching is a problem that affects both the environment and local livelihoods.

A more sustainable alternative is silvopastoralism -- a practice that combines pasture with increased tree cover in the form of forest patches, riparian vegetation, live fences, and trees in pastures. Silvopastoral systems provide important environmental benefits including carbon sequestration, watershed protection, and habitat for native plant and animal species. They can also increase farm profitability by providing animal feed, shade for livestock, and a variety of wood and non-wood tree products.

Between 2003 and 2007, the Regional Integrated Silvopastoral Ecosystem Management Project piloted the



Degraded pasture in Matiguás, Nicaragua. Source: Stefano Pagiola

use of payments for ecosystem services (PES) to promote biodiversity conservation and carbon sequestration by encouraging the adoption of silvopastoral practices in degraded pastures at three sites in Colombia, Costa Rica and Nicaragua. The project was financed by a grant from the Global Environment Facility (GEF) with the World Bank as the implementing agency and the technical support of FAO’s LEAD program. In Nicaragua, it was implemented by Nitlapan, an NGO affiliated with the Central American University, with the assistance of CATIE.

Although some farmers in the area were already using silvopastoral practices before the project started, about 63% of the area was under extensive pasture with minimal tree cover. Most farmers had difficulty adopting silvopastoral practices because of relatively high starting costs, prevalent perception of low profitability and the time lag between investment and returns. The project introduced PES to overcome these start-up difficulties, by paying land users for adopting silvopastoral practices.

To provide payments proportional to the level of



Improved pasture with high tree cover in Matiguás, Nicaragua. Source: Stefano Pagiola

services provided, the project developed indices of biodiversity conservation and carbon sequestration under different land uses and then aggregated them into a single 'environmental services index' (ESI). For example, the most biodiversity-poor land use (annual crops) was set at 0, and the most biodiversity-rich land use (primary forest) was set at 1. For carbon sequestration, the capacity of different land uses to sequester stable carbon in the soil and in hard wood was used to establish the index. One point on the scale represents about 10 tons of carbon/ha/year. The simplicity of the ESI gives land users a clear picture of what to include in their lands to earn the most payments.

Farmers received initial baseline payments of US \$10 per point on the ESI in 2003, and additional payments of US \$75 per incremental point according to land-use changes made in 2004 and 2005. The project also undertook very detailed monitoring at all sites to measure the actual biodiversity and carbon sequestration benefits, in addition to productivity measures.

In Matiguás, the PES scheme encouraged farmers to increase the use of silvopastoral systems in more than 24% of the total project area. The area of degraded pasture fell by two thirds, while pastures with high tree density increased substantially, as did fodder banks and live fences. The overall landscape impact was an increase in the effective forest cover to 31% across the

landscape, while landscape connectivity also increased significantly with over 67% of forest fragments connected to adjacent forest fragments by at least one route (of live fences).

The impact of the project on the welfare of participants is more difficult to assess. It was anticipated that by the time payments ended, the silvopastoral practices themselves would begin to generate additional income for land users. Although some PES recipients reverted to pre-project land uses once payments ended, most have been pleased with the increased productivity of the new silvopastoral approaches and are keeping the improved pasture systems. The municipal government has also introduced a new policy that grants tax relief to producers using silvopastoral systems.

Apart from PES, the future certification of "green" beef and dairy products holds promise for increasing the income generated by silvopastoral systems, if entry barriers (for example, meeting hygiene standards) can be overcome.

The main challenge for the future is to develop sustainable funding sources to continue the PES scheme. An added difficulty is institutional weaknesses, for example, a lack of continuity at the level of local government and a lack of producers associations. It is necessary to overcome this weakness by establishing a support infrastructure that can help farmers understand and adopt silvopastoral practices on a larger scale.

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Prepared by Karin Svadlenak-Gomez. For more information see:

- González López, M., et al. 2007. Gestión territorial en Matiguás, Nicaragua: un aporte al enfoque productivo y ecosistémico.
- Pagiola S., et al. 2005. Paying for Biodiversity Conservation Services. *Mountain Research and Development* 25(3): 206-211.
- Pagiola, S. et al. 2007. Paying for the Environmental Services of Silvopastoral Practices in Nicaragua. *Ecological Economics* 64(2): 374-385.

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