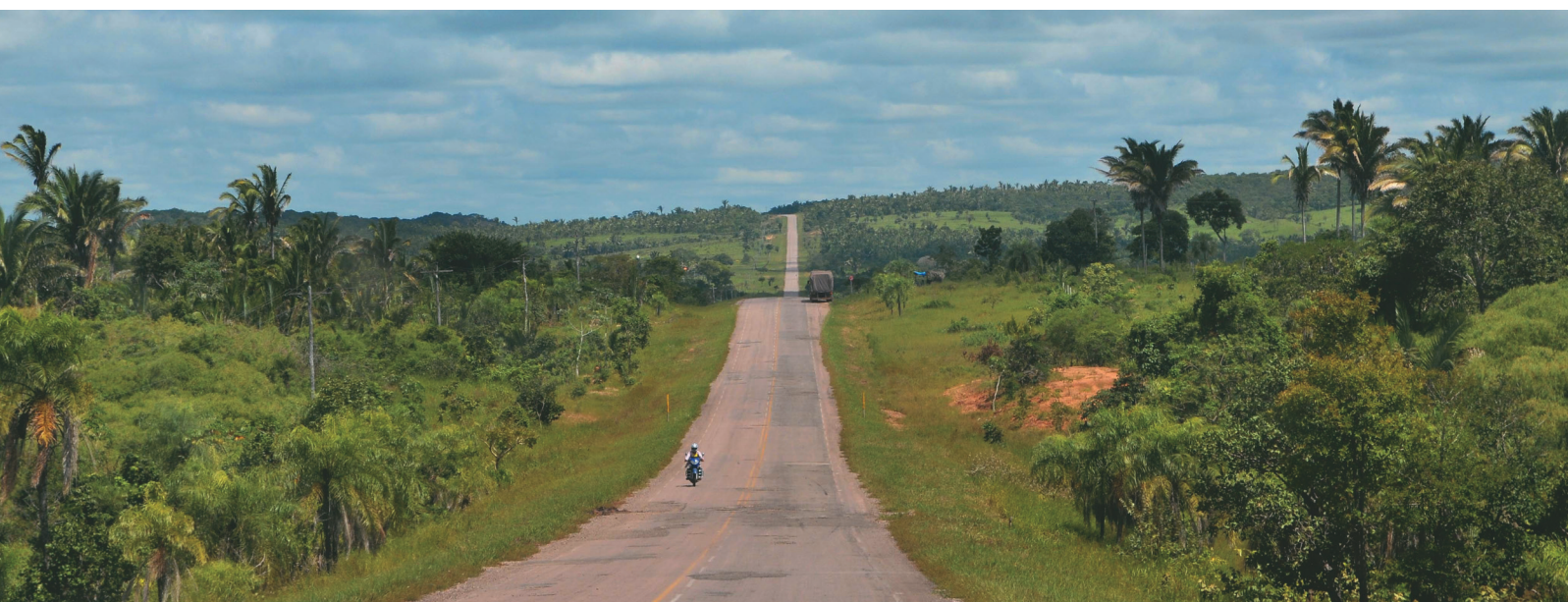




The Amazon Basin, home to approximately half of the world's tropical forests and a quarter of global biodiversity, has experienced alarming rates of deforestation, land degradation, and loss of ecosystem services since the 1960s. These processes have largely been driven by unsustainable, low-productivity agriculture, which has left a legacy of persistent rural poverty and over 30 million hectares of abandoned or severely degraded land. The vast deforested and degraded regions of the Amazon are in great need of restoration by 'eco-efficient' land use alternatives that efficiently utilize resources to produce sustainable livelihood benefits while also providing environmental services.

Promising examples of eco-efficient agriculture that have the potential to restore Amazonian landscapes include production systems such as improved fallows, multistory agroforestry systems, silvo-pastoral systems, and improved pastures. Although uptake of these strategies in the Amazon remains low, opportunities to promote these more sustainable land uses are quickly emerging, as concern for environmental issues increases, new markets for environmental services open up, consumer interest in niche and novel products rises, and market access improves. CIAT is working to improve the environmental and socioeconomic conditions in the Amazon by developing eco-efficient options for restoring degraded landscapes and by supporting the long-term success of these land use alternatives.

Developing options for Amazonian restoration

Measuring eco-efficiency and understanding its drivers

Knowledge gaps regarding the conditions that lead to eco-efficiency, and systematic methods for measuring it, are major hurdles to the design and development of productive, sustainable Amazonian landscapes. CIAT has recently been working to resolve these research needs by analyzing how a wide range of socioeconomic, landscape, and biodiversity variables influence carbon sequestration, hydrological functioning, soil fertility, and agricultural production in the Amazon. This work has contributed to the development of practical methods for measuring eco-efficiency and guiding landscape restoration in the basin.

Examining the connections between land use, soil functioning, and eco-efficiency

Amazonian soils play a key role in influencing agricultural productivity and the provision of environmental services such as carbon sequestration and hydrologic functioning. Perhaps one of the greatest challenges to eco-efficient land use in the Amazon is the ease with which the region's soils are degraded by poor land management. CIAT's extensive experience in investigating the relationship between land use and soil functioning in the Amazon is a valuable asset for developing alternative land use options that address soil degradation in the region.

Supporting the success of alternative production systems

Optimizing production systems for today and tomorrow

Eco-efficient agricultural systems in the Amazon often face biophysical constraints on production that limit their economic viability, and hence, adoption. In order to relieve these constraints, research must further the development of high-quality germplasm and methods for controlling pests and diseases. These research fields have been cornerstones of CIAT's activities since its establishment in 1967. The center's work in this area currently focuses on a number of the Amazon's most important crops (e.g., cassava, rice, forages, and tropical fruits).

While there is clearly great value in addressing the production constraints currently facing eco-efficient agricultural systems in the Amazon, it is becoming increasingly evident that the sustained productivity of these systems relies on their successful adaptation to the challenges of progressive climate change. CIAT is a global leader in anticipating the impacts that climate change will likely have on tropical agriculture and developing adaptation strategies to meet these challenges. This work is critical to ensuring that the eco-efficient land use alternatives promoted today will continue to thrive in the context of climate change. As the leading research center of the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), CIAT is well positioned to expand the scope of these studies to the Amazon.

Creating equitable and efficient value chains

Another major limitation on the adoption of eco-efficient agricultural systems in the Amazon is the inefficiency of value chains, which limits the economic benefits that producers reap. For over a decade, CIAT has been using participatory methods to promote the development of technologies,



Eco-efficient agroforestry system in the Colombian Amazon.

business models, and policies that increase value chain efficiency and smallholder benefits. Although this work has been focused on regions of Latin America outside the Amazon Basin, CIAT plans to extend and apply its work on value chain efficiency to the Amazon.

Conclusion

Attention to the Amazon often focuses on the region's vast areas of intact forest, but it is important not to forget the landscapes on the other side of the forest frontier, the ones that deforestation has left in its wake. Approximately 40% of this land currently persists in an unproductive, degraded state that contributes little to economic development or environmental sustainability. Fortunately, this does not have to be the case. Economically, socially, and technologically feasible land use alternatives exist that can greatly increase the contributions that these lands make to local livelihoods and ecosystem services. CIAT sees great value in continuing and expanding its support of these options for the restoration of degraded Amazonian landscapes.

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