THE CLIMATE BENEFITS OF SUSTAINABLE AGRICULTURE

Reducing Emissions, Increasing Carbon Storage and Helping Farmers Adapt to Changing Conditions

Thirty-eight percent of the Earth's land area is dedicated to agriculture[1]. As the world's population continues to grow[2], so too does the demand for food and, by extension, arable land. According to the United Nations Food and Agriculture Organization, in 20 years the world will need 50 percent more food production to meet the demands of the increasing population. This translates to an estimated 6.2 billion acres (2.5 billion hectares) of additional land required — the equivalent of two-thirds of the world's remaining natural forests.

Agriculture is a major cause of global climate change and is responsible for 14 percent of all greenhouse gas (GHG) emissions — primarily from erosion, soil tillage, irrigation, fertilizer use, the burning of biomass and livestock digestive systems — greater than the emissions generated by all of the world's planes, trains and automobiles combined (IPCC, 2007). When we also factor in the deforestation that occurs as farmers clear trees to establish or expand farms, agriculture is ultimately responsible for nearly one-third of all GHG emissions (WRI, 2008[3]).

Agricultural expansion is most pronounced in tropical regions. High-biodiversity, carbon-rich landscapes are increasingly fragmented into mosaics of cultivated land and remnant forest patches. Continual agricultural expansion leads to deforested landscapes and degraded natural forests, producing increasingly significant negative impacts on our global climate.

In this context, broadly supported strategies that minimize agriculture's impacts on climate change and forest degradation are vital to accommodating the needs of a growing population and complementing efforts to stem climate change. The adoption of sustainable agricultural practices can mitigate GHG emissions, increase carbon stocks and help farmers adapt to a changing climate. Sustainable agriculture is a practical, scalable means of simultaneously tackling climate change, conserving native ecosystems and improving the livelihoods of rural communities in the developing world.

The Climate Benefits of Sustainable Agriculture

In the tropics, conventional agriculture often begins with the razing of a forest and the burning of biomass to prepare for the short-term, intensive production of annual agricultural crops. A lack of knowledge about, and access to, sustainable management practices often leads to rapidly declining soil fertility — driving small producers to leave their degraded plots and move on to more fertile landscapes, thereby repeating the boom-bust cycle of deforestation–degradation–short-term production.

Minimizing agricultural expansion into forestlands conserves forests, sequesters carbon and avoids additional emissions of greenhouse gases.

To help break this cycle, the Sustainable Agriculture Network (SAN) — the coalition of leading tropical conservation organizations that manages Rainforest Alliance certification — developed the SAN Standard for sustainable agriculture. Many of the standard's criteria can provide significant climate benefits, leading to reductions in GHG emissions and/or increases in levels of carbon stored on farms:

- **Conservation and restoration of forests and other native ecosystems –** On Rainforest Alliance Certified™ farms, all existing natural ecosystems must be preserved, maintaining carbon stocks and avoiding carbon emissions by preventing the land's conversion to other uses. Globally, the conversion of land to agriculture produces 25 percent of CO_2 emissions and 10 percent of N_2O emissions (Palm et al., 2004). The SAN Standard, however, minimizes emissions through strict safeguards that ensure that native ecosystems cannot be degraded. *(Criteria 2.1, 2.2)*

OUR MISSION

The Rainforest Alliance works to conserve biodiversity and ensure sustainable livelihoods by transforming land-use practices, business practices and consumer behavior.

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- **Minimized use of agrochemicals** – Rainforest Alliance Certified farms are required to minimize their use of fertilizers, pesticides and other agrochemical inputs and prioritize the use of organic fertilizers, thereby reducing GHG emissions associated with the use, production and transport of these chemicals. *(Criteria 8.1, 9.2)*
- **Optimized shade** – Certified coffee and cocoa farms are encouraged to establish permanent shade in their production areas, with a shade density of 40 percent and a minimum of 12 native tree species. In regions or crops where this recommendation is not applicable, farms must have or establish a conservation area that covers at least 30 percent of the farm's total area. *(Criterion 2.8)*
- **Ensuring long-term productivity** – The establishment of new production areas must be based on land-use studies that demonstrate long-term production capacity. Furthermore, certified farms cannot burn land to expand their existing production area. *(Criteria 9.4, 9.5)*
- **Responsible waste and water management** – Certified farms must implement integrated management plans designed to reduce water use and waste production and ensure the proper disposal of all byproducts, which can reduce GHG emissions from processing activities. *(Criteria 4.1,10.1,10.6)*

An Increased Focus on Mitigation and Adaptation

In addition to the SAN Standard's existing sustainability requirements, the network has developed new, robust criteria for verifying climate-friendly practices on Rainforest Alliance Certified farms. Farms that achieve compliance with the SAN's new climate module can demonstrate their competence in a range of adaptation and mitigation activities, including:

- **Risk assessment and adaptation** – Farmers can address climate risks (e.g., rising temperatures, changing rainfall patterns, etc.) by implementing practices such as crop diversification, the use of adaptive varieties and rainwater harvesting and storage.
- **Baseline carbon accounting and GHG inventories** – Farmers will have the systems, tools and guidance to monitor and measure GHG emissions and carbon in soil, tree and crop carbon pools. This is a first step toward helping farmers earn payments from carbon-based ecosystem-services schemes.
- **Increase soil-carbon storage** – Farmers can maintain or increase soil carbon on their farms, by controlling land-use changes, reducing tillage, optimizing water retention or infiltration, and fostering an abundance of microorganisms.

Reducing the Carbon Footprint of Cattle and Biofuel Farms

Livestock — and the grazing pastures and cropland necessary to feed them — account for nearly 80 percent of the world's agricultural land use and emit significant levels of CO_2, methane and nitrous oxide emissions to the atmosphere (FAO, 2009), but it is possible for cattle ranchers to reduce these emissions and increase carbon storage by implementing sustainable practices. Among the criteria mandated by the SAN, cattle production systems must reduce methane emissions by giving their animals specialized diets and properly managing their manure, and farms must meet strict requirements for shade canopy cover on pasture lots and set aside land for conservation.

From coffee farms to cattle ranches, the Rainforest Alliance is helping to make agriculture more climate-friendly.

Biofuels can also be a viable part of a more sustainable society, but only if their cultivation does not replace native ecosystems and their production and use emphasizes a continuous drive toward greater efficiency and energy conservation. The SAN Standard addresses biofuel-specific concerns and encourages the sustainable production of oil palm, soy and sugarcane. When biofuels are grown in accordance with these criteria, they can help stem the tide of deforestation and climate change.

Linking Farmers to Carbon Markets

Rainforest Alliance certification helps lay the foundation for farmers to undertake robust carbon-accounting methods, which offers them the potential to develop projects that can generate carbon credits. To open the door to this market, the Rainforest Alliance has created a guide on the implementation of reforestation projects that can help farms produce carbon credits in addition to their production of tree crops such as coffee and cacao. Rainforest Alliance certification provides a framework for organizing carbon projects, which can help farmers diversify their income — providing a buffer from volatile price fluctuations for their primary crop — and maintain traditional farming practices.

A Framework for REDD+

Over the past several years, the concept of REDD+ — reducing emissions from deforestation and degradation, plus the sustainable management of natural forests and increases in forest cover — has garnered considerable support from the international community as a scalable, cost-effective way to mitigate climate change. Given agriculture's ubiquitous presence and the ability of sustainable agricultural practices to help reduce emissions, conserve native ecosystems and relieve pressures on threatened forests, the Rainforest Alliance believes that sustainable agriculture should be an integral part of a REDD+ system. We are working to achieve this goal by engaging selected national and regional governments in the tropics, integrating climate-friendly practices into agriculture and helping farmers benefit from REDD+.

[1] *The World Bank: data.worldbank.org/topic/agriculture-and-rural-development*
[2] *US Census International Database: www.census.gov/ipc/www/idb/worldpopgraph.php*
[3] *World Resources Institute (WRI) (2008) Climate Analysis Indicators Toolkit (CAIT): cait.wri.org*

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