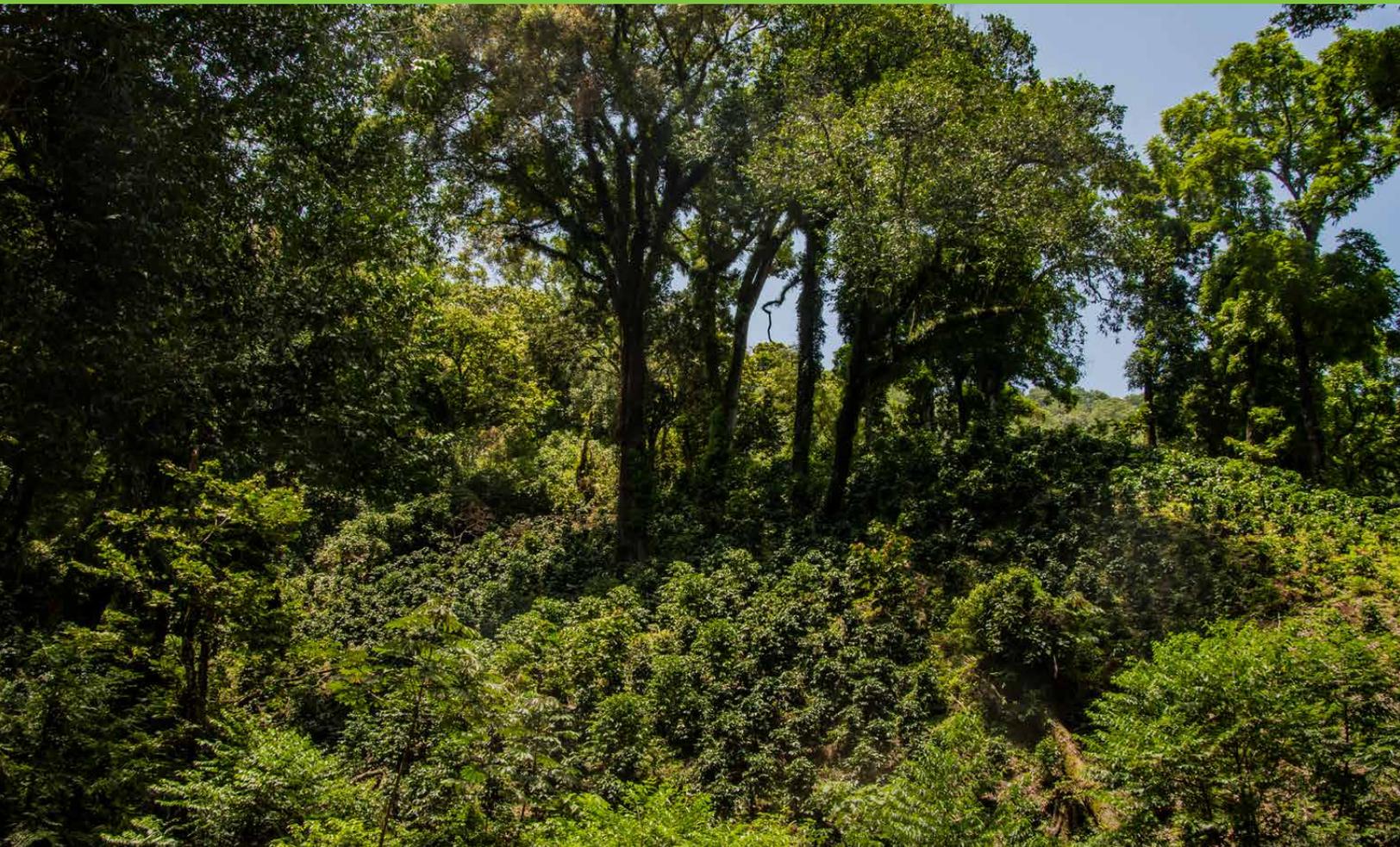


Raising the Bar—Regenerative Agriculture for More Resilient Agro-Ecosystems

The Rainforest Alliance's Position

The Rainforest Alliance is creating a more sustainable world by using social and market forces to protect nature and improve the lives of farmers and forest communities.



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INTRODUCTION

A GLOBAL CHALLENGE

With a growing human population expected to reach 9 billion by 2050, a major challenge of this century is meeting demand for agricultural production while conserving biodiversity and mitigating and adapting to climate change. Agriculture is one of the main contributors to climate change and biodiversity loss globally. At the same time, it represents an opportunity to protect and enhance biodiversity, and to mitigate and adapt to climate change.

Agricultural production generates an estimated 24 percent of total human-made greenhouse gas emissions¹ through land use change (around 10 percent) and direct agricultural production (14 percent). Half of this 14 percent is attributed to emissions from cattle production, and the other half to plant production systems, with soil fertilization making a substantial contribution.

Recent studies continue to highlight the ongoing decline in global biodiversity. The 2019 report on biodiversity by the Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services (IPBES)² estimates that around 1 million animal and plant species face extinction, many within decades, unless action is taken to reduce biodiversity loss. The main cause of this devastating loss of species is human activity that might destroy species' habitats, overexploit species (such as through overfishing), cause pollution, and help spread invasive species or diseases. The World Wide Fund for Nature (WWF) estimates that habitat destruction is the major threat to all taxonomic groups globally³. The majority of this destruction is driven by the agricultural sector.

WHAT IS REGENERATIVE AGRICULTURE?

In the face of climate change and biodiversity loss, well managed agriculture can be a force for greater adaptation and resilience. Regenerative agriculture takes a conservation and rehabilitation approach to food production. It focuses on the potential of agriculture to provide a multitude of ecosystem services⁴, such as carbon sequestration into soil and standing biomass, watershed protection, and biodiversity conservation—all of which contribute to ecosystem and climate resilience.

There is no universally accepted definition of regenerative agriculture. While some approaches focus strictly on soil health improvements and its carbon storage capacity⁵, others are broader and focus on the overall regeneration and health of the ecosystem. For the Rainforest Alliance, “regenerative agriculture” comprises a broad set of principles and practices under the umbrella of climate-smart agriculture. Taking an agroecology and integrated system management approach, regenerative agriculture aims to increase biodiversity, enhance ecosystem services, and increase agroecosystem resilience thus leading to resilient livelihoods. This way of farming is based on enhancing the inherent strengths of agroecosystems, ultimately enabling a reduction of external inputs (synthetic fertilizers and pesticides) and increasing farm net income by reducing costs.

Among the systems and practices commonly promoted under regenerative agriculture⁶, the Rainforest Alliance focuses on conservation agriculture (with an emphasis on soil health) and lower-input agriculture, including precision agriculture and agroforestry, as the systems that can best deliver the outcomes we aim to achieve.

By protecting and improving ecosystem health, and following regenerative agriculture practices and principles, farmers have an opportunity to improve their productivity and their livelihoods—as livelihoods and ecosystem protection are inextricably intertwined.

THE RAINFOREST ALLIANCE'S APPROACH TO REGENERATIVE AGRICULTURE

For over 30 years, the Rainforest Alliance has been working to make agriculture and forestry more sustainable through crop certification and landscape management. Our holistic approach and understanding of sustainable agriculture incorporate many of the principles of regenerative agriculture, such as organic soil management (including composting and mulching), integrated pest management, agroforestry, and a focus on climate-smart practices. We work mainly with perennial crops that offer great potential for carbon sequestration, soil regeneration, and positive impacts on biodiversity. We acknowledge the great importance of context, and support practices and recommendations that are tailored to the specific local realities, climate, and socioeconomic situation of each farming group and individual. We believe that full compliance with all criteria in the new Rainforest Alliance [Sustainable Agriculture Standard 2020](#) leads to regenerative agriculture.

PRINCIPLES AND PRACTICES

Regenerative agriculture comprises a wide range of principles and practices that can be applied at different scales.

At plot level

At this level (i.e., the focus on a sub-section of the farm where a particular crop is grown), one of the key principles is to improve soil health, which means improving the soil's chemical, physical, and biological properties. Practices that support this principle include adding organic matter, using cover crops and mulch to protect the soil, no-tillage, crop rotation, intercropping, and increasing plant diversity. Implementing these practices may improve nutrient availability and exchange capacity. A better soil structure results in greater capacity for water retention and infiltration, as well as enhanced biological activity—all of which has a positive effect on nutrient availability and carbon sequestration. A healthy soil results in healthier crops that are resilient to pest and diseases, reducing the need for inputs such as fertilizers and pesticides. Reducing such external, often polluting inputs is another of the key principles of regenerative agriculture. To reduce pesticide use, farmers take an integrated pest management (IPM) approach in which pesticides are used as the very last resource and under strict measures.

At farm level

At this level (i.e., an area of land devoted to agricultural production), the focus is on protecting and managing natural ecosystems to conserve biodiversity and enhance ecosystem services. Promoted practices include protecting on-farm forests and forest patches, implementing agroforestry systems, and establishing and maintaining riparian buffers (i.e. buffers beside rivers and streams) to protect aquatic ecosystems. Natural habitats on farms provide shelter for animals (insects, birds, bats, other mammals), some of which are extremely important to agricultural systems, for example providing pest control and crop pollination.

At landscape level

Regenerative agriculture can also support biodiversity conservation and climate change adaptation and mitigation in the wider landscape (i.e., an area covering a range of different ecosystems at a regional level). The principles and practices of regenerative agriculture (for example, the implementation of diverse agroforestry systems) can support the connectivity of forest patches and the conservation of key natural ecosystems such as forests and peatlands. Adopting regenerative agriculture also has positive effects on productivity, reducing pressure on forests (deforestation and forest degradation) due to agricultural expansion.

THE RAINFOREST ALLIANCE'S IMPACT ON REGENERATIVE AGRICULTURE

On soil health

The Rainforest Alliance Sustainable Agriculture Standard promotes a holistic approach to soil management in line with conservation agriculture to improve the soil's chemical, physical, and biological properties and reduce the use of synthetic fertilizers. We ask farmers to perform a soil assessment to better understand its characteristics, and based on this assessment to take appropriate measures for soil management. Measures promoted in the standard focus on building up soil organic matter, increasing on-farm nutrient recycling, and improving the soil's capacity to absorb and retain water. Other supporting practices include composting, mulching, cover crops, selective weed management, and soil conservation strategies. Farmers also use soil tests and analyses to better understand nutrient availability and requirements. Based on these analyses, they are expected to develop a more tailored nutrient management strategy involving precision fertilization—applying nutrients when and where they are needed to avoid excess application and eutrophication (i.e. harmful algal blooms and dead zones in water bodies), and to minimize run-off.

Studies in Colombia, Ghana, and Nicaragua comparing Rainforest Alliance Certified™ versus non-certified farms showed that certified farms are more effective at implementing erosion-preventing measures and enhancing soil fertility and overall soil health^{7,8}.



Contour planting, as seen here with tea bushes on a Rwandan farm, helps reduce soil erosion. Photo credit: Adam Gibbon

On biodiversity conservation and forests

The Rainforest Alliance approach is based on the principle of mainstreaming biodiversity conservation in all farming and environmental protection activities. That is why there are no specific individual criteria for biodiversity conservation in the new Rainforest Alliance Sustainable Agriculture Standard. Rather, several criteria in the management, farming, and environmental chapters aim both to prevent negative impacts from farming on biodiversity and to foster positive ones. These include: maintaining and increasing the diversity of native vegetation through practices such as agroforestry, establishing wildlife corridors, and conserving all-natural ecosystems; taking steps to diversify production systems and support functional biodiversity (pollinators and natural predators of pests) through an IPM strategy; supporting the protection of endangered species and other native plants and animals by prohibiting hunting and minimizing the spread of invasive species and human-wildlife conflict; and reducing negative impacts of farming by improving soil health through mechanisms such as erosion control and increasing soil organic matter. Another priority in the wider landscape is the protection of high conservation value areas such as Key Biodiversity Areas, intact forest landscapes, Ramsar sites, and

UNESCO World Heritages Sites and areas of cultural importance. These are areas of outstanding biological, ecological, social, or cultural significance. High conservation value areas are identified according to a risk-based approach, where different actions need to be taken depending on the area's risk level.

Evidence shows that Rainforest Alliance Certified farms are able to be regenerative and support biodiversity conservation at farm and wider landscape levels, and have higher forest quality⁹, higher carbon stocks, increased habitat connectivity^{10, 11}, lower deforestation and forest degradation¹², and improved migratory and forest bird communities compared with non-certified farms^{13, 14}. This has been shown in studies from Brazil, Colombia, Ethiopia, Ghana, and Nicaragua. Through our landscape and community projects we have supported the Petén forest communities of Guatemala to protect and sustainably manage the Maya Biosphere Reserve. Recent studies show that over 20 years the communities of the Maya Biosphere Reserve have successfully lowered the deforestation rates in Forest Stewardship Council® certified forestry to near-zero^{15, 16}.

On water conservation

Through the standard, Rainforest Alliance certification requires that farmers create and maintain all riparian buffer zones to protect aquatic ecosystems; implement zones next to natural ecosystems (including aquatic ecosystems) where chemicals are not applied; keep chemical storage infrastructure at a safe distance from water bodies; and test and implement wastewater management systems, for example in the case of wet coffee milling (a method of separating the fruit of the coffee cherry from the bean within). The Rainforest Alliance expects farms to maintain their irrigation systems to avoid leaks and improve irrigation efficiency, based on crop water needs and weather conditions. All these practices conserve and maintain water quality at the farm and wider landscape levels.

Studies show that Rainforest Alliance Certified farms have higher rates of adopting water conservation practices. Three separate studies in Côte d'Ivoire, Ghana, and Kenya found that Rainforest Alliance Certified cocoa farms applied water-related best management practices at higher rates than non-certified farms^{17, 18, 19, 20}.



A woman collecting rainwater in the Guatemalan Altiplano Photo: Sergio Izquierdo

On improved productivity

Rainforest Alliance Certified farmers often have higher yields than non-certified farms through implementing regenerative agriculture practices. In the Junin region of the Peruvian Andes, researchers compared coffee yields on Rainforest Alliance Certified and non-certified coffee farms²¹. They found that a Rainforest Alliance Certified coffee cooperative increased its annual production by 148 kg/ha compared with non-certified farms, which led to an additional US\$280/ha in coffee net revenue for certified farms. Similarly, research in Vietnam shows that certified farms are able to maximize coffee yields while minimizing environmentally detrimental inputs²². They found that certified farms had higher eco-efficiency scores, indicating that they achieved higher yields with lower inputs (agrochemicals, water, and land). The analysis showed that both certified and non-certified farms could reduce inputs by an additional 50 percent on average without sacrificing productivity. The yield increase is driven by the combination of different agronomic practices such as improving soil health, effective pruning, fertilization strategy, agroforestry systems, and IPM strategy. All of these practices are key aspects of regenerative agriculture.



*Coffee grows under the shade of trees in Peru.
Photo: David Dudenhoefer*

On reduced pesticide use

The Rainforest Alliance works to limit the exposure of workers, surrounding communities, and nature to harmful pesticides. Our certified farms perform significantly better than non-certified farms in terms of pesticide use and management. For example, a study in Ghana found that significantly more Rainforest Alliance Certified farms improved their pesticide management practices compared with non-certified farms, and had better record-keeping and storage of agrochemicals²³. Similarly, a study in Ecuador compared the performance of 10 Rainforest Alliance Certified banana farms and 15 similarly sized non-certified farms relative to 29 environmental and social best practices²⁴, and found that certified farms performed better regarding pesticide management. This is because the Rainforest Alliance Sustainable Agriculture Standard has always included strict safety requirements for workers applying

pesticides, and has limited the use of hazardous pesticides. The standard's pesticide management requirements are based on a strong IPM approach. This approach highlights the importance of preventing and monitoring pests, and encourages natural and manual pest control mechanisms such as crop sanitation, drainage control to prevent excessive soil moisture, and the use of preventive applications like mineral oils. Following a tailored IPM plan also means that preference is given to low-toxicity pesticides, and that pesticides are applied only to the parts of the crop affected by pests. In addition to requiring IPM, the standard requires limiting the use of pesticides.

On climate change mitigation and adaptation

The Rainforest Alliance approach to adaptation and mitigation of climate change impacts considers regenerative agriculture as an essential set of principles and practices that fall under the umbrella of climate-smart agriculture. This broader approach—climate-smart agriculture—takes account of current and future climate risks to define the best mitigation and adaptation approaches for the specific climate hazards. The Rainforest Alliance supports farmers by providing insights on current and future climate risks, and implementing measures to build adaptive capacity and resilience against climate change impacts within the Rainforest Alliance certification system, as well as within its landscape and community projects.

Some recent studies have shown the importance of building resilience to climate change impacts on Rainforest Alliance Certified farms in addition to their contributions to climate change mitigation. One study in Brazil found that cattle farms implementing sustainable livestock programs (including the Rainforest Alliance) generated 35 percent fewer greenhouse gas emissions²⁵. And another study with Colombian coffee farmers showed that certified farmers were more resilient to adverse climatic conditions²⁶. In a year of adverse weather and abundant fungal infestations, they only lost 1 percent of their yield while a control group lost 52 percent.



Former logging staging area turned mahogany regeneration site at Carmelita forest concession. Saplings with red ribbons are mahogany. Photo: Sergio Izquierdo

On improved livelihoods

Compliance with the Rainforest Alliance's certification system often has a positive impact on farmers' income and financial wellbeing. Studies have found that this effect is generally driven by higher yields on certified farms, often due to improved soil health, among others^{27, 28, 29}. Certified crops often—but not always—receive higher market prices. As well as increasing yields, certification also helps farmers improve the quality of their crops, an impact that is attributed to training in better agronomic practices. The Rainforest Alliance approach to tackling low incomes and supporting sustainable livelihoods centres around helping farmers improve their business through improving farming and farm management, which allows them to be more profitable and resilient. We enable farmers to access relevant data to help assess and mitigate the risks and opportunities in their environment, and allow households to make informed decisions resulting in better incomes. An important aspect here is our focus on gender equity—women are central to the fight against climate change and the impending global food crisis. Gender equality is not only a question of human rights, or of increasing economic activity in developing countries. It is the key to effectively meeting some of the greatest challenges we face. Finally, we recognize that responsibility for improving livelihoods must be shared across the supply chain so that the risks, costs, and burdens of sustainable production do not fall on farmers alone. We take a shared responsibility approach designed to encourage companies to reward and invest in more sustainable production and drive more value from the supply chain to workers, creating greater transparency and shared value throughout the supply chain.

CONCLUSION

The Rainforest Alliance's approach to regenerative agriculture is solidly embedded in the four areas where it operates—the certification program; projects at landscape level; our work with companies via tailored supply chain services; and as a priority focus of our advocacy strategy – to truly promote widespread adoption of regenerative agriculture, supply chain companies and other actors must offer additional support and incentives for farmers and farm groups, and monitor progress towards long-term outcomes and goals. All of these contribute to a holistic strategy to support farmers and forest communities on their journey towards more resilient farming systems. We recognize that improved livelihoods, productivity, and environmental aspects are intertwined, and the interrelation of all these aspects needs to be considered holistically. This helps ensure that farms are operating in a way that respects the environment, farm workers, their families, and local communities, resulting in thriving and resilient livelihoods and landscapes, and restored ecosystems—goals shared with the regenerative agriculture approach. This is especially vital in today's context of population growth and climate crisis, enabling farming, one of the main contributors to climate change via greenhouse gases and land use change, to also grasp the opportunities for mitigation and adaptation through a transformation to regenerative agriculture.

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