

Rainforest Alliance and Nescafé Plan

Monitoring and Evaluation Highlights 2025

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.



CONTENTS

1. INTRODUCTION	3
2. WHY FOCUS ON REGENERATIVE AGRICULTURE?	5
3. NESCAFÉ PLAN FARMER REGENERATIVE AGRICULTURE EVOLUTION	6
4. REGENERATIVE AGRICULTURE AND FARM ECONOMICS	11
5. REGENERATIVE AGRICULTURE AND NITROGEN EFFICIENCY	13
6. CONCLUSIONS AND RECOMMENDATIONS	14

1. INTRODUCTION

THE RAINFOREST ALLIANCE-NESCAFÉ PARTNERSHIP

The Rainforest Alliance has been the monitoring and evaluation (M&E) partner for Nescafé's sustainability initiative, the Nescafé Plan, since 2014. The scope of work has evolved from initial co-development of the program's theory of change and data collection across approximately 1,000 farmers in Côte d'Ivoire, Indonesia, and Mexico, to a standardized M&E process spanning up to 15 countries^a and more than 3,500 farmers annually. The Rainforest Alliance has surveyed more than 15,000 Nescafé farmers cumulatively from 2018-2025, including both Farmer Connect units (farmer groups assisted directly by Nescafé agronomists) and Vendor units (farmer groups assisted by supplier agronomists with Nescafé oversight.). In 2025, data was collected from more than 3,800 farmers across 12 countries.

The annual M&E survey—the key component of this work—has grown over time. Initially, the focus was on Nescafé Better Farming Practices, elementary production costs, diversification practices, and agrochemical use. Since 2023, the M&E survey captures a wide range of detailed data on regenerative agriculture practice adoption, farm economics, and farm carbon footprints.

Annual, reliable, independently collected and processed M&E data helps Nescafé:

1. Produce verified, third-party data to support non-financial disclosures and environmental, social, and governance (ESG) reporting
2. Track progress against company sustainability goals
3. Establish baseline metrics and priority activities in specific farmer units
4. Obtain insights into the impact of the Nescafé Plan field programs, the deployment of regenerative agriculture practices, and their environmental and economic results.

^a These 15 countries include: Brazil, China, Colombia, Côte d'Ivoire, Honduras, India, Indonesia, Kenya, Mexico, Peru, the Philippines, Rwanda, Thailand, Uganda, and Vietnam. The number of countries has increased over time, and not all countries are in scope every year. These countries represent the origins where Nescafé sources the majority of its coffee supplies.

FIGURE 1

Nescafé Plan M&E data collection scope in 2025

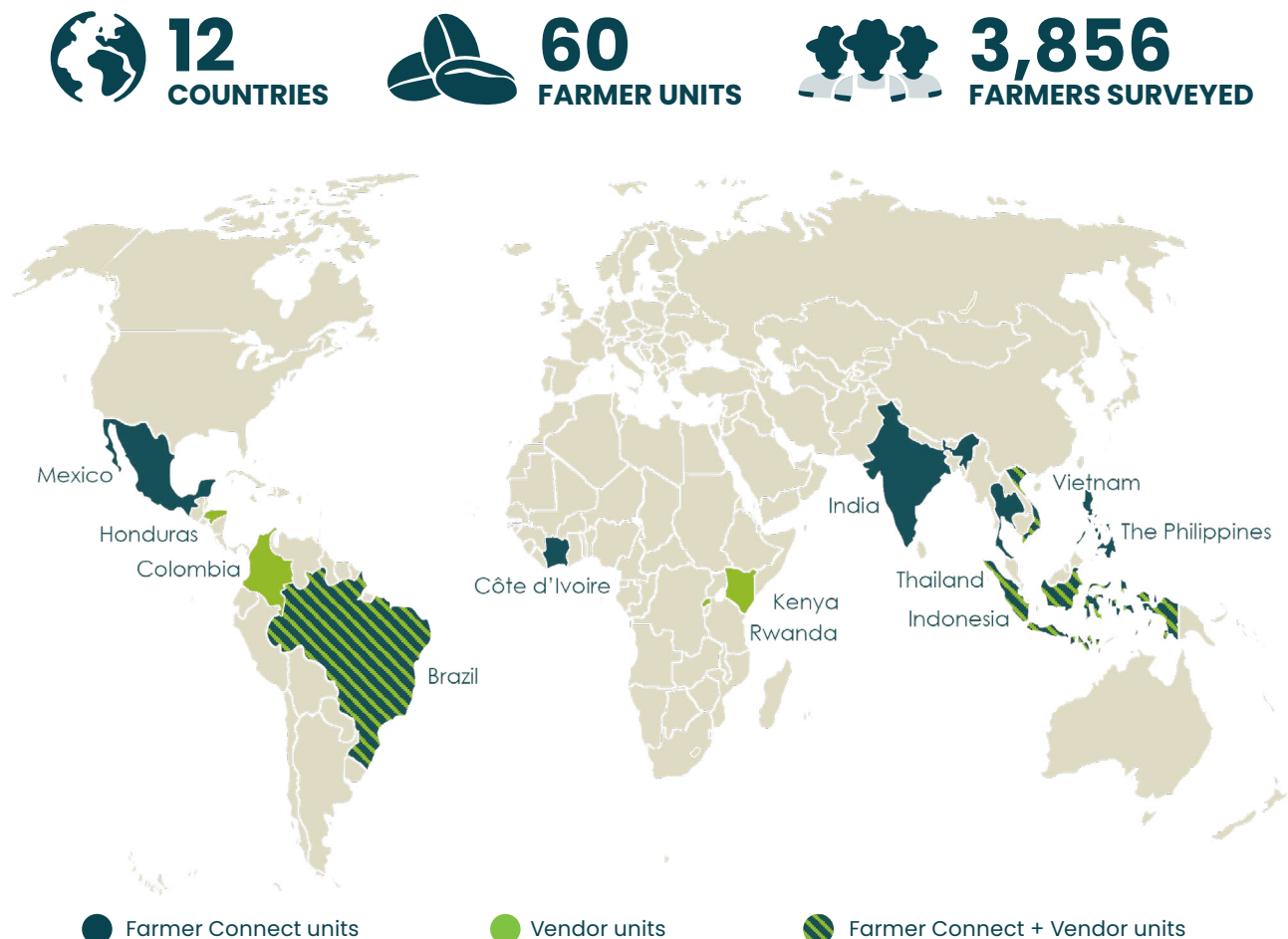


TABLE 1

2025 Median Nescafé Plan farmer characteristics

Country	Farm size (ha)	Farmer age	Household size	Education level
Brazil (Arabica)	60	51	3	Tertiary
Brazil (Robusta)	42	47	4	Secondary
Colombia (Arabica)	2.5	60	3	Primary
Côte d'Ivoire (Robusta)	5.3	50	8	None
Honduras (Arabica)	5.4	52	4	Primary
India (Robusta)	3.3	52	3	Secondary
Indonesia (Robusta)	1.0	47	4	Secondary
Kenya (Arabica)	0.4	58	5	Primary
Mexico (Arabica)	1.5	55	4	Primary
Mexico (Robusta)	1.9	53	4	Primary
The Philippines (Robusta)	2.0	46	4	Secondary
Rwanda (Arabica)	0.7	55	5	Primary
Thailand (Robusta)	4.8	54	4	Primary
Vietnam (Robusta)	1.4	52	4	Secondary

* Table presents median Nescafé Plan farmer characteristics, based on responses to the 2025 M&E survey. Figures for Indonesia and Vietnam include both Farmer Connect and Vendor units sampled in 2025. China was not part of the 2025 M&E campaign.

NESCAFÉ'S SUSTAINABILITY JOURNEY

Building on their previous coffee farmer program activities, Nescafé—a world leading coffee brand—launched the Nescafé Plan in 2010,¹ outlining their approach to improve resilience in their coffee supply chain and coffee-growing communities. In 2022, Nescafé introduced their updated Nescafé Plan 2030,² positioning regenerative agriculture as the driver to enhance farm resilience to the effects of climate change, increase farmer incomes, and reduce greenhouse gas (GHG) emissions. The Nescafé Plan is aligned with Nestlé's goals to source 20 percent of its key raw materials from farmers adopting regenerative agriculture practices by 2025, and 50 percent by 2030.³ The Nescafé Plan also contributes to the Nestlé Net Zero CO₂ journey⁴ and its target to reduce GHG emissions by 50 percent by 2030, relative to a 2018 baseline. By 2025, Nescafé reported sourcing 53 percent of coffee supplies from farmers adopting regenerative agriculture, and saw an 18.3 percent reduction in green coffee GHG emissions.⁵

KEY INSIGHTS FROM 2025 M&E DATA

This report utilizes annual M&E data to assess how Nescafé has progressed to date against its Nescafé Plan 2030 goals. Looking at cross-sectional data from 2018–2025—with some data points available for only a portion of this

period given the evolution of the survey—we find that:

- Nescafé Plan farmers have **improved their adoption of soil cover, integrated weed management, agroforestry, and intercropping practices**. For example, the share of farmers applying soil cover over at least 75 percent of their coffee area rose from 41 percent in 2022 to 67 percent in 2025, and the share of farmers dedicating at least 50 percent of their farm area to agroforestry rose from 22 percent to 46 percent.
- In some origins, **optimized fertilization**—including adoption of organic fertilizer, and connecting soil analysis results to on-field fertilizer application—and **renewing/rejuvenating** aging coffee farms remains **technically challenging or expensive** for farmers to implement. For example, the share of farmers integrating organic fertilizer is quite low in Brazil, Colombia, Côte d'Ivoire, and Mexico, and aging tree stocks present long-term productivity challenges in West and East African origins. Addressing these structural challenges is a key focus of Nescafé Plan activities.
- Increased regenerative practice adoption**, as measured by Nescafé's Farm Assessment Tool, is positively **associated** in most origins **with higher farm yields**—supporting improved and diversified farmer incomes—and **better nitrogen efficiency**—a driver of production cost optimization and reduced GHG emissions.

2. WHY FOCUS ON REGENERATIVE AGRICULTURE?

Regenerative agriculture has become a key focus area for coffee companies, driven by increased production challenges exacerbated by climate change. The Nescafé Plan supports coffee farmers in adopting regenerative agriculture practices to bring more value to farmers and their communities, to increase resilience, and to reduce GHG emissions.

While there is no single definition of regenerative agriculture, Nestlé defines regenerative agriculture (in line with the Sustainable Agriculture Initiative (SAI) Platform and the Global Coffee Platform guidance) as an approach to farming which aims to conserve and restore natural resources—primarily soil, water, and biodiversity—while capturing carbon in soils and plant biomass, and supporting farmers' livelihoods.⁶ This way of farming is based on enhancing the inherent strengths of agroecosystems. Ultimately, regenerative agriculture enables an optimization of agrochemical inputs (synthetic fertilizers and pesticides) and increases net farm income. This is achieved by improving farming and land use efficiency with higher yields and reducing costs over the medium- to long-term. It is not a standard set of practices for farmers to adopt, but a holistic approach that requires adaptation to local farming conditions, aiming to restore the balance between people and nature, and to promote long-term supply chain resilience. This vision is well aligned with the Rainforest Alliance's approach to sustainable and regenerative agriculture. For nearly 40 years, the Rainforest Alliance has been designing and implementing programs with private sector partners, including Nescafé, that take an integrated system management approach to support farmers and communities on a journey to more resilient farming systems.⁷

A growing body of evidence suggests that investing in regenerative agricultural practices—maintaining soil health, promoting biodiversity, conserving water resources, and supporting farmer livelihoods and improved farm management—can have long term positive impacts on productivity and conservation outcomes.⁸ Improving soil health is at the heart of regenerative agriculture. The adoption of soil regeneration practices, such as utilizing nitrogen-fix-



ing cover crops or mulch, contributes to improved nutrient, soil moisture and carbon retention,^{9 10 11 12} which improves yields^{13 14 15 16} and reduces the need for agrochemical inputs.^{17 18 19 20} Another key regenerative practice is intercropping and integrating trees in and around the coffee farms. A meta-analysis found that intercropping perennial crops like coffee with the right level of shade trees, fruit trees, and other annual crops enhances farm biodiversity, increases the presence of pollinators on farms, improves soil fertility, and reduces pest incidence without compromising yields.²¹ In addition to protecting coffee plants and soil from direct sun, intercropping provides smallholder farmers with diversified revenue streams, improving household income and food security.^{22 23 24 25}

A recent study suggests that scaling regenerative agricultural practices from 15 percent of cropland today to 40 percent by 2030 could avoid 600 million metric tons of CO₂e emissions.²⁶ Coffee farmers—the vast majority of whom farm two hectares or less²⁷—face challenges to remain in coffee production under changing climatic conditions without adequate support. Through the Nescafé Plan, Nescafé is helping farmers within its supply chain across 15 countries to transition to regenerative practices by investing in field programs promoting:

FIGURE 2

Nescafé Plan 2030 priority activities²⁸



3. NESCAFÉ PLAN FARMER REGENERATIVE AGRICULTURE EVOLUTION

OVERVIEW

Nescafé currently measures farmers' adoption of regenerative agriculture practices using its Farm Assessment Tool (FAT), developed globally in partnership with The Nature Conservancy (TNC),²⁹ which was introduced into the annual M&E survey in 2021 and revised in 2023. The FAT assesses farmer practices along the following categories:

TABLE 2

Farm Assessment Tool (FAT) categories

Category	Sub-Category	Key Practices
Soil	Soil conservation	Erosion control, soil cover, mulching
	Crop nutrition	Soil testing, organic fertilizer use, targeted soil enhancements, optimized synthetic fertilizer use
Biodiversity	Chemical inputs and weed management	Herbicide use, integrated weed management
	Renovation and rejuvenation	Grafting, stumping, pruning, distribution of selected varieties of plantlets
	Natural habitat	Protecting existing wildlife corridors and natural ecosystems, attracting pollinators and natural predators
	Agroforestry and intercropping	Shade tree planting, agroforestry integration, intercropping practices, wind breaks
Water	Water footprint	Irrigation water use and monitoring, wet processing water use and monitoring, wastewater treatment
	Water source protection	Maintenance of riparian buffer zones between water ways and fields
Farmer	Farm management	Recordkeeping

Farmers are categorized from low/non-existent regenerative agriculture adoption ("Conventional") to high adoption ("Leading").^b As of 2025, **all Nescafé Plan farmers sampled and surveyed** by Rainforest Alliance across 12 countries **reached "Engaged" level or higher** on the FAT (up from 80 percent in 2023), and **66 percent reached "Advanced" or higher** (up from 39 percent in 2023). Nescafé reported that 53 percent of their total coffee supplies came from these farmer units.³⁰ The greatest improvements came from farmers in Honduras, who moved from majority "Conventional" in 2023 to majority "Engaged" or higher in 2025 (Figure 3).^c Farmers in Indonesia, Mexico, and Thailand also made great strides, moving from majority "Engaged" to "Advanced" by 2025. Looking across practice areas, Nescafé Plan farmers performed the best on measures of soil conservation, integrated weed management, and water source protection. Crop nutrition remains a challeng-

ing practice to implement across many regions due to structural and cost barriers to optimized fertilization. Natural habitat restoration is also a challenge for smallholder farmers, further complicated by land scarcity in some countries. **This highlights the importance of investing in farm efficiency measures which enable higher yields in a cost-effective manner and also support the surrounding environment while helping to lower on-farm emissions.**

Using the FAT categories as a guide, the following sections focus on individual practice adoption trends from cross-sectional data across the top seven origin countries for Nescafé coffee supplies (Brazil, Colombia, Côte d'Ivoire, Honduras, Indonesia, Mexico, and Vietnam).^d Note that the annual M&E survey has evolved over the years, and some comparisons are only available from 2022–2025.

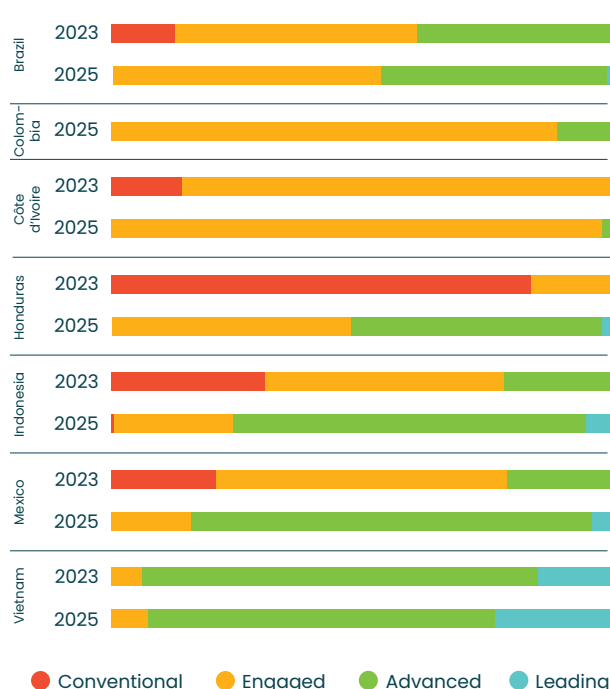
^b **Engaged** farmers must fully comply with the requirements as defined in the [Nestlé Responsible Sourcing Core Requirements](#), as well as achieve a score of at least 25 percent on the FAT assessment. **Advanced** farmers must score at least 50 percent, apply organic fertilizer on at least 50 percent of their plot, and maintain year-round soil cover over at least 50 percent of the plot. **Leading** farmers must score at least 75 percent, adopt integrated weed management practices, apply organic fertilizer on at least 75 percent of their plot, fertilize based on soil analysis results, maintain year-round soil cover over at least 75 percent of their plot, and monitor and record total water usage.

^c The current version of the FAT was integrated into the annual M&E survey in 2023. Figure 3 shows a comparison of farmer FAT scores from 2023–2025. There was no data collection in Colombia in 2023 and 2024, so only the 2025 data point is shown.

^d This analysis primarily relied on data from 2018, 2022, and 2025 surveys. We use 2019 data for Honduras in place of 2018, as data collection did not begin until the following year. There was no 2022 survey conducted in Colombia, so 2021 data was used for mid-point comparison. In 2025, M&E data collection in Brazil, Indonesia, and Vietnam included Farmer Connect units and vendor units. Only Farmer Connect unit data is used for this analysis to allow for comparability with historical data.

FIGURE 3

Regenerative agriculture FAT scores for top seven Nescafé origins, 2023–2025



SOIL

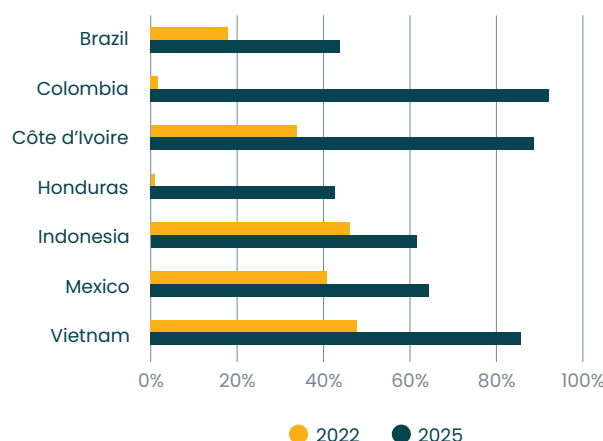
Improving soil health is a key focus of regenerative agriculture adoption. This includes promoting **soil conservation** practices such as erosion control, soil cover (including mulching), pH correction and investing in **crop nutrition**. This is achieved by conducting regular soil testing and implementing targeted soil enhancements, including organic fertilizer, enhanced compost and/or soil amendment application, mulching, and optimized use of synthetic fertilizers over time. This holistic approach to soil health is expected to reduce soil erosion, improve nutrient cycling, increase water absorption and retention, increase resilience to prolonged drought, and enhance biodiversity—all while supporting better yields.³¹

Soil conservation

M&E data suggests that Nescafé Plan farmers have broadly adopted soil cover measures on their coffee farms such as cover crops, mulch, and residues. Notably, the share of farmers using soil cover over at least 75 percent of their coffee area increased in all origins between 2022 and 2025 (Figure 4).^e Improving soil cover is one of the most accessible regenerative practices to implement in the near term. It is relatively low-cost for smallholders, and within a year or two, farmers can already observe both reduced labor needs for weeding, as well as improved soil and plant health.

FIGURE 4

Percent of farmers using soil cover on >75% coffee area



Crop nutrition

The most important soil nutrient management practice to improve productivity in the short to medium term is to correct soil pH and optimize fertilization. This is a focal regenerative agriculture practice in all Nescafé origins, with a specific focus on composting and residue management in Brazil, Côte d'Ivoire, and Honduras.

M&E data suggests there has been mixed progress on increasing organic fertilizer use (which includes any organic fertilizer or composted organic material).^f Organic fertilization practices remain widespread in Vietnam; most farmers follow a formal process to compost their farm residues. While uptake remains lower in other origins, organic fertilizer use improved in Côte d'Ivoire, Honduras, and Indonesia from 2022 to 2025 (Figure 5). However, rates declined in Brazil and Mexico due to a combination of factors. In Brazil, the main obstacle to higher organic fertilizer use is the upfront capital required to buy machinery to handle large volumes of coffee husks. Given Brazil's large farm sizes, producing on-farm organic fertilizer by hand without mechanization is not scalable. In addition, there was a significant decrease in input prices in Brazil in 2024, which—combined with higher coffee prices—contributed to higher investments in inputs, including synthetic fertilizer, likely causing some farmers to shift away from organic alternatives. In Mexico, fertilization rates are generally low and sensitive to price fluctuations. Higher organic fertilizer use in 2022 could be linked to the rise in synthetic fertilizer prices that particular year, which led some farmers to shift to organic fertilizer use to compensate.

Overall application volumes remain low in most origins, which may make it more challenging for farmers to notice a meaningful improvement in soil health or a reduction in synthetic input costs in the short term. Faced with smallholder feedback that composting is labor intensive

^e The 2018 survey asked about any use of ground cover within coffee areas but did not ask for percentage of field covered. Graph shows 2022 and 2025 values for comparability.

^f While the 2018 survey included questions about organic fertilizer use, the definition of organic fertilizer changed over time (inclusion/exclusion of pruning residues and coffee pulp). Graph shows 2022 and 2025 values for comparability. In Colombia, 2021 data (mid-point, given no 2022 survey) included non-composted coffee pulp in its definition of organic fertilizer, so this figure was recalculated to only include those who used commercial organic fertilizer, compost, bokashi, or manure-based fertilizer for comparability with the 2025 data point.



with low soil nutrient value, Nescafé is currently piloting low-cost, low-labor composting solutions—including cash incentives for compost heap establishment in Côte d'Ivoire,⁹ and introducing goat keeping in Indonesia to produce manure to enrich the nitrogen content of on-farm compost—to try to enhance smallholder farmer adoption rates.

Another key element of optimized fertilization includes helping farmers better understand the nutritional needs of their farms. Fertilizer interventions must run in parallel to efforts to improve soil pH to ensure efficient uptake of nutrients. By tailoring fertilization plans and soil amendments to local soil conditions, farmers can, over time, reduce production costs by prioritizing only necessary inputs. The Nescafé Plan supports improved access to soil analysis, either through individual farm soil testing, or by providing community benchmark figures that farmers can use to tailor fertilization plans. From 2022 to 2025, the share of farmers with access to soil analysis results and input recommendations rose substantially in Honduras, Indonesia, Mexico, and Vietnam, and declined in Brazil and Colombia.

Mexico, and Vietnam (Figure 6).^h Declining rates in Brazil and Colombia should be treated with some caution. In Colombia, most farmers are relatively new to the Nescafé Plan, so responses reflect farmer-driven testing versus systematic testing support. In Brazil, farmers were newly required to provide proof of testing during data collection in 2025; declining testing rates likely reflect farmer over-reporting in previous years. By 2025, soil testing was widely available for most Nescafé Plan farmers, except in African origins, where soil testing rates remain very low due to cost barriers and limited local testing infrastructure.^{32 33}

While Nescafé Plan farmers have increased access to soil analysis through the program, there is a notable gap in farmer use of the results to guide their fertilization plans, specifically in Honduras, Indonesia, Mexico, and Vietnam. The next step for the Nescafé Plan is to help farmers translate those results into practical, affordable, and locally relevant fertilization decisions.

FIGURE 5

Percent of farmers using organic fertilizer

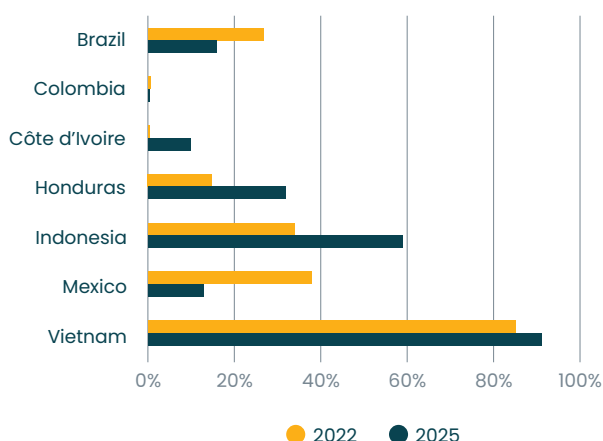
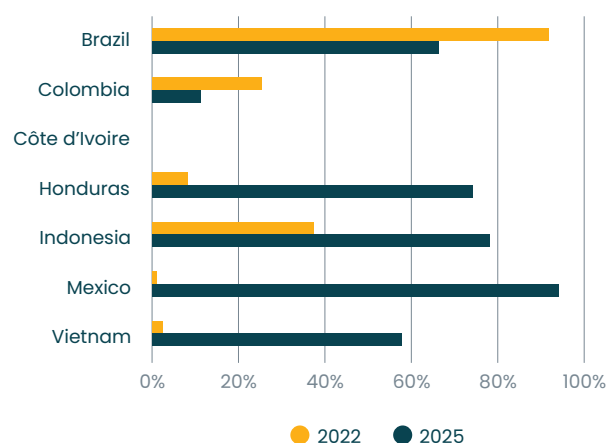


FIGURE 6

Percent of farmers with soil analysis available (at least every 3 years)



⁹ Rainforest Alliance supports implementation of the Nescafé Plan activities in Côte d'Ivoire with partner Centre d'Etudes, Formation, Conseils et Audits (CEFCA), with a focus on promoting composting uptake.

^h While the 2018 survey included questions about soil testing in a few origins, crop nutrition questions were not included for all origins until 2022. Graph shows 2022 and 2025 values for comparability.

BIODIVERSITY

Mainstreaming biodiversity conservation is a core tenant of regenerative agriculture. This includes reducing the use of chemical inputs in favor of integrated pest and weed management practices, supporting existing wildlife and natural ecosystems, investing in coffee tree **renovation and rejuvenation**, and promoting **agroforestry and intercropping** integration.³⁴

Rejuvenation and renovation

Nescafé Plan farmers in some countries have benefited from its plantlet distribution program to support their farm renovation efforts from 2018–2025. The share of the coffee tree stock over 20 years old fell by 12 percentage points from 2018 to 2025 in Mexico and Vietnam (and remained low in Brazil, Colombia, and Honduras), assisted by Nescafé plantlet distribution initiatives (Figure 7). In Mexico, Nescafé has been distributing plantlets of new and more drought- and pest-resistant coffee varieties since 2010, a major focus of Nescafé Plan activities in the country. However, aging coffee trees remain a problem for long-term productivity in Côte d'Ivoire. Replacing susceptible, aging coffee trees with disease/pest resistant or drought-tolerant varieties is a huge investment.¹ While necessary for preserving the long-term productivity of farms, renovation can decrease yields for the first few years until new coffee trees reach full production potential. Most smallholders cannot absorb this loss in income, so they renovate their plots on an as-needed basis (replacing plants as they die), instead of proactively renovating their farm in a planned manner (i.e. replacing 10–25 percent of trees each year over four to 10 years).

Nescafé is piloting conditional cash incentives for rejuvenation activities in Côte d'Ivoire—not only to help smallholder farmers finance the cost of pruning, but also to offset lost income while plants mature. Early results in Côte d'Ivoire are encouraging; M&E data suggests that stumping rates (the key rejuvenation practice promoted) were higher among farmers receiving cash incentives (11 per-

cent) compared to those with no incentive (two percent).

Agroforestry & intercropping

Nescafé promotes agroforestry in most origins as a means of improving soil health, increasing shade cover, supporting on-farm ecosystems for pollinators and pest predators, improving resilience to prolonged drought, and diversifying production systems and income.

M&E data suggests that the share of farmers dedicating at least 50 percent of their coffee area to integrated agroforestry systems grew in Colombia, Côte d'Ivoire, Honduras, Indonesia, Mexico, and Vietnam from 2022–2025 (Figure 8).² Additionally, Côte d'Ivoire, Honduras, Indonesia, and Mexico saw the average number of shade tree species on coffee farms rise from approximately three to five during this same period. Nescafé's tree seedling distribution occurs mainly through the implementing partners of Nestlé's Global Reforestation Program³⁵—which has helped plant 13 million trees to date³⁶—which likely contributed to these gains.

Beyond agroforestry, Nescafé promotes intercropping of other commercial and household crops within the coffee area to optimize land use and reduce household dependence on a single cash crop. M&E data suggests that the share of farmers intercropping coffee with other crops rose between 2018 and 2025 in Colombia and Côte d'Ivoire, and remained high in Indonesia and Vietnam. However, the number of species grown decreased in most origins. Farmers in Côte d'Ivoire, Indonesia, and Vietnam typically cultivate two to four additional crops within coffee plots, while multi-species intercropping is less common in Latin America. Through Nescafé Plan partner, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Nescafé continues to support farmers in Indonesia, Thailand, the Philippines, and Côte d'Ivoire to develop alternative farming activities to help farmers increase household income and food security.³⁷ These activities include goat and bee keeping, and growing alternative crops like avocados, chilis, bananas, pepper, vanilla beans, and sweet potatoes—often as part of intercropping systems.

FIGURE 7

Percent of coffee trees >20 years old

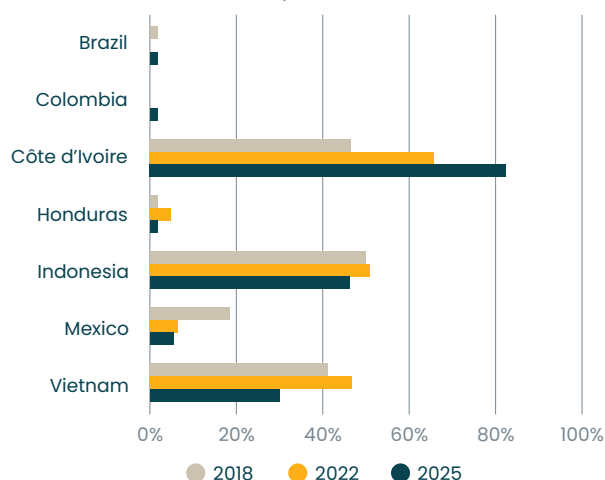
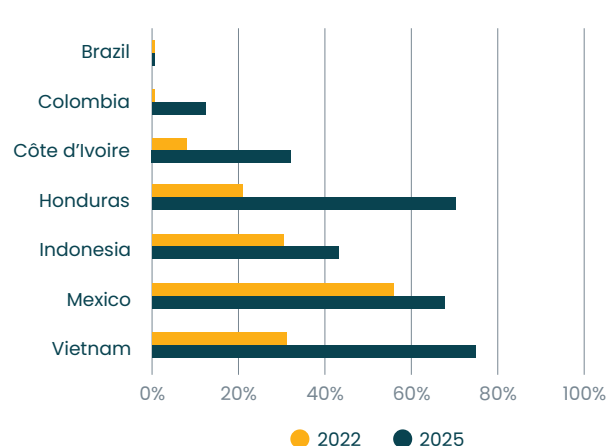


FIGURE 8

Percent of farmers with >50% coffee area dedicated to agroforestry



¹ Aging coffee farms remain a sector-wide challenge in Côte d'Ivoire, requiring Nescafé to collaborate with other relevant stakeholders, including governmental, on long-term mitigation strategies. The Rainforest Alliance supports implementation of the Nescafé Plan activities in Côte d'Ivoire with partner Centre d'Etudes, Formation, Conseils et Audits (CEFA), with a focus on stumping support for farmers.

² The 2018 survey does not ask questions about agroforestry, so figures from 2022 and 2025 are included for comparison. The 2021 survey in Colombia did not include a question on agroforestry; only 2025 data is available.

WATER

Adopting water conservation practices is central to a regenerative farming approach. This includes monitoring on-farm water footprints, implementing **irrigation** and **wet milling** efficiency measures where applicable, and protecting on-farm waterways by maintaining riparian buffer zones.³⁸

Irrigation

Mirroring national trends in most coffee growing regions, M&E data suggests irrigation is still relatively uncommon in Nescafé's coffee supply chain—most farmers rely on rain-fed production models, an increasing challenge in some origins as climate change disrupts seasonal rainfall predictability. Irrigation use is more common in Brazil, India, and Vietnam, where coffee production is more mechanized and/or farm topography supports systematic irrigation technology. Encouragingly, data suggests that from 2020–2025, Nescafé Plan farmers reduced their annual water usage by 25 percent in Brazil, 22 percent in India, and 11 percent in Vietnam (Figure 9). These reductions were mostly driven by increased adoption of optimized practices. In Brazil, farmers invested in more efficient irrigation infrastructure in response to significant droughts in 2022–2023. These investments, combined with more favorable rainfall in 2024–2025, helped reduce irrigation water use in 2025. In Vietnam, farmers reported adapting their irrigation practices to respond to El Niño conditions during the 2024–2025 growing season, increasing irrigation frequency while reducing the volume applied per round.

Wet milling

In addition to irrigation, most coffee farmers in China, Colombia, and Honduras conduct coffee wet milling on their farms,³⁹ which contributes to their overall water footprint. M&E survey questions on wet milling practices have changed over time, but looking at comparable data from 2023–2025, we find that almost all farmers in China, and about half of farmers in Colombia and Honduras, use less than 20 liters of water per kg of coffee parchment, demonstrating efficient water use practices (Figure 10).^k In Colombia, farmers have reduced water use in wet milling due to stricter regulations, and increased demand for certified coffee that meets sustainability standards.⁴⁰ While affordability remains a challenge for many smallholder farmers, low-tech solutions such as rainwater harvesting and semi-wet processing methods have allowed farmers to improve water use practices. In Honduras, Nescafé's local partner has been encouraging farmers to adopt more efficient wet processing practices, such as eco-pulpers that consume less water per kg of coffee. These investments, combined with lower water availability, likely contributed to improved practice uptake.

Wet milling generates wastewater that requires treatment to ensure it does not pollute nearby waterways and soil. While almost all farmers in China reported adequate water treatment relative to production volumes in 2024, more investment is needed to improve water treatment practices in Colombia and Honduras.

FIGURE 9

Irrigation water use in 2025 (m³/ha/year), relative to 2020/2021*

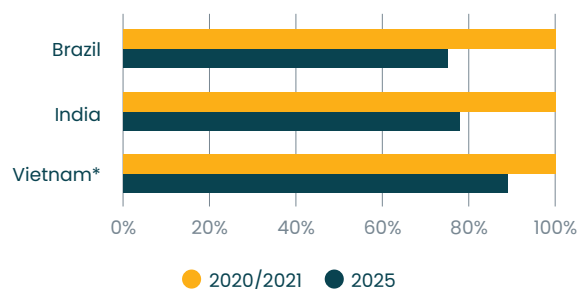
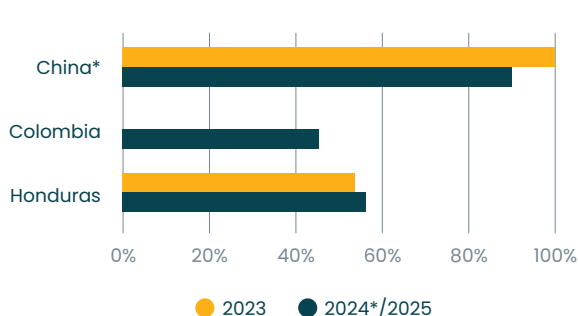


FIGURE 10

Wet processing water use (percent of farmers using <20 liters water/kg coffee parchment)



FROM PRACTICE TO IMPACT

Under the Nescafé Plan 2030, promoting regenerative practices is not an end in itself—rather, regenerative agriculture adoption is a cross-cutting strategy to achieve Nescafé's broader sustainability goals. In the following sections, we look at two of the three Nescafé Plan 2030 goals—increase farmers' income and reduce GHG emissions—to assess if adoption of regenerative practices is correlated with improved outcomes.



^k The M&E survey was not conducted in Colombia in 2023 or 2024, so only a 2025 data point exists.

4. REGENERATIVE AGRICULTURE AND FARM ECONOMICS

Increasing regenerative agriculture adoption has the potential to increase farmer income by improving productivity and reducing input costs. Farm renovation and rejuvenation are key to improving yields on aging and disease-susceptible coffee farms. Healthier plants and soils require fewer inputs like pesticides, reducing those costs for farmers. Additionally, agroforestry and intercropping help diversify household income streams, providing alternative revenue sources during the coffee lean season, and improving household economic resilience. A recent study by TechnoServe suggests that transitioning to regenerative coffee practices could increase farmer income in the medium term.⁴¹

PRODUCTIVITY TRENDS 2018–2025¹

Looking at Nescafé Plan M&E cross-sectional data from 2018–2025 for 13 countries with historical data available,^m we find that **Arabica yields** decreased in recent years, mirroring global production trends,⁴² driven by hotter temperatures and more sporadic rainfall (Figure 11).⁴³ Analyzed data reveals that trends varied by origin. Looking at three-year movingⁿ average yields (kg green bean equivalent [GBE]/ha), production increased from 2018–2022 in Kenya and Mexico, before decreasing by 2025. In Kenya, this decline was likely driven by a reduction in Arabica tree density, reduced synthetic fertilizer use, and an aging coffee tree stock. In Mexico, yields grew from 2018–2022 due to favorable La Niña conditions, which brought more consistent rainfall to key growing regions. Yields have since fallen due to El Niño weather patterns, which brought hotter, drier weather to the region, disrupting flowering and bean de-

velopment. In contrast, in Colombia and Honduras, yields declined from 2018–2022 but have since recovered. These gains in Colombia were driven by favorable rains in 2024–2025, combined with investments in renovation to increase coffee tree densities to stabilize production. In Honduras, coffee rust disease and aging coffee plantations contributed to lower productivity from 2018–2022.

Robusta productivity trends likewise varied by origin (Figure 12). India, the Philippines, and Vietnam have seen increasing yields since 2018. The Philippines specifically has seen significant yield growth, driven by increased access to fertilizer through partnerships between Nescafé Philippines, local government, and private fertilizer companies, as well as coffee tree renovation and rejuvenation efforts. Elsewhere, while yields grew from 2018–2022 in Brazil, Côte d'Ivoire, and Mexico, they have since contracted. In Brazil, 2025 production was strong, but the three-year moving

FIGURE 11

3-year moving average yield, Arabica, relative to 2019 baseline

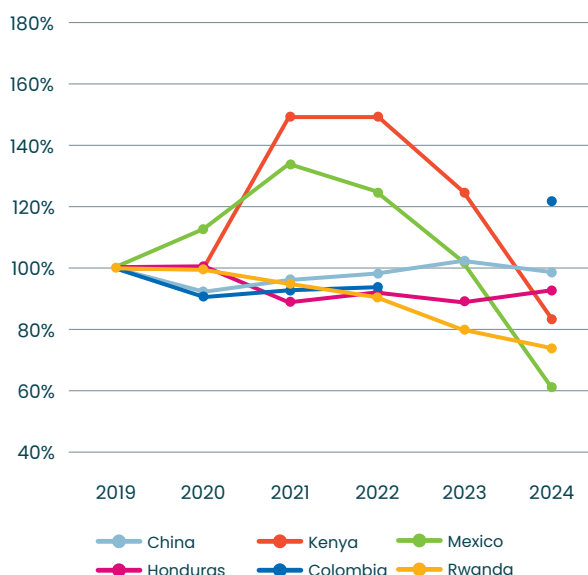
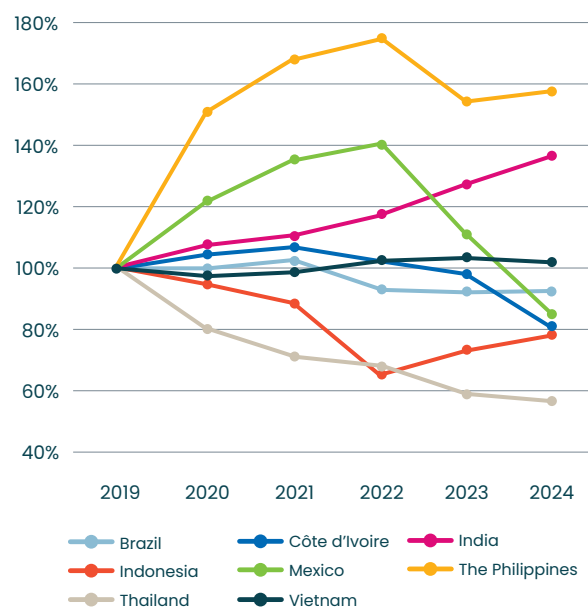


FIGURE 12

3-year moving average yield, Robusta, relative to 2019 baseline



¹ The analysis in this section utilizes repeated cross-sectional M&E surveys. Survey samples and participating farmer units may vary between years, meaning that the results describe changes in the surveyed populations rather than changes among a fixed panel of farmers. Three-year moving averages are used to reduce sensitivity to annual fluctuations, but differences in sample composition, data availability and external conditions should be considered when interpreting trends. The analysis is descriptive and does not isolate the effects of Nescafé Plan interventions or individual regenerative agriculture practices.

^m This includes data from Brazil, China, Colombia, Côte d'Ivoire, Honduras, India, Indonesia, Kenya, Mexico, the Philippines, Rwanda, Thailand, and Vietnam. Data collection has not yet been carried out in Peru. Data collection in Uganda occurred in 2021 and 2023, so is excluded here given a lack of a recent data point.

ⁿ Three-year moving averages are used to reduce sensitivity to annual fluctuations. We ignore missing values and take averages using available data. In Colombia, there was no data collection from 2022–2024, so the graph shows a break for these years rather than interpolate mid-point values.

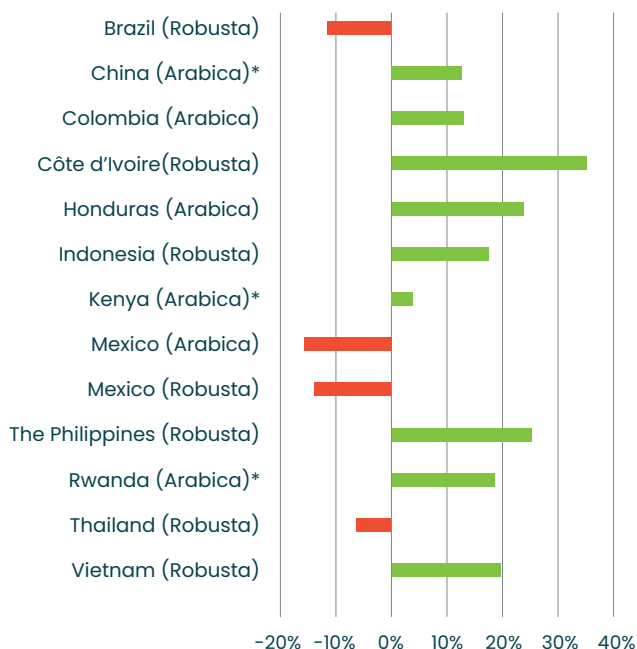
average is still dragged down by lower 2023 yields. In Côte d'Ivoire, this decline was driven by aging coffee trees and minimal rejuvenation efforts, a decrease in coffee area due to competing commercial crops, unfavorable weather conditions in 2023–2024, and extremely low fertilization rates. In Mexico, adverse El Niño climate conditions across coffee growing regions also impacted Robusta yields. Thailand has seen declining yields per hectare since 2018, driven mainly by a reduction in the number of coffee trees as some farmers' shift to competing crops like durian production.

REGENERATIVE AGRICULTURE ADOPTION AND PRODUCTIVITY

With these trends as background, in this section we segment farmers by regenerative agriculture FAT levels to assess whether higher regenerative agriculture practice adoption is associated with improved farm productivity. Looking at aggregate data from 2023–2025 (to avoid a single year driving results), we compare median^o productivity (kg/ha) for farmers scoring “Engaged” on the FAT with farmers scoring “Advanced” or “Leading.” Preliminary analysis suggests that “Advanced+Leading” farmers have higher production than “Engaged” farmers in China, Colombia, Côte d'Ivoire, Honduras, Indonesia, Kenya, the Philippines, Rwanda, and Vietnam (Figure 13).^p The percentage

FIGURE 13

Median change in productivity, Engaged vs. Advanced + Leading farmers (2023–2025)



*China data available 2023–2024. Kenya and Rwanda data available 2024–2025.

change in productivity between FAT levels ranges from four to 35 percent, depending on the origin.

Brazil, Mexico (Arabica and Robusta), and Thailand do not fit this pattern, where “Engaged” farmers report higher median production. In Brazil, the larger average farm size, together with greater investment capacity and higher levels of mechanization, appear to have a stronger influence on productivity differences between farmer groups than FAT scores alone. Nevertheless, the adoption of regenerative agriculture practices remains important for strengthening longer-term farm resilience. In Mexico, severely adverse weather conditions affecting both Arabica and Robusta production areas may have reduced the observable effect of regenerative agriculture practice adoption in yields in recent years, making differences between farmer groups less evident. In Thailand, since 2018 broader diversification trends away from coffee towards other profitable cash crops likely complicates the relationship between productivity and regenerative agriculture adoption.

While these initial trends are encouraging, establishing whether regenerative agriculture practice adoption causes higher productivity remains a significant challenge. The observed relationship needs to be interpreted in the context of farm size, farmer resources, geography, weather, program selection, and prior income. Improved uptake of regenerative practices may support farmer income over the medium to long term through higher or more resilient productivity, more efficient use of inputs, and, where relevant, diversified farm income. These pathways depend on local conditions and may require higher investment in the short term. However, the inverse is also true: Farmers with higher incomes are able to invest more in new technologies and improved practices. This suggests that Nescafé Plan interventions that focus on improving productivity (renovation/rejuvenation, optimized fertilization), alongside efforts to diversify on and off-farm income streams, will be important for achieving improved farmer incomes in the medium to long term.

Nescafé is encouraged by these positive early results, nevertheless, and Nescafé and the Rainforest Alliance will continue to analyze these relationships over the coming years. These results highlight the importance of regular analysis to measure these trends year-over-year as part of a comprehensive M&E approach, to inform programmatic interventions and future directions of Nescafé Plan activities. In addition, these initial trends emphasize the urgency of continued context-specific investments to support the regenerative agriculture transition, which in turn supports the long-term resilience of coffee production, both within and beyond Nescafé's supply chain.

^o Median values have been chosen because they are more representative of the typical farmer within each farmer unit. However, it does not reflect the full distribution of outcomes.

^p India is excluded from this analysis, since all farmers scored Advanced or higher on the FAT from 2023–2025.

5. REGENERATIVE AGRICULTURE AND NITROGEN EFFICIENCY

Improved regenerative agriculture practices have the potential to both reduce on-farm emissions and increase carbon sequestration. By implementing soil testing to better tailor fertilizer application to actual soil and plant needs, increasing the use of organic fertilizers and soil amendments, and correcting soil pH, farmers can gradually reduce their reliance on synthetic nitrogen inputs. The resulting improvements in overall soil fertility and nutrient management reduce GHG emissions over time. In addition, utilizing soil cover, planting shade trees, and protecting natural vegetation increases the presence of carbon-storing organic matter on farms, increasing sequestration potential. A regenerative coffee farm should therefore have a lower net carbon footprint than a conventional coffee farm. A recent study by TechnoServe suggests that transitioning to regenerative coffee practices could reduce current GHG emissions by 3.5 million tons of CO₂e annually.⁴⁴

Nescafé started measuring farmers’ carbon footprints using the Cool Farm Tool (CFT) in 2024.⁴⁵ To calculate farm-level carbon emissions and sequestration, this tool focuses on practices related to crop residue, agroforestry, soil, inputs, fuel, energy, wastewater use, irrigation, land use change, and transportation. In parallel, Nescafé has supported several sector-wide research initiatives to establish country- and regional-level coffee carbon footprint baselines.^{46 47}

Initial analysis by the Rainforest Alliance suggests that improved regenerative agriculture practice adoption (as measured by the FAT) is associated with improved nitrogen efficiency. Nitrogen use efficiency looks at the share

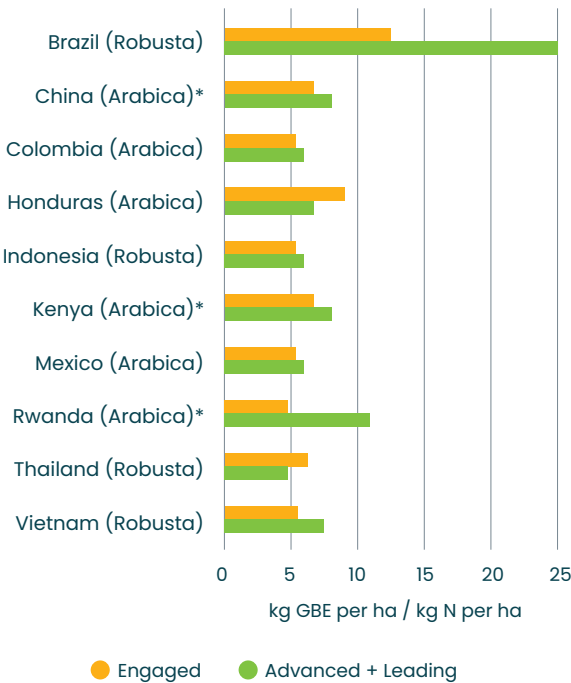
of nitrogen fertilizer that is used by crops compared to the total volume applied.⁴⁸ Higher values indicate greater nitrogen uptake by plants and less runoff into nearby waterways and ecosystems.

As an assessment of nitrogen efficiency, the comparison of median nitrogen productivity (kg GBE per ha / kg nitrogen applied per ha) from 2023–2025 shows that “Advanced+Leading” farmers have higher nitrogen efficiency than “Engaged” farmers in Brazil, China, Colombia, Indonesia, Kenya, Mexico (Arabica), Rwanda, and Vietnam (Figure 14).⁴⁹

Nitrogen use efficiency is linked to fertilization, a major driver of GHG emissions. Thus, improved nitrogen efficiency is a positive sign that Nescafé Plan efforts to improve yields, optimize fertilization, and improve soil cover and agroforestry will help lower on-farm emissions over time. Nescafé is currently transitioning to the latest Cool Farm Perennials (CFP) tool to continue to improve the way it measures emissions for its farmer units.

FIGURE 14

Median nitrogen productivity (kg GBE per ha / kg N per ha) from 2023–2025 by FAT level



*China data available 2023–2024. Kenya and Rwanda data available for 2024–2025.



⁴⁹ India is excluded from this analysis, since all farmers scored Advanced or higher on the FAT from 2023–2025. Given limited fertilizer application in Côte d’Ivoire, it is also excluded from this analysis. Results for Mexico (Robusta) and the Philippines are also excluded from this analysis, given the need for additional due diligence on initial data trends.

6. CONCLUSIONS AND RECOMMENDATIONS

Regenerative agriculture adoption is a journey. Supporting farmers with the technical know-how, evidence, and confidence to shift to more regenerative practices takes time, trust, and continued coherent engagement at the local level. Regular, robust, and reliable farm-level M&E data is a critical part of this work; it is helping Nescafé track progress towards their regenerative agriculture goals, identify what is working well, and where challenges remain, to inform adaptive management and future areas of focus. The Rainforest Alliance is a trusted M&E partner for this work, from data collection and validation to data analysis and reporting, underpinned by subject matter expertise.

Rigorous analysis of cross-sectional data and findings suggests that Nescafé Plan farmers have made positive progress on their regenerative agriculture journey, especially in soil conservation measures such as soil cover and erosion control, intercropping and agroforestry adoption, and water use efficiency. However, key structural challenges remain, including low adoption of optimized fertilization practices, aging coffee plantations in some origins, and cost constraints that prevent smallholders from adopting more labor-intensive practices. Nescafé and their partners continue to learn from evidence and evolve program design to affect continuous improvements across these harder-to-advance practices.

The next four years of the Nescafé Plan will be critical to help farmers accelerate their regenerative agriculture

transition and enable Nescafé to continue contributing to Nestlé's ambitious 2030 targets. Based on the 2025 M&E results, the Rainforest Alliance identified several common areas for future work to help farmers move to the next level of regenerative agriculture engagement, tailored to local country conditions and farm type:

- **Soil health:** Invest in soil pH correction and strengthen support for cost- and nutrient-effective composting and residue management.
- **Optimized fertilization:** Provide farmers with direct access to soil analysis results and feedback, including fertilizer recommendations based on soil, plant needs and local experience.
- **Agroforestry:** Promote balanced shade levels, increase the use of nitrogen-fixing trees, and encourage introduction of fruit and timber to strengthen resilience and farmer income diversification.
- **Plantlet distribution/farm renovation:** Provide targeted investments to help at-risk origins replant, stump, and graft aging trees to improve productivity.

Measuring the uptake and impact of field programs is not easy, but Nescafé and the Rainforest Alliance's collaboration on Nescafé Plan M&E proves that it can be done at scale to inform investment and strategy decisions, and support external reporting of ESG results.

The Rainforest Alliance's supply chain M&E work supports Nescafé and their partners in better understanding the impact of their field programs on farmer practice uptake and outcomes, helping shape future sustainability investment decisions to improve positive outcomes for coffee farmers and Nescafé supply chains.



REFERENCES

- ¹ Nescafé, Our Sustainability Journey – Ten Years of the Nescafé Plan (Nestlé, 2021), <https://www.nestle.com/sites/default/files/2021-01/sustainable-journey-ten-years-nescafe-plan-2021-en.pdf>.
- ² “Nestlé launches Nescafé Plan 2030 to help drive regenerative agriculture, reduce greenhouse gas emissions and improve farmers’ livelihoods,” Nestlé, October 4, 2022, <https://www.nestle.com/media/press-releases/allpressreleases/sustainable-coffee-nescafe-plan-2030>.
- ³ Nestlé, The Nestlé Agriculture Framework (Nestlé, 2024), <https://www.nestle.com/sites/default/files/2022-07/nestle-agriculture-framework.pdf>.
- ⁴ Nestlé, Nestlé’s Net Zero Roadmap (Nestlé, 2023), <https://www.nestle.com/sites/default/files/2023-12/nestle-net-zero-roadmap-en.pdf>.
- ⁵ Nescafé, Nescafé Plan 2030: Progress Report 2025 (Nescafé, 2026), <https://www.nestle.com/sites/default/files/2026-06/nescafe-plan-2030-progress-report-2025.pdf>.
- ⁶ Nestlé, “Regenerative Agriculture,” Nestlé, accessed June 22, 2026, <https://www.nestle.com/sustainability/nature-environment/regenerative-agriculture>.
- ⁷ Rainforest Alliance, Raising the Bar – Regenerative Agriculture for More Resilient Agro-Ecosystems (Rainforest Alliance, 2020), <https://www.rainforest-alliance.org/wp-content/uploads/2021/07/Raising-the-Bar-Regenerative-Agriculture-for-More-Resilient-Agro-Ecosystems.pdf>.
- ⁸ Estelle Raveloaritiana and Thomas Cherico Wanger, “Long-term agricultural diversification increases financial profitability, biodiversity, and ecosystem services: a second-order meta-analysis,” *Nature Communications* 17 (2026): 1016, <https://www.nature.com/articles/s41467-025-67757-7>.
- ⁹ Christopher Poeplau and Axel Don, “Carbon sequestration in agricultural soils via cultivation of cover crops – A meta-analysis,” *Agriculture, Ecosystems and Environment* 200 (2015): 33–41, <https://www.sciencedirect.com/science/article/abs/pii/S0167880914004873>.
- ¹⁰ Jessica Villat and Kimberly A. Nicholas, “Quantifying soil carbon sequestration from regenerative agricultural practices in crops and vineyards,” *Frontiers in Sustainable Food Systems* 7 (2015), <https://www.frontiersin.org/journals/sustainable-food-systems/articles/10.3389/fsufs.2023.1234108/full>.
- ¹¹ Jeanne Dollinger and Shibu Jose, “Agroforestry for soil health,” *Agroforestry Systems* 92 (2018): 213–219, <https://link.springer.com/article/10.1007/s10457-018-0223-9>.
- ¹² Mohamed Abdalla et al., “A critical review of the impacts of cover crops on nitrogen leaching, net greenhouse gas balance and crop productivity,” *Glob Chang Biol*, 25, 8 (2019): 2530–2543, <https://pubmed.ncbi.nlm.nih.gov/30955227/>.
- ¹³ Innocent Nzeyimana et al., “Mulching effects on soil nutrient levels and yield in coffee farming systems in Rwanda,” *Soil Use and Management* 36, 1 (2019): 58–70, <https://bsssjournals.onlinelibrary.wiley.com/doi/full/10.1111/sum.12534>.
- ¹⁴ Maïke Nesper et al., “Shade tree diversity enhances coffee production and quality in agroforestry systems in the Western Ghats,” *Agriculture, Ecosystems and Environment* 247 (2017): 172–181, <https://www.sciencedirect.com/science/article/abs/pii/S0167880917302670>.
- ¹⁵ Lorena Soto-Pinto et al., “Shade effect on coffee production at the northern Tzeltal zone of the state of Chiapas, Mexico,” *Agriculture, Ecosystems and Environment* 80, 1–2 (2000): 61–69, <https://www.sciencedirect.com/science/article/abs/pii/S0167880900001341>.
- ¹⁶ Jialing Teng et al., “Conservation agriculture improves soil health and sustains crop yields after long-term warming,” *Nature Communications* 15 (2024): 8785, <https://www.nature.com/articles/s41467-024-53169-6>.
- ¹⁷ Rosalíen E. Jezeer et al., “Benefits for multiple ecosystem services in Peruvian coffee agroforestry systems without reducing yield,” *Ecosystem Services* 40 (2019): 101033, <https://www.sciencedirect.com/science/article/abs/pii/S2212041619302001>.
- ¹⁸ Quan Vu Le et al., “A Study of Regenerative Farming Practices and Sustainable Coffee of Ethnic Minorities Farmers in the Central Highlands of Vietnam,” *Frontiers in Sustainable Food Systems* 5 (2021), <https://www.frontiersin.org/journals/sustainable-food-systems/articles/10.3389/fsufs.2023.1234108/full>.
- ¹⁹ Katherine L. Tully et al., “More trees less loss: Nitrogen leaching losses decrease with increasing biomass in coffee agroforests,” *Agriculture, Ecosystems and Environment* 161 (2012): 137–144, <https://www.sciencedirect.com/science/article/abs/pii/S0167880912002927?via%3Dihub>.
- ²⁰ Loekie Schreefel et al., “Regenerative agriculture – the soil is the base,” *Global Food Security* 26 (2020): 100404, <https://www.sciencedirect.com/science/article/pii/S2211912420300584?via%3Dihub>.
- ²¹ Giovanni Tamburini et al., “Agricultural diversification promotes multiple ecosystem services without compromising yield,” *Science Advances*, 6, 45 (2020), <https://www.science.org/doi/10.1126/sciadv.aba1715>.
- ²² Martha Caswell et al., “Revisiting the “thin months” – A follow-up study on the livelihoods of Mesoamerican coffee farmers,” *CIAT Policy Brief No. 19* (2014): 6, http://ciat-library.ciat.cgiar.org/Articulos_Ciat/biblioteca/Policy_Brief_19_Thin_Months.pdf.
- ²³ Minyan Pinoargote et al., “Carbon stocks, net cash flow and family benefits from four small coffee plantation types in Nicaragua,” *Forests, Trees and Livelihoods* 26, 3 (2016): 183–198, <https://www.tandfonline.com/doi/abs/10.1080/14728028.2016.1268544>.
- ²⁴ Piet J.A. van Asten et al., “Coffee-Banana Intercropping: Implementation guidance for policymakers and investors,” *CGIAR Climate-Smart Agriculture Practice Brief* (2015), <https://cgspace.cgiar.org/items/c1971e38-282a-4c2e-bd65-ef6c9d1ae28>.

- ²⁵ Katlyn S. Morris et al., "Agroecology and Climate Change Resilience in Smallholder Coffee Agroecosystems of Central America," Agroecology and Rural Livelihoods Group University of Vermont (2016), <https://cgspace.cgiar.org/server/api/core/bitstreams/3c286057-c15a-44e7-b62e-b5f5b84f125d/content>.
- ²⁶ Carl Atkin-House, "Scaling Regenerative Agriculture," Climate Asset Management, July 11, 2023, <https://climateassetmanagement.com/insight/scaling-regenerative-agriculture/>.
- ²⁷ Sjoerd Panhuysen and Frederik de Vries, Coffee Barometer 2023 (Coffee Barometer, 2023), https://coffeebarometer.org/documents_resources/coffee_barometer_2023.pdf.
- ²⁸ Adapted from internal note from Nescafé on key regenerative agriculture priorities by origin.
- ²⁹ Nestlé, Regenerative Agriculture at Nestlé (Nestlé, 2024), <https://www.nestle.com/sites/default/files/2022-12/nestle-agriculture-framework-measures.pdf>.
- ³⁰ Nescafé, Nescafé Plan 2030: Progress Report 2025 (Nescafé, 2026), <https://www.nestle.com/sites/default/files/2026-06/nescafe-plan-2030-progress-report-2025.pdf>.
- ³¹ Rainforest Alliance, Raising the Bar – Regenerative Agriculture for More Resilient Agro-Ecosystems (Rainforest Alliance, 2020), <https://www.rainforest-alliance.org/wp-content/uploads/2021/07/Raising-the-Bar-Regenerative-Agriculture-for-More-Resilient-Agro-Ecosystems.pdf>.
- ³² Evelyne Musambi, "Farmers in Africa say their soil is dying and chemical fertilizers are in part to blame," Associated Press, July 24, 2024, <https://www.ap.org/news-highlights/spotlights/2024/farmers-in-africa-say-their-soil-is-dying-and-chemical-fertilizers-are-in-part-to-blame/>.
- ³³ Philip Kamau et al., "Gendered farmer perceptions towards soil nutrition and willingness to pay for a cafeteria-style filter system for in-situ soil testing: Evidence from Central Kenya," Heliyon 10, 18 (2024): e37568, <https://pmc.ncbi.nlm.nih.gov/articles/PMC11422606/>.
- ³⁴ Rainforest Alliance, Raising the Bar – Regenerative Agriculture for More Resilient Agro-Ecosystems (Rainforest Alliance, 2020), <https://www.rainforest-alliance.org/wp-content/uploads/2021/07/Raising-the-Bar-Regenerative-Agriculture-for-More-Resilient-Agro-Ecosystems.pdf>.
- ³⁵ Nestlé, Nestlé's Global Reforestation Program (Nestlé, 2022), <https://www.nestle.com/sites/default/files/2022-02/nestle-global-reforestation-program.pdf>.
- ³⁶ Nestlé, Long-term forest conservation and restoration (Nestlé, 2025), <https://www.nestle.com/sustainability/nature-environment/forests/conservation-restoration>.
- ³⁷ Nescafé, Nescafé Plan 2030: Progress Report 2024 (Nescafé, 2025), <https://www.nestle.com/sites/default/files/2025-06/nescafe-plan-2030-progress-report-2024.pdf>.
- ³⁸ Rainforest Alliance, Raising the Bar – Regenerative Agriculture for More Resilient Agro-Ecosystems (Rainforest Alliance, 2020), <https://www.rainforest-alliance.org/wp-content/uploads/2021/07/Raising-the-Bar-Regenerative-Agriculture-for-More-Resilient-Agro-Ecosystems.pdf>.
- ³⁹ TechnoServe, Coffee Wet Mill Processing Guide (TechnoServe, 2022), <https://www.technoserve.org/wp-content/uploads/2022/03/TechnoServe-Wet-Mill-Processing-Guide.pdf>.
- ⁴⁰ Carmen Caballero, Colombia's sustainable coffee sector and its lessons for climate solutions (World Economic Forum, 2025), <https://www.weforum.org/stories/climate-action/columbias-sustainable-coffee-sector-and-its-lesson-for-climate-solutions/>.
- ⁴¹ TechnoServe, Regenerative Coffee Investment Case: Global Brief (TechnoServe, 2025), <https://www.technoserve.org/regenerative-coffee-investment-case/>.
- ⁴² USDA, Coffee: World Markets and Trade (USDA Foreign Agriculture Service, 2026), <https://apps.fas.usda.gov/psonline/circulars/coffee.pdf>.
- ⁴³ Inter-American Development Bank, "The most unexpected effect of climate change," IDB, July 24, 2020, <https://www.iadb.org/en/blog/agriculture-and-food-security/most-unexpected-effect-climate-change>.
- ⁴⁴ TechnoServe, Regenerative Coffee Investment Case: Global Brief (TechnoServe, 2025), <https://www.technoserve.org/regenerative-coffee-investment-case/>.
- ⁴⁵ "About the Cool Farm Tool," Cool Farm Alliance, accessed August 7, 2025, <https://coolfarm.org/the-tool/>.
- ⁴⁶ Conservation International, Sustainable Coffee Challenge, and MEO Carbon Solutions, Latin America Coffee Footprint Baseline Study: Brazil, Colombia, Honduras, Mexico, Peru (Sustainable Coffee Challenge, 2026), <https://www.sustaincoffee.org/coffee-carbon-research>.
- ⁴⁷ Enveritas, Establishing Carbon Footprint Baselines for Robusta Coffee Production in Two Origins in Southeast Asia: Central Highlands, Vietnam, and Southern Sumatra, Indonesia (USAID, Nestlé, JDE Peets, Lavazza, and Costa Coffee, 2023), https://d73svof8ook8y.cloudfront.net/resources/Carbon-footprint-Robusta_Vietnam-and-Indonesia_final-report_May-2023.pdf.
- ⁴⁸ FAO, Nitrogen use efficiency must be improved to reduce harm to human and environmental health (FAO, 2025), <https://www.fao.org/newsroom/detail/FAO-nitrogen-use-efficiency-report/en>.

