LEARNING REPORT: THE COFFEE FARMER RESILIENCE INITIATIVE

Financing Farm Renovation:
How to Build Resilience Using a Blend of Capital

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IN THIS BRIEF

Root Capital

Root Capital is pioneering finance for high-impact agricultural businesses in Africa, Asia and Latin America. We lend capital, deliver financial training, and strengthen market connections so that businesses that serve hundreds, and often thousands, of smallholder farmers can grow rural prosperity. Since our founding in 1999, Root Capital has disbursed more than $900 million in loans to 580 businesses and has improved incomes for more than 1.2 million farm households.

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We would like to thank IDH, The Sustainable Trade Initiative for generously supporting the production of this report, and for its dedication to continuous learning, collaboration, and innovation. We also extend our gratitude to the U.S. Agency for International Development (USAID) and the Multilateral Investment Fund of the Inter-American Development Bank (IDB-MIF) for their ongoing support of the Coffee Farmer Resilience Initiative, including impact and learning activities.

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FOREWORD

Investing in Smallholder Farming

It is expected that in 2016, global consumers will drink more coffee than ever before. With growing populations and rising incomes, demand for coffee — as well as cocoa, tea, and other agricultural commodities — will continue to increase in the coming years.

However, this demand cannot be met with a dwindling supply. Perennial crops such as these decline in productivity over time and become increasingly susceptible to the effects of climate change and outbreaks of pests and diseases. To avoid this, millions of smallholder farmers must continually replace aging trees, but they often lack financial resources, knowledge of good agricultural practices, access to the right planting material and inputs, or a combination of these.

Even if they are able to undertake the costly process of renovating or rehabilitating unproductive trees, smallholder farmers must overcome a significant gap between the moment of investment and the moment of harvesting the benefits. For these reasons, financial support in the form of long-term loans is frequently needed.

IDH, The Sustainable Trade Initiative and our partners have calculated that, at a global level, roughly 13 million hectares of smallholder farmland is in need of, and suitable for, renovation or rehabilitation. Doing so, we estimate, would require $110 billion over a period of 25 years. This investment would generate export earnings from developing countries of $300 billion over the same period of time. More fundamentally, it would improve incomes for millions of smallholder producers and support the next generation of family farmers.

There is a strong case for investing in renovation and rehabilitation. But the long-term and relatively high-risk nature of such investments means that there are few financial institutions willing and able to take action. As a result, there are currently only a dozen or so renovation and rehabilitation schemes meeting a fraction of the global need. And the models and mechanisms to finance this activity are still evolving, as are the channels through which to deliver capital efficiently.

To accelerate investments in crop renovation and rehabilitation among smallholder farmers, it is vital that successful practices are analyzed and shared. At IDH, we see it as our role to convene platforms that promote learning and facilitate collaboration. To that end, in November 2015 we organized an "Innovation Forum on Renovation and Rehabilitation of Smallholder Tree Crops," bringing together more than 100 participants representing 19 countries and a cross-section of the agri-food industry, financial institutions, national governments, development finance institutions and non-governmental organizations.

The Innovation Forum featured candid reflections from pioneers who are doing the difficult work to pilot new models. Among them, Root Capital has mobilized diverse partners to invest in coffee renovation throughout Latin America. Its work is a great example of how public-private partnerships can provide blended capital and technical assistance to support cooperatives and SMEs in implementing renovation and rehabilitation schemes.

We are pleased to partner with Root Capital and to disseminate their learning with the wider industry. We hope this publication inspires actors throughout agricultural value chains and across the finance and development sectors to engage in addressing these urgent issues. Together, we can create a more prosperous future for smallholder farmers and a more sustainable planet.

Lucian Peppelenbos
Director of Learning and Innovation
IDH, The Sustainable Trade Initiative

FOREWORD

Combating Food Insecurity in the Coffeelands

Over 70 percent of the world's coffee is produced by smallholder farmers. Millions of these farmers also suffer from food insecurity and malnutrition. In the coffee-growing regions of Latin America, seasonal hunger is so common that it has a name: los meses flacos, or "the lean months." Typically, the lean months occur in the weeks and months leading up to a new coffee harvest, when families have depleted most of their income from the previous season. And today, because of increasingly erratic and unpredictable rainfall patterns and rising temperatures, smallholder coffee farmers and their families are even more vulnerable.

Over the past three years, coffee leaf rust has devastated farms throughout Latin America, where some of the world's finest beans are grown. From Mexico to Peru, the fungal disease has had a dramatic ripple effect on local economies.

For households in these communities, the cultivation and sale of coffee is often the only source of income used to purchase food. And for many—including seasonal farm laborers—the leaf rust epidemic has meant a sudden loss of that income, exacerbating food insecurity in a region already suffering from a prolonged drought.

The U.S. Agency for International Development (USAID) has a long history of supporting the world's coffee farmers and their communities. In 2014, we partnered with Root Capital and leading coffee companies—including Cooperative Coffees, Equal Exchange, Keurig Green Mountain, and Starbucks—to help smallholder coffee farmers overcome the disease and build more resilient livelihoods.

Through Root Capital's Coffee Farmer Resilience Initiative, USAID is helping farmers access the credit and training needed to replant aging and disease-affected trees and diversify into new income-generating activities. Our partnership with Root Capital complements USAID's broader efforts to find sustainable long-term solutions to food insecurity in the coffeelands, a challenge made worse by the leaf rust outbreak.

Recognizing coffee's contribution to poverty reduction and development, USAID devotes significant resources to improving the productivity and incomes of smallholder coffee producers in Africa, Latin America, and Asia, in particular through Feed the Future, the U.S. Government's global hunger and food security initiative. USAID also recognizes the important role that access to affordable finance plays in helping smallholders build sustainable businesses. For this reason, we support efforts worldwide to identify and promote new ways for farmers to use finance to increase productivity and access markets.

Nearly three years after launching the Coffee Farmer Resilience Initiative, Root Capital has documented initial learning and shared progress in this new report designed for practitioners. The report offers important lessons and recommendations that are broadly applicable to agricultural finance and development: from structuring long-term loans for farm renovation to designing a platform through which the private sector can support producers at the base of their supply chains. Importantly, the report also highlights how such large-scale efforts can be financed using a blend of capital, pairing public and private sector funding with impact investments while also leveraging matching grants and catalytic credit guarantees.

The importance of reliable access to financial services for smallholder farmers cannot be overstated, especially in times of shocks and stresses like the coffee leaf rust epidemic. As part of this initiative, Root Capital, USAID, and our partners are taking the first step in helping smallholder farmers on the front lines adapt to a changing climate.

Justin Finnegan
Deputy Assistant to the Administrator
Bureau for Food Security
U.S. Agency for International Development

From food security and nutrition to environmental sustainability and economic growth, investment in agriculture—perhaps more than any other sector—has the potential to bring about unprecedented change today and into the future.

Executive Summary

The Canary in the Coal Mine

For the past three years, a debilitating crop disease known as coffee leaf rust has spread throughout Latin America. Called *la roya* in Spanish, this naturally occurring fungal disease attacks coffee plants and kills them over time. It has dramatically reduced crop yields and caused significant economic losses for smallholder farmers and rural communities from Mexico to Peru.

Leaf rust has revealed the consequences of underinvestment in the coffee sector and highlighted the vulnerability of participants throughout the entire supply chain, especially smallholder farmers. It also underscores broader challenges faced by smallholder farmers — from depleted soil and aging plant stock to limited agronomic knowledge and insufficient access to inputs and finance.

Although the full financial impact of leaf rust has yet to be quantified, during the height of the outbreak in early 2013, analysts estimated that over 50 percent of the total coffee-growing area in Central America had been affected, costing producers approximately $500 million in lost revenue and eliminating an estimated 375,000 jobs.[1]

The outbreak has had a severely negative ripple effect on the region's economies, prompting governments to declare national states of emergency as global traders and roasters searched for ways to support producers and avoid potential supply disruptions. When large-scale crop failures began, public and private sector actors alike were reacting in real time, but they had limited visibility into the magnitude of the challenge. And few, if any, organizations could offer interventions capable of meeting the urgency and scale of what has now become the most serious leaf rust outbreak since the disease first appeared in the region three decades ago.

Leaf rust is not a short-term problem, and there are no quick fixes for overcoming the epidemic. Output from coffee plants affected by the fungus is significantly reduced, which means that farm incomes are depressed precisely when farmers need cash to control and combat the disease. Plus, without active and ongoing management, the combination of aging plants and poor farming practices creates an environment that is even more susceptible to pest and disease attacks. These factors, in turn, start a downward cycle of low productivity, reduced income, and underinvestment that often leads to migration, deforestation, and other desperate measures.

At the same time, climate change is becoming a source of additional risks, taxing already overstretched resources. Climate scientists

1 International Coffee Organization (ICO), "Report on the Outbreak of Coffee Leaf Rust in Central America and Action Plan to Combat the Pest," May 13, 2013.

predict that the area available to grow quality Arabica coffee, a crop that thrives in cooler conditions, will shrink as temperatures rise in lower-altitude production zones. While some coffee farmers may be able to shift to higher, cooler altitudes, others have no place to go. In that sense, the leaf rust outbreak is a symptom of much larger, chronic problem facing farming communities globally. It is the proverbial "canary in the coal mine," signaling the impact of climate change on agricultural production.

Building More Resilient Agricultural Supply Chains with Blended Finance

As the effects of the leaf rust outbreak became apparent in early 2013, Root Capital hurried to develop a response. To address both the urgent financing needs of smallholder coffee farmers fighting leaf rust and longstanding barriers to on-farm investment, we leveraged existing relationships with public, private, and nonprofit partners to launch the Coffee Farmer Resilience Initiative (CFRI).

Working through local enterprises, such as farmer cooperatives and private coffee mills, that aggregate smallholders, the multi-pronged approach channels short- and long-term financing as well as technical assistance to coffee farmers. A core component of the initiative is providing credit to help producers finance the upfront cost of renovating and rehabilitating diseased, aging, or otherwise unproductive coffee plants.[2]

Perennial tree crops like coffee and cocoa are valuable assets that depreciate over time. In order to maintain healthy and productive yields, these assets require continual maintenance and periodic renewal.

For many commercial and semi-commercial farmers who cultivate tree crops, renovation and rehabilitation (R&R) is simply business as usual. It is a standard maintenance practice that is conducted on an ongoing, rotational basis each year. And it's backed by reliable financial models and consistent growth assumptions as well as an established network of service providers like nurseries and input distributors.

It's an entirely different situation for smallholder farmers. In addition to agronomic knowledge and the ability to make significant upfront investments in R&R — average renovation costs in Latin America range from $3,000 to $5,000 per hectare — these farmers must have alternative sources of income to bridge the period of time between when diseased trees are uprooted and when new trees become productive. For households that rely on coffee farming as their primary livelihood, income is severely reduced during this two- to three-year "valley of death." And it's one of the many reasons why producers are reluctant to place a bet on renovation or rehabilitation.

A recent analysis by Dalberg finds the global need for coffee-sector R&R to be roughly five million hectares, which carries an approximate cost of $6 billion within the first year and $35 billion over the course of 25 years. The same report identifies similar financing needs in the smallholder cocoa, palm oil, and tea sectors, totaling an additional $14 billion today and $74 billion over the next 25 years.[3]

Even if this large pool of capital was available for R&R activity — which it is not — there is the added complexity of being able to deploy it efficiently so that it actually reaches individual producers. Today, farmer cooperatives, processors, and other organizations within agricultural value chains play an important role in bringing together hundreds, often thousands, of smallholders and serving as a centralized hub. These aggregators have also been essential in promoting financial inclusion for their local communities, making the disbursement, monitoring, and collection of credit in small amounts more feasible and usually more cost-effective for rural borrowers. As we explore ways to scale R&R, these are key channels through which to deliver R&R financing. Still, there are only so many of these well-functioning aggregators, and most of the world's smallholders are, in fact, not affiliated with them. Additionally, a majority of existing aggregators lack the capacity to absorb long-term loans, design an internal credit fund, and originate R&R loans with individuals. It's new territory for most and requires sophisticated accounting systems and internal controls. For this reason, technical assistance is crucial.

With aging trees and declining yields, Latin America's coffee-growing regions required large-scale investments in R&R well before the outbreak of leaf rust. The sudden spread of the disease and the subsequent drop in output did prompt a broader recognition of the urgent need to make long-term investments in sustainable production. In practice, however, many actors throughout the value chain remain reluctant when it comes to allocating capital and assuming the risk that typically comes with multiyear R&R investments. With the notable exception of Colombia's recent coffee renovation efforts, there are few successful models for how to design and conduct large-scale R&R programs in agricultural value chains dominated by smallholder famers.

Defining Renovation & Rehabilitation (R&R)

Renovation: Entirely replacing diseased, aging, or otherwise unproductive trees with new seedlings

Rehabilitation: Grafting, stumping, or pruning to rejuvenate diseased, aging, or otherwise underproductive trees

2 CFRI countries include Guatemala, Honduras, Mexico, Nicaragua, and Peru.

3 Dalberg. "Smallholder Tree Crop Renovation and Rehabilitation: A Review of the State of the Emerging R&R Market and Opportunities to Scale Investment," October 2015.

Blended finance refers to the deliberate use of funds from capital providers that operate with a range of financial and impact return expectations, from philanthropic capital with a negative rate of return to those seeking capital preservation and below-market to market-rate returns. Generally, blended finance approaches are used to attract capital for investments addressing market failures and delivering substantial social and/or environmental impact in emerging and frontier markets.

Private Sector	coop coffees, EQUAL EXCHANGE FAIRLY TRADED, KEURIG GREEN MOUNTAIN, Starbucks
Public Sector	FOMIN Multilateral Investment Fund Member of the IDB Group, USAID FROM THE AMERICAN PEOPLE
Philanthropic & Impact Investors	STICHTING DOEN, FORD FOUNDATION, OPEN ROAD KEEPING IMPACT ON TRACK, skoll FOUNDATION, SVENSKA POSTKOD LOTTERIET

COFFEE FARMER RESILIENCE INITIATIVE ACTIVITIES

FINANCE

- **Short-term lending** to facilitate market access, cover ongoing operating expenses, and stabilize cash flows so that producers can continue to generate income from coffee trees that have not been crippled by leaf rust
- **Long-term lending** to finance the rehabilitation and renovation of aging and diseased trees

ADVISORY SERVICES

- **Financial training** so enterprises can qualify for and effectively manage credit
- **Agronomic assistance** to promote climate-smart farming practices
- **Income diversification training** at both the enterprise and producer levels
- **Mobile technology services** to help producer organizations digitize processes and modernize their operations

IMPACT & LEARNING

- **Impact assessment** to understand the role that Root Capital lending and training have on agricultural enterprises and the impact that these enterprises, in turn, have on individual producers
- **Knowledge sharing** to document and capture challenges, progress, and learning to contribute to scalable models
- **Market engagement** to demonstrate practical models for investing in sustainable supply chains

SUMMARY OF RECOMMENDATIONS

1. Leverage Blended Finance
2. Identify Scalable Distribution Channels
3. Expand Risk Management Solutions
4. Bundle Credit with Capacity Building
5. Strengthen Enabling Environment for Farm Renewal

What We're Learning

In an effort to contribute to the dialogue around blended finance approaches to R&R specifically, and investing in smallholder agricultural more broadly, this report shares details of the public-private partnership model Root Capital has developed, what we've done over the first two years of the initiative, and what we're learning. Drawing from existing literature and on-the-ground observations from Root Capital loan officers, financial trainers, and agronomic advisors, as well as our partners in the initiative, the report offers five practical recommendations for conducting R&R at scale. These are explored in more detail in the full report.

1. **Leverage blended finance structures and incorporate targeted subsidies to finance R&R.** While there is now unprecedented interest in agricultural investing, private markets have generally failed to deliver financing for smallholder R&R, and for smallholder agriculture more broadly. Given the risks inherent in agriculture, coupled with the limited availability of adequate insurance and hedging products in these markets, the cost of commercial capital to fund R&R over a seven-plus-year time horizon would exceed what most smallholder farmers can afford. It is therefore unrealistic to expect that smallholder R&R can be financed on purely commercial terms and deliver risk-adjusted returns to investors.

   For R&R to happen at scale with smallholder farmers — whether in coffee or other value chains like cocoa — what is required is a blend of capital with different risk/return expectations and impact objectives, as well as targeted subsidies for accompanying technical assistance. When designed and implemented in ways that align incentives, mechanisms such as partial loan guarantees, risk-sharing facilities, reserves for first-loss capital, and technical assistance funds can mitigate risk and expand impact. These types of blended financing structures, if further scaled, can also help lower barriers to entry for other lenders and mobilize capital from a range of sources.

2. **Identify and strengthen scalable aggregation points for channeling capital to smallholders.** The vast majority of the world's smallholder farmers — estimates suggest up to 90 percent — do not participate in tightly organized value chains.[4] Rather, they are unorganized and lack strong, consistent relationships with buyers, as well as access to finance, farm inputs, agronomic training, and other support services that often accompany those relationships. Even within the coffee sector, which is generally considered to be among the most well-organized and transparent agricultural value chains, a majority of the world's 25 million producers are not aggregated into formal enterprises. And in the context of leaf rust, smallholders who are not affiliated with an aggregator may be the most strongly affected and have the greatest need.

   New channels are needed to efficiently deploy capital to smallholders beyond those connected to well-organized producer organizations and private enterprises. For instance, opportunities exist to channel capital through local microfinance institutions, savings and loan cooperatives, and commercial banks. While these financial institutions typically have strong internal lending systems, their slow and uneven expansion into rural areas means that they may lack an understanding of agricultural finance, such as seasonal cash flows. Therefore, supply-side technical assistance is needed to help these institutions adapt their urban and peri-urban models of short-term lending to meet the financial needs of smallholders.

   Additionally, there is a need to develop and mainstream innovative risk-sharing mechanisms in which aggregators assume part but not all of the risk on the performance of the loans they deploy and manage. Doing so could further increase the addressable demand by an order of magnitude. We believe this approach offers a promising avenue for future product development and innovation.

3. **Expand risk management solutions to benefit individual producers.** As coffee growers recover from leaf rust and are confronted with a decision as to whether and how much to invest in R&R, they do so amid an increasingly volatile coffee market. After surging 50 percent to $2.20 per pound in 2014, the benchmark price of Arabica retreated throughout 2015. In early 2016, the most actively traded futures contract price declined to $1.11 per pound — a two-year low and only slightly above Central America's estimated average cost of production. At the same time, exceptionally strong El Niño conditions are provoking further uncertainty, with potential disruptions to the timing and volume of rainfall in several coffee-producing countries.

4 Dalberg, "Catalyzing Smallholder Agricultural Finance", September 2012.

This is the context in which smallholder coffee producers are deciding whether or not to make 10–plus–year investments in their farms; what may appear to be a smart, rational decision to invest one year may prove otherwise the next. And despite the extent to which both public and private sector actors have embraced the concepts of resilience and sustainability, it is the producers who still take on a disproportionate share of the risks. They remain most vulnerable to and least able to cope with shocks and stresses and the boom-and-bust price cycles that often follow.

Therefore, in addition to focusing on increasing production through R&R, policymakers and practitioners should devote equal attention to designing and deploying effective risk management solutions that are both accessible and applicable to farmers and farmer enterprises. This can include early warning systems and crop insurance schemes to protect farmers from downside risk, especially in times of natural disasters and widespread crop failure. In addition, specialty buyers whose business is linked to specific flavor profiles and origins can offer incentives and rewards for quality with price premiums and long-term contracts that partly insulate farmers against market volatility.

4. **Bundle financial and non-financial support to increase the absorptive capacity of enterprises and individual farmers to qualify for and manage credit.** The opportunity for individual farmers to invest in R&R will largely be determined by the strength and capacity of the institution administering R&R financing on a local level. While more commercial banks and microfinance institutions may provide financial products and services for R&R in the future, aggregators — producer cooperatives and private exporters, in Root Capital's experience — continue to play this role. Today, these organizations are the conduit through which most financing reaches individual producers. Yet more often than not, lack of capacity, limited technical knowledge, and weak internal controls at the aggregator level become the biggest bottleneck to scaling renovation financing.

   Similarly, because many rust-affected farmers are reluctant to take on multiyear financial commitments in the current context of extreme market volatility and unpredictable growing conditions, more advanced decision-support tools are needed to remove the guess-work and help producers objectively evaluate potential financial returns. This includes robust cost–benefit analyses to determine the financial viability of renovation, as well as detailed yield projections that are informed by climate scenarios mapped at various altitudes and with different production systems.

   For smallholder farmers and the enterprises that aggregate them, it is rarely the case that both capital and technical assistance are available (and often neither is available). Bringing the two together is essential for expanding the addressable demand for R&R finance and, for that matter, other types of working capital and capital expenditure finance as well.

5. **Strengthen the overall enabling environment by ensuring consistent access to high-quality planting material and information about coffee varieties.** The decisions farmers make about which varieties to plant could likely impact their livelihoods for the next 20 years or more. However, decision-making is often incidental rather than strategic, and coffee farmers rarely have enough information to make informed choices based on what is optimal for their local conditions.[5] For example, limited information and a lack of consensus on varieties presents one of the most formidable challenges to successful renovation; the ongoing debate over the relative merits of rust-resistant and non-rust-resistant varieties leaves many farmers with mixed messages.

   Alongside variety research, R&R initiatives must place a strong focus on technical training, capacity building, and transparent reporting related to nursery management and seedling production, as quality control at the seedling production phase has been inadequate. Seemingly small and easily overlooked details, such as the origin and quality of coffee tree seedlings, make a significant difference in the success of a renovation program. In some cases in Peru, we have found up to one-third of seedling mortality after transplantation to the field, mostly due to root problems originating at the nursery stage. Well-managed nurseries typically experience seedling mortality rates of less than 5 percent. In other cases, nurseries mistakenly mixed seedling varieties. These and related quality-control issues not only increase the cost of renovation but also reduce productivity and depress farmer incomes, thereby jeopardizing loan repayments.

5 Neuschwander, Hanna, "The Importance of Research and Investing in the Future," *Specialty Coffee Chronicle*, October 30, 2015.

Looking Ahead

It is likely that leaf rust and other crop diseases will affect farmers not just in the Latin American coffee sector but across all crops and regions globally for years to come. The unpredictable weather conditions that come with climate change will further jeopardize farmers' ability to cope with pests and pathogens. Indeed, leaf rust is just one crop disease threatening producers in one value chain in one region.

While there are no simple solutions to these challenges, we are seeing some encouraging signs of progress — from well-managed renovation plans to innovative income diversification projects — across our lending portfolio of 115 coffee enterprises representing approximately 100,000 farmers in Latin America. At the same time, we are also seeing many cases of farmers simply waiting to see what happens to their coffee trees, or abandoning their land in desperation and migrating to work elsewhere.

This document shares our learning — progress and challenges alike — from the first two years of the Coffee Farmer Resilience Initiative. Although it is modest in scale relative to the overall need, we hope that the initiative can provide insights to inform emerging models for building farmer resilience and prosperity in the coffee sector as well as other agricultural sectors in which smallholder farmers play a crucial role (e.g., cashew, cocoa, maize, palm oil, tea). The report is divided into four sections.

- **Latin America's Coffee Crisis:** The report begins by providing brief context on the global coffee market and the rise of leaf rust disease.
- **A Collaborative Approach to Building Smallholder Resilience:** This section explores the design and funding sources of this multi-stakeholder initiative. It discusses the range of interventions used to promote resilience and highlights implications for aligning diverse actors to work on a larger scale.
- **Financing Coffee Renovation:** This section delves into how Root Capital structures long-term loans for R&R, outlining the due diligence and monitoring required. It also breaks down the estimated cost of renovation and discusses the critical role of internal credit funds in channeling finance through aggregators to individual farmers.
- **Leveraging Private Sector Investment for Technical Assistance:** The report concludes by exploring the complementary role that technical assistance plays alongside the provision of credit in expanding addressable demand and mitigating risk for R&R investments. It does this by highlighting the mechanism within CFRI through which private sector roasters and traders have channeled investments into their own supply chains to support agronomic training, mobile technology adoption, and a range of income diversification activities.

Produced and exported from more than 50 countries and enjoyed by millions, coffee is among the world's most valuable traded agricultural commodities. Its cultivation plays a crucial role in the livelihoods of 25 million coffee farmers and their families, not to mention those involved in other steps along the value chain: farm inputs, harvesting, processing, transport, roasting, and retail.

Latin America's Coffee Crisis

For decades, millions of these small-scale farmers have struggled to earn a stable income due to often interrelated challenges of depleted soil, erratic weather, limited agronomic knowledge, and insufficient access to inputs, technology, markets, and financing. Compounded by the sudden and swift impact of crop diseases, these factors are in large part responsible for the pervasive "yield gap" in smallholder coffee production — and in smallholder agriculture more generally — that inhibits farmer productivity and prosperity. That is, while farmers in Colombia, the world's second-largest producer of Arabica coffee, achieve average coffee yields of 900 kilograms per hectare, farmers in Nicaragua realize average yields of 600 kilograms per hectare and those in Tanzania produce just 300 kilograms per hectare.[6] Worse, coffee yields in many countries have been steadily declining due to aging plants and chronic underinvestment.

Still, many farmers and other participants in agricultural value chains have traditionally thought of perennial crops such as coffee as a long-term, lower-risk annuity that yields steady and reliable dividends each season. And for years, the industry has tended to focus on the variability of coffee prices — an important issue, to be sure, and one that should not be forgotten in this discussion — rather than declining productivity.

This dialogue has recently evolved; production risk on the farm is now seen as being just as important as price risk in the marketplace.[7] As extreme weather events become more frequent with climate change, the issues that constrain productivity and farmer prosperity — and discourage younger generations from following their parents into farming — urgently demand our attention.

6 International Coffee Organization, 2015.

7 Sheridan, Michael, "Coffee Rust: What's Below the Surface?" CRS Coffeelands, April 24, 2014.

The Productive Lifespan of Coffee

Coffee is a perennial crop that, much like grapes grown for wine, is greatly affected by soil, temperatures, rainfall, and various other factors. For this reason, only countries located in the equatorial "coffee belt" offer suitable growing conditions and the specific altitudes required for producing Arabica and Robusta coffee.

Coffee plants are long-term assets that become less productive as they age. On average, it takes about three years from the time a seedling is planted for it to bear fruit, and five years for it to reach full productivity. From this point until the tree is about 15 to 20 years old — barring any incidence of diseases or pests and assuming the consistent application of good agricultural practices — it produces fruit, with yields generally beginning to decline in years eight to 10 and falling over time. However, unlike with grapevines, there is no economic value or quality attribute that come from "old growth" coffee plants.

In order to maintain healthy and productive plants, investment in ongoing maintenance and periodic renewal is required. In an ideal production system, it is recommended that farmers strategically rehabilitate sections of their farms each year, typically 5 to 10 percent depending on the life cycle of the specific variety in that particular production zone, as opposed to pruning all trees at once.

This approach minimizes income losses in that small blocks are gradually taken offline on a rotational basis. Even though farmers are rehabilitating a percentage of plants each year, overall production increases over time because existing plants are more healthy and productive. For smallholder farmers, this also means more consistent cash flows.

However, without this type of active and ongoing management, the combination of aging plants and poor farming practices creates an environment that is more susceptible to pest and disease attacks. This, in turn, starts a downward cycle of low productivity and low income and, as a result, farmers are unable to invest in their land.

In Honduras, for instance, 60 percent of coffee trees are older than 20 years[8], and the average age of coffee plants in El Salvador is 50 years[9]. Meanwhile, it is estimated that more than 50 percent of coffee trees in regions of Eastern and Central Africa are over 50 years old[10]. With aging trees that are increasingly susceptible to disease, and minimal investment in farm rejuvenation as the status quo, the consequences of droughts, severe disease outbreaks, and other shocks become even worse.

For indicative purposes

8 Sheridan, Michael, "Overheard at the First International Coffee Rust Summit," CRS Coffeelands, April 2013.

9 Morales, Juan Jose, "Antigüedad de Cafetales Incidió en Daños Por," El Salvador, March 26, 2013, http://www.elsalvador.com/articulo/negocios/antiguedad-cafetales-incidio-danos-por-roya-31124.

10 Neuschwander, Hanna, "The Importance of Research and Investing in the Future," *Specialty Coffee Chronicle*, October 2015.

The Rapid Rise of Roya

Coffee leaf rust, or *la roya* in Spanish, is a naturally occurring fungal disease caused by the airborne pathogen *Hemileia vastatrix*, which comes from the same family of rusts that affect staple crops like maize and wheat. It attacks coffee plants by covering their leaves with yellowish-brown dust-like spores, diminishing the plant's ability to photosynthesize and store energy. This process reduces yields and can kill plants entirely — sometimes within a matter of weeks.

The disease is believed to have originated in East Africa, where it was first discovered in 1861. Over the following century, leaf rust spread throughout Africa and Asia, where it famously destroyed the coffee industry in present-day Sri Lanka. In 1970, it was discovered in Brazil and is now present throughout much of Latin America.[11]

Although leaf rust has existed in coffee-producing countries for decades and is present in some areas during every season, serious outbreaks have been rare. Traditionally, the disease has only affected coffee trees planted in more humid areas at lower altitudes. Many farmers controlled it sufficiently by using fungicides. However, in late 2012 the disease spread to new areas and to unusually high altitudes, from southern Mexico to Peru. With more than half of Central America's total coffee-growing area affected, the epidemic has been the worst seen since leaf rust first appeared in the region three decades ago. During the height of the outbreak in early 2013, analysts estimated that leaf rust could reduce Central America's annual output by up to 40 percent, costing producers approximately $500 million in lost revenue and eliminating nearly 375,000 jobs.[12] As a result, the governments of Costa Rica, Guatemala, Honduras, Nicaragua, and Peru all declared national states of emergency.

The situation caught many coffee farmers, buyers, researchers, and policymakers off guard, and it jeopardized decades of work to strengthen the coffee value chain and improve producer livelihoods. Within the industry, questions began to emerge about the future availability and quality of coffee as well as the long-term viability of its production in Latin America. Would the benchmark price of coffee — which remained below $1.50 throughout 2013 during the outbreak due to a record 2012/13 harvest in Brazil — offer farmers enough incentive to make such long-term investments in their land? Or would leaf rust drive smallholder farmers out of coffee growing and into other crops, or out of agriculture entirely?

Almost three years after the initial spread of leaf rust, its impacts are more visible, as are the potential solutions. In some countries, rust-related losses were not as drastic as had been feared, yet in other countries the disease took an unexpectedly devastating toll. In El Salvador, for example, leaf rust cut production by 60 percent in 2013/2014 compared to a year earlier.[13]

Even within countries, incidence and severity of leaf rust were uneven. In Peru, 40 percent of total coffee-growing areas have been affected by rust, but the disease hit much harder in the central part of the country than it did in the north.[14] For instance, some producer organizations that Root Capital finances in the Selva Central region experienced 80 percent drops in production due to leaf rust, and many farmer are abandoning the land to work in mines or to migrate.

11 Schieber, E. and G.A. Zentmyer. "Coffee rust in the Western Hemisphere". *Plant Disease.* 68:89-93, 1984.

12 International Coffee Organization (ICO), Report on the Outbreak of Coffee Leaf Rust in Central America and Action Plan, May 13, 2013.

13 International Coffee Organization, 2015.

14 USDA. Peru Annual Coffee Report, 2015.

The Canary in the Coal Mine

Across Latin America, leaf rust has revealed the effects of decades of underinvestment in agriculture. It is also the proverbial "canary in the coal mine," signaling the impact that climate change will likely have on crop production and, in turn, on the livelihoods of smallholder farmers. In that sense, the outbreak is a symptom of a much larger problem for farming communities.

More broadly, aging plants that are increasingly vulnerable to pests and disease and result in declining yields are now common across many value chains. For example, in Ghana, where diseases like black pod have ravaged cocoa production, an estimated 23 percent of cocoa tree stock is more than 30 years old, according to the country's cocoa board.[15] When combined with coffee, palm oil, and tea, the cost associated with R&R in these four value chains will exceed $100 billion over the next 25 years.[16]

Coffee in the Age of Climate Change

Scientists predict that climate change will dramatically affect coffee production, particularly the more sensitive, high-quality Arabica variety. In the short term, increasingly frequent or severe weather events, such as droughts and floods, heat waves, and tropical storms, will reduce yields, jeopardize quality, and increase pest and disease incidence.

Looking further ahead, by 2050 scientists predict the area available to grow quality coffee will shrink. The International Center for Tropical Agriculture (CIAT) concluded that current coffee-producing regions will likely experience severe reductions in land suitable for coffee.[17] Researchers predicted average declines on the order of 20 and 30 percent for the Andes and Central America, with higher losses in certain countries. These finding were reaffirmed in a more recent study commissioned by World Coffee Research suggesting that there will be a 50 percent reduction in global land area suitable for Arabica production by 2050.[18]

It might take several decades to see the full effects, but changing climatic condition are already impacting coffee production. A recent study, for example, found that a warming trend over the last several decades has reduced coffee productivity in Tanzania. The same study estimated that every 1°C rise in night time temperature will result in yield losses of roughly 140 kilograms per hectare, cutting in half the country's average yields per hectare by 2060.[19]

In some cases coffee farmers may be able to shift to higher, cooler altitudes, but in many regions, higher land is not available and farmers simply have no place to go. In addition to helping coffee producers invest in R&R, some coffee-producing countries are implementing adaptation strategies to help farmers diversify beyond coffee. For example, the Honduran government recently announced plans to help farmers convert 20 percent of the country's total coffee-growing land for cocoa production over the next few years, taking advantage of rising consumer demand for chocolate in emerging markets and cocoa's ability to thrive in warmer conditions.[20]

"It feels like a scourge from God," said Nicolas Pineda.

Nicolas Pineda is a member of the Montaña Verde coffee cooperative in Honduras. He has farmed coffee for two decades, selling premium-quality beans to international buyers through the cooperative.

The last time leaf rust struck hard in Honduras was during the 1980s, and Nicolas Pineda watched his father lose the family farm. Undeterred, he himself decided to get into the coffee business, only to find history possibly repeating itself.

Over the past two years, the 2.5 hectares that Nicolas cultivates have been hit hard by leaf rust. While some coffee trees were only partially affected, many have been destroyed. Today, with the help of his cooperative, Nicolas is continuing to combat the spread of leaf rust on his farm, but the future remains uncertain.

15 Kofi, Francis, "Ghana's Efforts at Sustaining Cocoa Production," presented at the International Cocoa Organization's Cocoa Market Outlook Conference, 2015.

16 Dalberg, Smallholder Tree Crop Renovation and Rehabilitation: A Review of the State of the Emerging R&R Market and Opportunities to Scale Investment, October 2015.

17 Ovalle-Rivera, O. et al., "Projected Shifts in *Coffee Arabica* Suitability Among Major Global Producing Regions Due to Climate Change," *PLOS ONE* 10 (4), 2015.

18 Bunn, Christian et al., "Multiclass Classification of Agro-Ecological Zones for Arabica Coffee: An Improved Understanding of the Impacts of Climate Change,"PLOS ONE, October 27, 2015.

19 A.C.W. Craparoa et al., "Coffee Arabica Yields Decline in Tanzania Due to Climate Change: Global Implications," *Agricultural and Forest Meteorology*, Vol. 207, July 2015.

20 Reuters Africa, "Honduras to Replace Nearly 8 Percent of Coffee Land with Cocoa," August 28, 2015.

The leaf rust outbreak highlighted the critical need for new models to tackle environmental shocks and stresses, which are becoming increasingly frequent and severe in the face of a changing climate.

A Collaborative Approach to Building Smallholder Resilience

Mobilizing Partners and Resources

After participating in an emergency summit to discuss the impacts of leaf rust, convened in Guatemala by PROMECAFE, a regional coffee industry organization, and World Coffee Research in April 2013, Root Capital began mobilizing partners from across the public, private, and nonprofit sectors to co-design the Coffee Farmer Resilience Initiative (CFRI).

To respond rapidly to the leaf rust outbreak, we leveraged our existing relationships to design and then launch the initiative six months later. A benefit of this approach was that we were able to respond relatively quickly; a drawback is that we had limited engagement with national governments and other public sector agencies in affected countries that, in the long term, will need to be involved in setting policies that facilitate R&R investment at a greater scale.

The initiative is funded with a blend of below-market-rate capital, including low-cost debt, catalytic credit enhancements, and grant funding.

- The Ford Foundation, Inter-American Development Bank's Multilateral Investment Fund (IDB-MIF), and Starbucks Coffee Company made long-term investments (seven to 10 years) totaling $12.5 million in Root Capital to support R&R-related lending.
- Keurig Green Mountain and USAID each provided credit enhancements: Keurig Green Mountain's in the form of first-loss capital of $400,000, equal to just under 3 percent of target credit disbursements, and USAID's in the form of a 50 percent *pari passu* guarantee of up to $15 million (i.e., USAID absorbs $0.50 of the loss for every dollar not repaid by eligible borrowers after the $400,000 in first-loss coverage has been used).

- USAID committed $2 million in grant funding under the Global Development Alliance, a mechanism designed to mobilize funds from the private sector. Three leading specialty coffee roasters — Cooperative Coffees, Equal Exchange, and Keurig Green Mountain — channeled funding for technical assistance directly to their suppliers through an accompanying fund.
- Support from other donors — including the DOEN Foundation, Open Road Alliance, the Skoll Foundation, and the Swedish Postcode Foundation — along with additional funding from IDB-MIF and Keurig Green Mountain covered costs associated with program design, financial management training, agronomic capacity building, income diversification, and mobile technology activities; and impact assessment efforts.

Each of these partners operates with different motivations and perspectives:

- Public sector institutions seek to overcome barriers to economic development and food security while efficiently addressing systemic issues of conflict, migration, environmental deforestation, and a host of other critical challenges;
- Private sector partners have a commercial need for a reliable supply of high-quality coffee and have also articulated an ethical interest in contributing to social development and environmental sustainability in the communities where they source their coffee; and
- Philanthropic partners have specific development and impact objectives and motivations to convene new cross-sector models in which their funding can be catalytic in unlocking resources from the private and public sectors.

While there is substantial common ground at a philosophical level, reconciling diverse priorities within a single partnership has proven challenging at times on a practical level. For instance, both USAID and IDB–MIF were interested in collaborating with global coffee buyers to help ensure the long-term sustainability of this work. However, they required the private sector to co-invest so as not to subsidize corporate supply chains themselves, and stipulated that funds be used where development needs were greatest. Conversely, individual companies were committed to supporting interventions in their own supply chains but hesitant to commit funds to a general pool that would address an industrywide problem. In the end, we were able to channel corporate investments to their specific suppliers and use public funds to complement these resources and address needs in other communities where corporate support was not targeted.

We recognized from the outset that the involvement of national governments, agricultural research organizations, and industry promotion entities is critical for financing R&R at scale, for both coffee and other commodities — as demonstrated in Colombia during an earlier leaf rust outbreak. We are now engaging more proactively with these stakeholders, including the International Center for Tropical Agriculture (CIAT), the International Institute of Tropical Agriculture (IITA), and the Junta Nacional del Café in Peru, which represents the country's coffee producers.

With aging trees and declining yields, Latin America's coffee-growing regions required large-scale investments in renovation and rehabilitation well before the outbreak of leaf rust.

Financing Coffee Renovation

Responding to a Billion-Dollar Fungus

Leaf rust is not a short-term problem, and there are no quick fixes for overcoming the epidemic. The fungus impacts coffee trees immediately and can reproduce several times in a single crop cycle. Once leaf rust strikes, a farmer has one of four options:

- **Do nothing:** With limited income to combat the fungus and uncertainty about its causes and potential severity, many producers take a "wait and see" approach. Some stay on the land and continue farming, while others abandon farming altogether, migrating to work in non-farm sectors.
- **Apply fungicide:** Those with the financial resources and technical expertise may decide to apply fungicide as a short-term solution for controlling leaf rust. Copper-based fungicides are the most common and can be effective in reducing the likelihood of outbreaks. However, these fungicides are costly, have short periods of effectiveness, must be timed carefully, and can be detrimental to the environment.[21]
- **Rehabilitate:** Some producers have decided to graft, stump, or intensively prune diseased trees, followed by the application of recommended fertilizer and other inputs. Typically, only about five inches of the original coffee tree trunk remains, with its roots still in place.
- **Renovate:** The most costly option, and the primary approach among current Root Capital clients under CFRI, renovation involves replacing diseased trees with new seedlings, often of a more productive variety that is adapted to the agro-ecological region and/or resistant to leaf rust and other pests and diseases. To avoid leaving farmers entirely without income, coffee tree renovation is typically conducted on a staggered, rotational basis. That is, coffee trees are cleared and seedlings planted on a portion of a farmer's land each year over the course of several years. Ideally, and independent of leaf rust, farmers would renovate 5 to 10 percent of their coffee trees annually so that they are replacing aging trees before productivity substantially declines from its peak and the trees become more susceptible to diseases. However, in the context of coffee leaf rust affecting the

21 Kubota, Lily, "Some Insights on Coffee Leaf Rust (*Hemileia vastatrix*)," SCAA Chronicle, February 15, 2013.

majority of a farmer's trees, as has been the case for many of the coffee enterprises Root Capital supports, farmers are renovating a much higher portion of their land — typically 20 to 35 percent. This higher percentage translates into larger financing needs and elevated risk for farmers and agricultural enterprises taking out loans to make these investments, as well as for lenders like Root Capital issuing the loans.

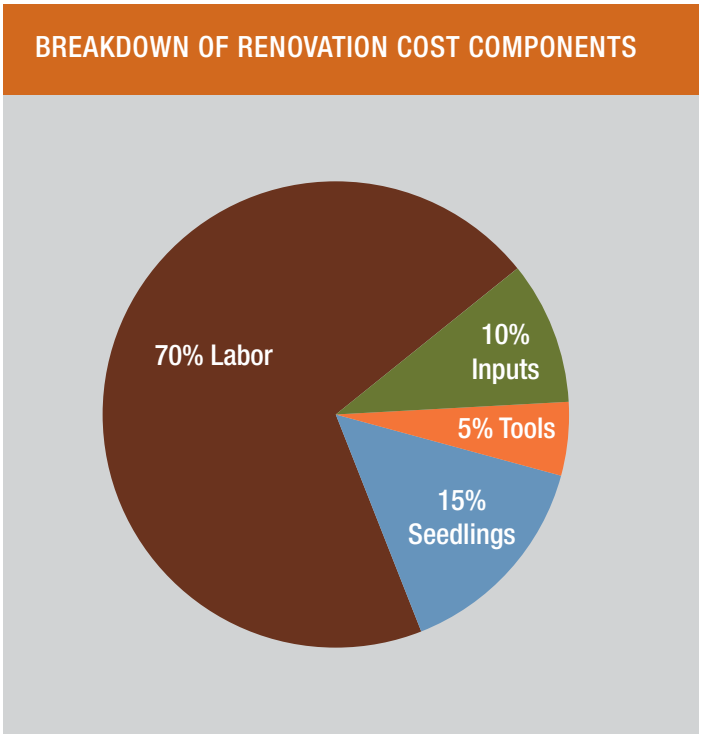
The Cost of Renovating

A recent analysis by Dalberg finds the global need for coffee-sector R&R to be roughly three million hectares, which carries an approximate cost of $6 billion within the first year and $35 billion over the course of 25 years. The same report identifies similar financing needs in the smallholder cocoa, palm, and tea sectors totaling an additional $14 billion today and $74 billion over the next 25 years.

The availability of accurate, comprehensive, and comparable data on the true cost of renovation — from seedling production to transport to planting to maintenance — is limited. Nevertheless, we have identified some broad parameters in our loan portfolio that are consistent with what our peers and other practitioners report; we share these below with the caveat that cost figures can be materially influenced by local factors, especially labor wages.

Because output from trees affected by leaf rust is significantly reduced, farm incomes are depressed precisely when farmers are in most need of cash to control and combat the disease. In addition to technical knowledge and labor, renovation requires significant funding, with total costs in Latin America ranging from $3,000 to $5,000 per hectare, much of which is allocated to labor. For this reason, most producers utilize credit, yet it is often inaccessible due to the lack of formal channels for rural finance.

BREAKDOWN OF RENOVATION COST COMPONENTS



Even if the credit needed to renovate is available, the terms and repayment schedules may not take into account the constrained and time-delayed cash flows of farmers who must wait years before productivity resumes, the so-called "valley of death" when coffee revenue is severely limited. Without access to flexible financing, inputs, or training, farmers are left with few alternatives.

Designing a Multiyear Loan Product

While an increasing number of financial institutions are engaging in agricultural value chain finance, few are offering long-term loans for on-farm production improvements, and even fewer are financing the renovation or rehabilitation of perennial tree crops.

Throughout our 15-year history, Root Capital has provided cooperatives and private enterprises with more than $900 million in financing. Of the roughly 2,000 loans we have closed since 1999, 80 percent had short-term tenors of less than 12 months. To structure these short-term working capital and trade credit loans, we typically require that clients have in place forward purchase agreements with buyers against which we lend. In most instances, this triangulation model avoids the need for fixed-asset collateral.

Under CFRI, Root Capital is providing R&R loans of up to seven years with a two-year grace period on principal repayments. We currently market renovation loans to clients within Guatemala, Honduras, Mexico, Nicaragua, and Peru. Within the first two years of the initiative, we have approved $9 million in long-term renovation loans to nine enterprises. These loans are helping 1,335 smallholder coffee farmers renovate 3,500 hectares of land under cultivation.[22]

While these loans comprise a material portion of Root Capital's overall loan portfolio, they address only a minute fraction of the underlying demand for R&R in the region, let alone globally.

These loans are made directly to enterprises: producer organizations, private businesses, or local financial institutions that aggregate individual farmers. In the context of renovation financing, these businesses on-lend funds as smaller loans to individual producers and, in doing so, bear the risk of repayment. Enterprises manage all loan origination, disbursement, monitoring, and repayment internally through an internal credit fund.

As the official counterparty, the enterprise is responsible for repaying the loan in full to Root Capital. For this reason we require collateral, and we verify through initial due diligence and ongoing monitoring that the enterprises to which we lend are well-positioned to implement renovation financing by having both the necessary accounting systems in place and the requisite technical agronomic knowledge.

22 The cost of R&R is often complemented by internal funds from coffee enterprises and/or farmers themselves.

The Critical Role of Internal Credit Funds

By aggregating hundreds and often thousands of smallholder producers, farmer cooperatives and similar organizations provide rural communities with much-needed services. These producer organizations, both large and small, serve as central gathering points for otherwise disaggregated smallholders, making the disbursement, monitoring, and collection of credit in small amounts more feasible and usually more cost-effective for rural borrowers. And with an intimate understanding of the needs and production capacity of their members, agricultural cooperatives with internal loan funds can more quickly and closely match credit disbursements with expenditures and collateralize loans with assets such as land titles or future product if necessary.

A well-functioning and transparent internal credit fund represents a critical step for a cooperative to become a multi-service provider to its members. Today there are many success stories of cooperatives developing what essentially becomes a rural bank, providing individuals with access to credit and overcoming what is often an insurmountable obstacle in extending financial services to smallholders: last mile, direct-to-farmer delivery.

However, offering credit to members (and often to non-members as well) is neither a practical nor a prudent option for cooperatives that are undercapitalized, under-resourced, or suffering from weak governance. As agricultural cooperatives decide to become micro-lenders as well, they must build more sophisticated accounting systems and solve new challenges. Some cooperatives may be unable or unwilling to invest the financial and non-financial resources that are required to operate a revolving loan facility. For others, such a move may prove to be a distraction that jeopardizes their core agricultural-based business over time.

While many cooperatives have previously extended micro-credit funds to their members in the form of short-term, pre-harvest financing, the provision of long-term financing is new territory for most. Well-designed and well-run internal controls and accounting systems are essential when offering farmers relatively large, multiyear renovation loans. Indeed, much of the ultimate success or failure in financing renovation and rehabilitation is dependent on the strength and stability of a cooperative's internal credit fund.

An effective internal credit funds requires, among other things, well-trained and appropriately paid staff; realistic capitalization strategies, including lines of credit and the use of retained earnings; clear decision-making policies and procedures; timely and accurate monitoring and evaluation of portfolio performance; transparent recordkeeping; and efficient portfolio servicing, including all processes and activities required to evaluate, approve, disburse, monitor, and recover loans. However, many enterprises struggle to develop these capacities, and these are the most commonly observed deficiencies among potential R&R loan clients, due in large part to a skills gap and a lack of trained financial professionals.

For example, we have seen cases of cooperative leaders with minimal financial knowledge running day-to-day operations of what are often informal and unregulated internal credit funds — a task that should be the responsibility of a full-time accountant who is removed from the commercial activities of the cooperative and with full oversight from a well-informed and involved board of directors. At times, credit decisions can be politically or personally motivated, rather than being based on established policies to determine financial need and creditworthiness.

Root Capital's financial advisory team has therefore placed special emphasis on promoting foundational measures for internal credit funds, such as internal controls and accounting systems, and this is a core focus of accompanying technical assistance.

To responsibly underwrite R&R credit, Root Capital had to invest in or adapt a number of internal systems and client services. For example:

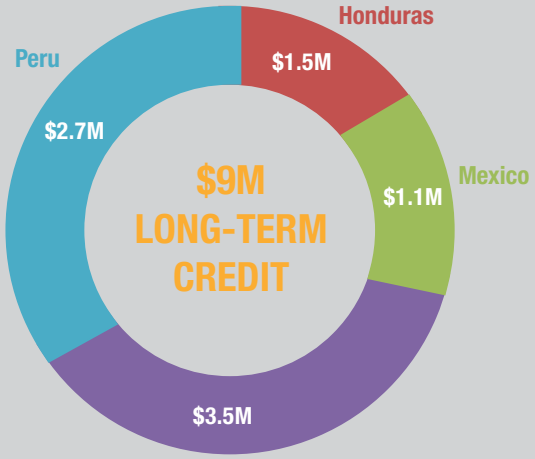
- We raised longer-term, 10-year debt and extended the tenor of existing notes with our investors to match the long-term duration of R&R loans.
- We hired two agronomic advisors who advise our loan officers on the technical aspects of renovation plans as part of our agronomic due diligence and assist with loan monitoring by verifying land under renovation.
- We enhanced our advisory service offering to support clients in developing strong accounting and internal credit systems so that they could on-lend funds to individual producers, and we facilitated access to third-party agronomic trainings.

RENOVATION & REHABILITATION LOANS

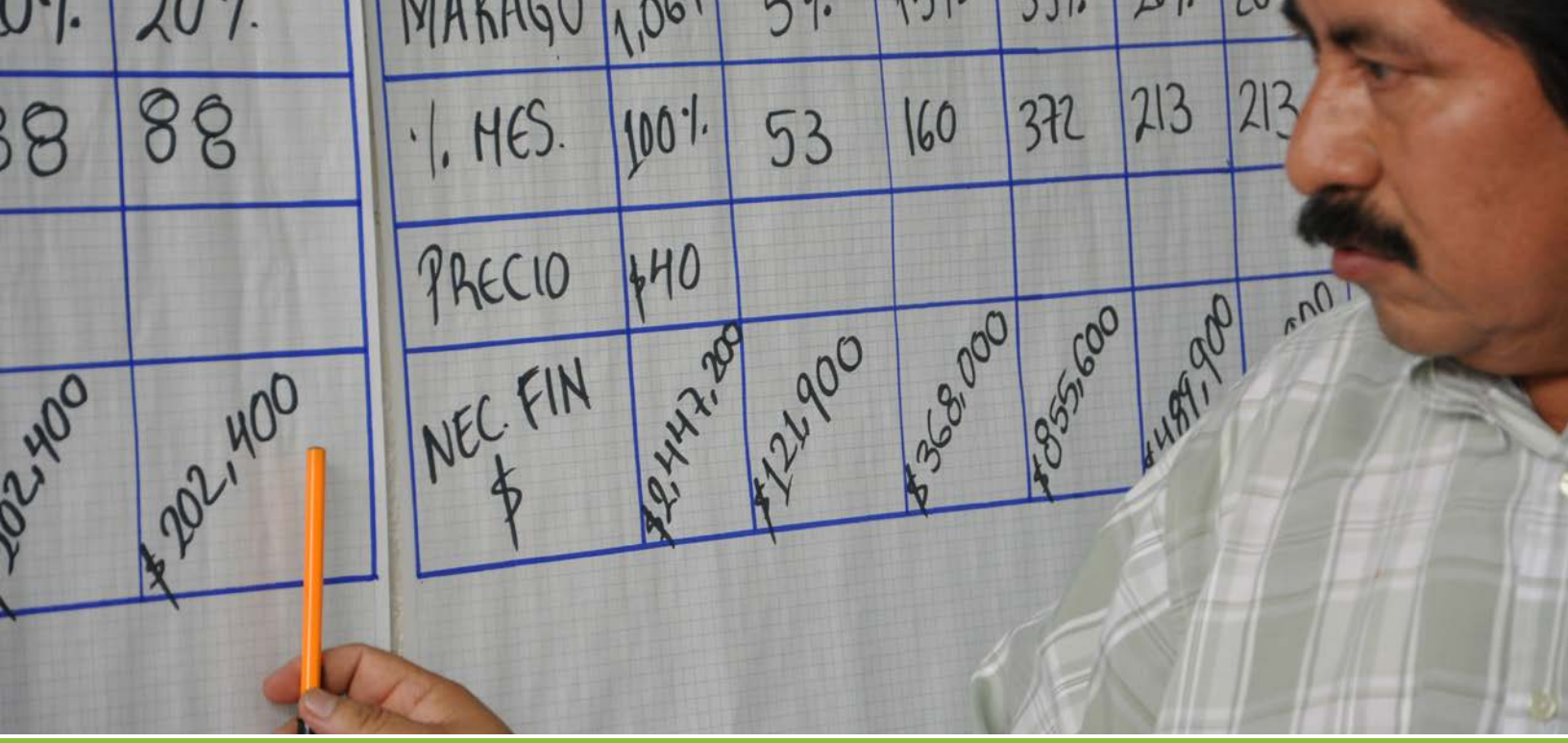
Amount	$100,000 to $2 million
Purpose	Rehabilitation or renovation of permanent crops
Tenor	Three visits per year to the enterprise as well as to the farms of 20 percent of participating producers, a sample randomly selected by a Root Capital agronomist
Monitoring	Amortized repayment of principal beginning in year three; interest payments beginning immediately and paid on a quarterly basis
Repayment	Amortized repayment of principal beginning in year three; interest payments beginning immediately and paid on a quarterly basis
Collateral Requirements	100 percent loan-to-value on a fully discounted basis over the life of the loan; offered in land, facilities, or hard assets, or through joint guarantee

Specific financing terms and conditions may differ

GEOGRAPHIC BREAKDOWN OF ROOT CAPITAL R&R LENDING



November 2013 – December 2015
(USD, Millions Approved)



Conducting Due Diligence and Managing Risk

As a mission-driven financial institution serving agricultural enterprises that are not typically reached by commercial lenders, Root Capital has built a conservative balance sheet designed to absorb potential losses while protecting our investors. We aim to maintain a cushion of loan loss reserves that provide 20 to 25 percent first-loss coverage to these investors. Since our founding in 1999, Root Capital has maintained a historic default rate of 3 percent among our borrowers and a 100 percent repayment rate to our investors.

Investing in agriculture is inherently risky. The possibility of further crop disease outbreaks, extreme weather events, and a host of other issues makes multiyear R&R financing much riskier than traditional short-term value chain finance. As such, Root Capital secured two credit enhancements under CFRI to further protect our balance sheet and reduce risk for investors:

- A thin slice of dedicated first-loss capital from Keurig Green Mountain of up to $400,000. This is on-balance sheet capital, meaning that any losses from R&R loans will first come out of this tranche, which represents just under 5 percent of renovation loans approved to date and just under 3 percent of our target disbursements.
- A guarantee facility from USAID's Development Credit Authority (DCA). This covers 50 percent of losses on up to $15 million of lending for eligible coffee renovation, rehabilitation, and related investments. This guarantee is off-balance sheet, meaning that any losses beyond the $400,000 absorbed by the first-loss tranche will be reimbursed by USAID at a 50 percent rate.

In addition to having the capacity and infrastructure to meet projected production volumes, potential clients must have more than five years of operating history and three years of audited financial statements, from which we derive key financial ratios, such as the ability to service existing debt. Enterprises must also have adequate sources of internal financing to cover at least 20 percent of the R&R investment cost, although exceptions are made for organizations that have been particularly affected by leaf rust but meet minimum requirements of business stability and management capacity.

Through our underwriting process, we assess the credit risk of borrowers using an internal rating system that weights various risk categories, including scale and diversification, enterprise strength and growth potential, financial flexibility, and financial strategy. This data is combined with the experience and judgment of our loan officers to inform a full assessment of credit risk. All potential loans, including R&R loans, are scored using this risk-rating methodology.

For R&R lending, prospective clients must also submit an agronomic plan accompanying their loan application, and the plan must be endorsed by a Root Capital–approved agronomist. At a minimum, it must include the following components:

- Diagnosis of coffee farms, including the estimate of damage in number of trees affected.
- Prescribed treatment by percent of land under cultivation that requires renovation or rehabilitation, and percent that is going to be renovated or rehabilitated using funds from Root Capital.
- Selection/application of adequate farm inputs that meet our environmental sustainability standards.

- Projected revenue and costs of the renovation or rehabilitation plan. Agronomic projections are a key input into the organizational cash flow forecast used by the loan officer to determine the client's financing need. This forecast includes plant mortality and annual yield estimates.

As part of due diligence, Root Capital agronomists conduct at least one on-site visit to the potential client and interview members of its agronomic team, as well as at least two producers chosen at random, to confirm the quality and capacity of the enterprise's support team. In these visits, Root Capital agronomist advisors use diagnostic tools to assess the following:

1. Experience of the agronomic team and key management personnel in delivering quality technical assistance and successfully implementing R&R projects;
2. Capacity of the agronomic team in relation to the number of members receiving assistance;
3. History of the relationship between farmers and agronomic team members; and
4. Overall quality of the agronomic data collection and analysis systems.

The Root Capital agronomist then confirms or rejects the viability and operational soundness of the proposed plan, detailing any perceived issues and how the client has addressed those issues. Any material concerns raised in the agronomist's assessment must be addressed in the loan officer's credit proposal with associated mitigating measures. If the agronomist's initial review does not result in approval of the plan, then clients may receive follow-up support from a two-person advisory team, including an agronomist and a financial advisor.

Alongside the agronomic components of due diligence, loan officers conduct comprehensive financial analysis of potential clients and their internal credit funds. It is required that every R&R loan candidate complete a diagnostic outlining the strengths and weaknesses of its internal credit fund, policies and processes, and management. The client must work with Root Capital's financial and technical advisory teams to complete (or update, in the case of existing Root Capital clients) its diagnostic.

Additionally, as part of Root Capital's process for evaluating prospective borrowers, we have designed customized social and environmental scorecards to complement our financial credit-scoring methodology for all loan applicants. Using these scorecards, loan officers evaluate enterprise-level performance based on self-reported client responses as well as observations from farm and enterprise visits. This information on social and environmental performance and likely impacts informs credit decisions; any enterprise that does not meet our social and environmental standards is not eligible for financing without remedial action, regardless of its financial strength and business acumen.

Note that the social and environmental scorecards are designed as a performance metrics system, not an impact assessment system. They do not capture information about causality or the counterfactual (e.g., what would have happened in the absence of our financing or training). We complement social and environmental due diligence with deeper impact studies to assess changes over time at both the enterprise and producer levels. *(For more information on Root Capital's social and environmental due diligence, including the scorecards our loan officers use, please see our 2014 Issue Brief on the topic).*[23]

23 Root Capital, "Social & Environmental Due Diligence: From the Impact Case to the Business Case," 2014.

Learning from Colombia: Subsidizing Large-Scale Renovation

Beginning in 2008, above-average rainfall resulted in humid conditions that caused increased outbreaks of coffee leaf rust across Colombia, and over the next three years production decreased by nearly one-third.[24] By 2011/12, output fell to a 30-year low; the 7.7 million 60-kilogram bags produced that season represented less than half of what the country produced in the mid-1990s and contributed to a spike in the global benchmark price of coffee that year.

Shortly before the outbreak, the Colombian government, in partnership with the Federación Nacional de Cafeteros de Colombia (FNC), mounted a large-scale crop renovation program to replace aging trees, the Permanence Sustainability and Future (PSF) program. To support nationwide renovation efforts, FNC designed a low-interest loan scheme under the program. The minimum a coffee grower could renew was 0.2 hectares and the maximum was 1.5 hectares. Delivered by Banco Agrario, the seven-year renovation loans were specifically tailored to the multiyear period for new trees to become productive and the uneven cash flows tied to annual harvest cycles (e.g., a two-year grace period on principal and interest payments during the period of non-productivity). Average annual interest rates were 10 percent, and borrowers were required to pay back only 60 percent of loan principal.[25]

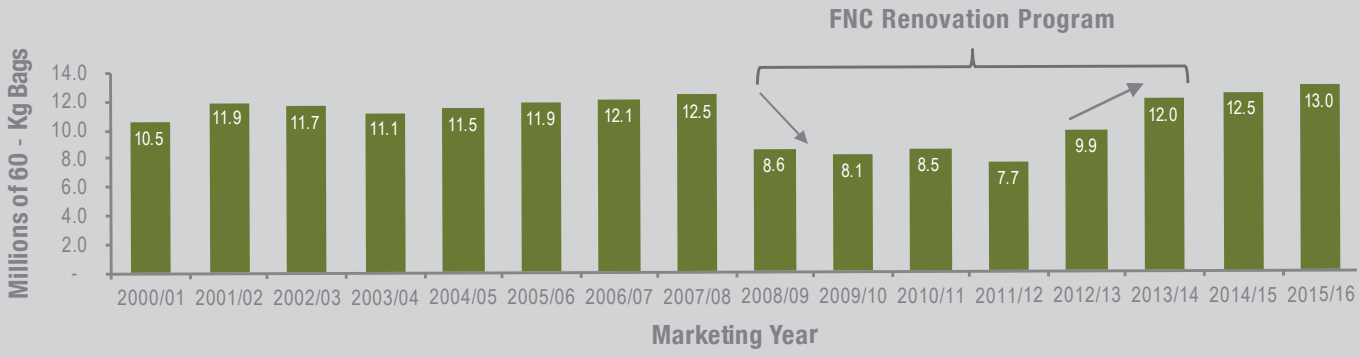
With the spread of leaf rust, this subsidy was only offered to farmers willing to plant the rust-resistant Castillo variety, a powerful but controversial economic incentive to abandon traditional varieties believed by many in the industry to be of higher quality. Additionally, a public collateral fund was established to pool 100 percent of the credit risk. The program temporarily compensated growers during the unproductive period after old trees were cut and before new ones generated income.[26]

Since 2009, two-thirds of Colombia's total coffee-growing lands — roughly 640,000 hectares — have been renovated. As a result, the average age of coffee trees has declined from 15 to seven years, while average coffee productivity has increased to 900 kilograms per hectare, from 600 kilograms per hectare just five years earlier.[27] With new trees now reaching productive age, output has rebounded, almost doubling the amount produced four years ago; annual production for the 2015/16 season is estimated to top 13 million 60-kilogram bags.

It is important to point out that this is the only example of a country implementing large-scale coffee renovation in a coordinated way. Much of the success of Colombia's PSF program can be attributed to the country's strong coffee institutions, which have been in existence for over five decades. Such a level of capacity, coordination, and committed funding is still largely absent throughout other coffee-producing countries. This underscores the need for blended finance and the importance of collaboration among research organizations, financial institutions, buyers, technical assistance providers, and agricultural enterprise.

> *"Colombia's production is only now beginning to rise again after five years of steady declines. Colombia's national coffee program dates to 1927. Its research center to 1938. Its breeding program to 1961. Colombia's national coffee program, in short, is arguably the most powerful in the world."*
>
> — *Michael Sheridan*
> *Borderlands Coffee Project Director*
> *Catholic Relief Services*

COLOMBIA'S ROAD TO RECOVERY — COFFEE PRODUCTION SINCE 2000



24 Avelino, Jacques, et al., "The Coffee Rust Crises in Colombia and Central America (2008 – 2013): Impacts, Plausible Causes and Proposed Solutions," *Food Security*, 2015.

25 Rios, Luz Diaz, "Recent Experiences of Coffee Replanting Programs in Colombia" in "Risk and Finance in the Coffee Sector," Agricultural Global Practice Discussion Paper 2, The World Bank, February 2015.

26 Ibid.

27 USDA Foreign Agricultural Service, Colombia – Annual Coffee Report, May 2015.

Building Client Capacity

To increase the capacity of agricultural businesses to absorb and effectively manage credit, the provision of technical assistance is critical. The nine clients approved for renovation loans thus far have required a total of 320 days of technical assistance training over the past two years, of which roughly two-thirds was for financial management training and one-third for agronomic training. Without this accompanying support, we would not have been able to make the majority of these loans and would have assumed greater risk on those we did originate.

Utilizing a network of 35 full- and part-time financial consultants across the five CFRI countries, Root Capital delivers financial advisory services to managers and accounting staff of both potential and existing clients with the goal of strengthening the financial management capacity of these businesses.

Financial management training begins with an initial one-day diagnostic to identify weaknesses and opportunities for improvement. Using a scorecard developed by our advisory team, we work with participants to evaluate the strength of their enterprise's financial planning and analysis, internal controls, accounting systems, and overall financial literacy. After conducting the initial financial diagnostic, Root Capital staff work in partnership with the client to develop a customized action plan to improve performance. Based on the results of the diagnostic, as well as the needs expressed by the client and the recommendation of the loan officer, we deliver follow-up advisory services across the following areas:

- **Managerial:** We support senior management in developing strategic plans and tools to analyze financial performance and mitigate risk.
- **Organizational:** This broader set of training modules focuses on organizational management, financial literacy, governance, commercialization of product, pricing, and price risk management.
- **Technical:** The foundation of our training curriculum lies in our technical modules: bookkeeping, basics of accounting, cash flow forecasting, and inventory management systems.
- **Internal Credit:** Modules in this area overlap with those above but focus principally on building and managing internal credit funds. Specific trainings include those on internal credit fund management, portfolio analysis, advanced accounting, and advanced internal controls.

Evaluating the Financial Capacity of Clients

Conducted before and after an advisory engagement, Root Capital's financial diagnostic measures the capacity of both the overall enterprise and its internal credit system. We define a score of "2" as being the minimum acceptable threshold for enterprises to be able to effectively manage credit. For those clients seeking multiyear renovation finance, we typically look for scores at or above "3" in all categories, especially those related to internal credit systems. The provision of financial management training continues after we disburse a loan, and we often expand our advisory services relationship with clients over time to meet their evolving needs, including new efforts to introduce mobile technology platforms.

Financial Fundamentals Scorecard

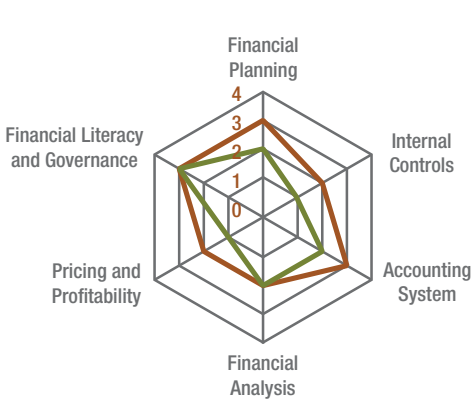
Client Information

Client Name: Medrar Cooperative **Product:** Coffee (Arabica) **Country:** Guatemala

ENTERPRISE LEVEL PERFORMANCE

	DAYS DELIVERED
Financial Planning	2
Internal Controls	2
Accounting System	4
Financial Analysis	0
Pricing and Profitability	3
Financial Literacy and Governance	0
Total Days	11

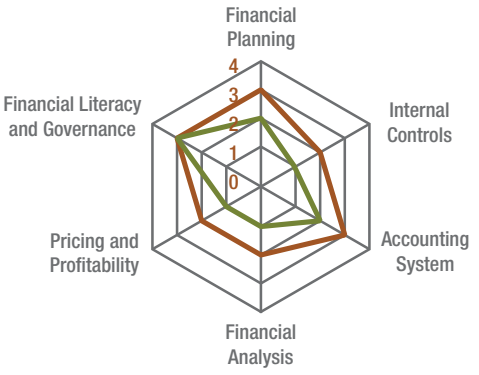
SCORING	
PRE	POST
2	3
1	2
2	3
2	2
1	2
3	3



INTERNAL CREDIT PERFORMANCE

	DAYS DELIVERED
Financial Planning	1
Internal Controls	2
Accounting System	4
Financial Analysis	3
Pricing and Profitability	2
Financial Literacy and Governance	0
Total Days	12

SCORING	
PRE	POST
2	3
1	2
2	3
1	2
1	2
3	3



For Illustrative Purposes Only

For smallholder farmers and the enterprises that aggregate them, it is rarely the case that both capital and technical assistance are available. Bringing the two together is essential for managing risk and expanding the addressable demand for R&R finance.

Leveraging Private Sector Investment for Technical Assistance

Going Beyond Credit

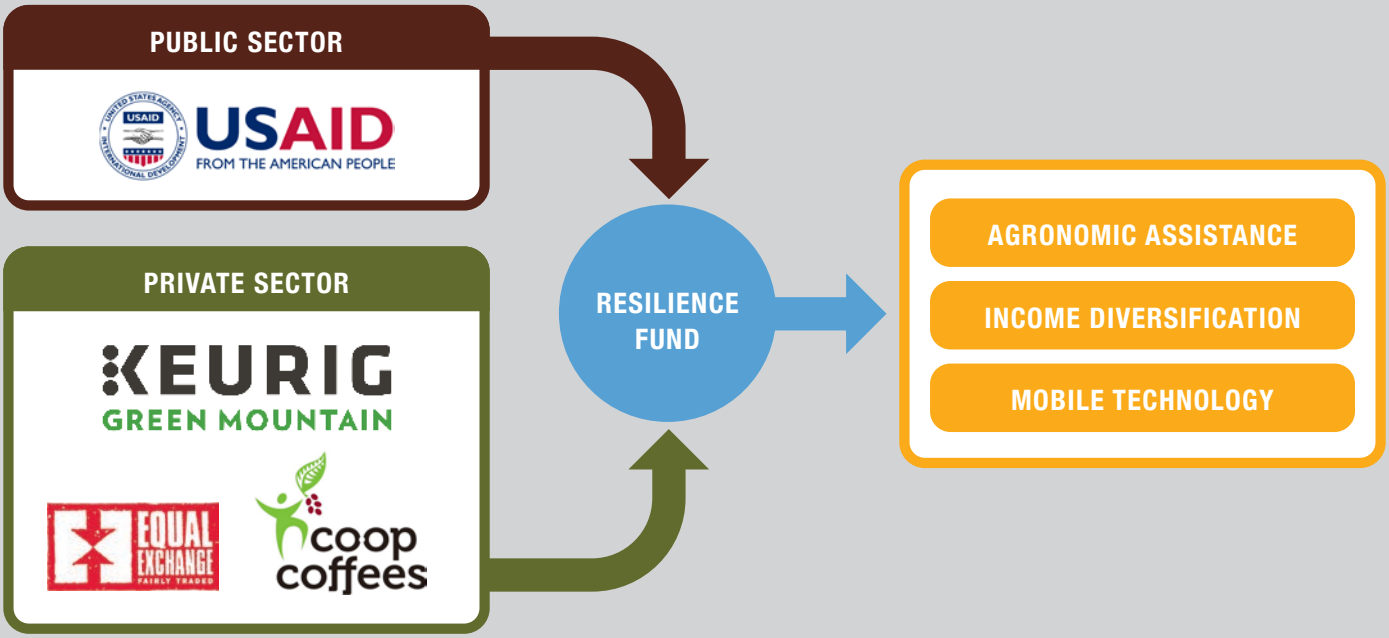
As the leaf rust outbreak worsened, coffee buyers and traders quickly recognized the social, economic, and environmental devastation occurring at the base of their supply chains. Yet many buyers struggled to develop a concrete and coordinated response to the crisis. They were unsure of what interventions were needed and, acting independently, could not bear the full costs of addressing such a complex challenge that impacts the entire industry.

To overcome this collective action hurdle and mobilize the interests of traders and roasters, Root Capital designed the Resilience Fund, a companion facility within the broader initiative to fund technical assistance activities for agricultural enterprises. USAID committed $2 million to the Resilience Fund under the Global Development Alliance, a mechanism designed to mobilize matching funds from the private sector. Three leading specialty coffee roasters — Cooperative Coffees, Equal Exchange, and Keurig Green Mountain — committed a combined $2 million to match USAID's contribution and channel investments directly to their suppliers. These companies recognized that supporting smallholders in becoming more productive and resilient could, in turn, reduce their own costs, enhance supply chain stability, strengthen risk management, build supplier loyalty, and advance their commitment to corporate sustainability.

Enterprises can apply to the Resilience Fund for grants to build agronomic capacity, launch income diversification projects, and improve internal business operations using mobile technology platforms. Prospective recipients submit a short proposal describing how they intend to use the funds to invest in resilience activities. Root Capital and our private sector partners evaluate the strength of each proposal, work plan, and budget and determine the potential for impact. If selected, enterprises are awarded up to $25,000 per year, with the possibility of two renewals. Grantees are required to co-fund a minimum of 20 percent of project costs in the first year, 25 percent in the second year, and 30 percent in the third and final year.

The Progreso Foundation, a Netherlands-based nonprofit organization that specializes in providing technical assistance to coffee cooperatives, supports the administration and implementation of activities. In addition, the Junta Nacional del Café, the Peruvian trade association that represents coffee producer organizations, acts as an agronomic service provider in Peru. As of late 2015, the Resilience Fund had enabled 32 enterprises to invest in climate-smart agriculture, develop income diversification projects, and adopt mobile technologies for productive purposes.

FARMER RESILIENCE FUND



EXAMPLES OF RESILIENCE FUND INVESTMENTS

CESMACH — **MEXICO**

With a renovation program already in place, CESMACH is using a Resilience Fund grant to install three demonstration plots to educate its members

TRIUNFO VERDE — **MEXICO**

Used a Resilience Fund grant to train 30 members in developing bio-fertilizers; purchased inputs to create organic fungicides for roughly 400 farmers

CADECH — **GUATEMALA**

Helped 50 producers develop farm rehabilitation plans; purchased 16,000 coffee tree seedlings and 3,350 fruit plants; and established six demonstration plots

APROCASSI — **PERU**

Trained 485 producers on R&R techniques; pest control; coffee quality cupping; and income diversification activities

PICHANAKI — **PERU**

Hired three trainers to provide technical assistance on beekeeping and other income diversification activities for producers

FACILITATING AGRONOMIC ASSISTANCE

As part of CFRI, Root Capital's advisory team is coordinating with third-party agronomic advisors, local universities, and government partners to help clients develop and implement R&R plans built on sound, climate-smart agronomic practices. During agronomic training workshops, special attention is paid to varietal selection, seedling production, compost application, farm maintenance, and integrated crop management.

In the first year of the Resilience Fund, it was notable that all enterprise proposals included requests for support for agronomic extension activities. One coffee cooperative in Peru, for example, requested funding to launch a peer-to-peer training program, sending staff to another local cooperative known for its innovative farmer extension program. These proposals reinforce the need for greater investment in extension services and suggest models for how private and public partners might co-fund these investments. *(For more information on shared value approaches to delivering agricultural extension, please see our 2015 Issue Brief on the topic.)*[28]

For instance, working in close collaboration with the Junta Nacional del Café in Peru, we have held agronomic workshops focused on standardizing indicators and evaluation tools for technical assistance in coffee renovation. A total of 55 technical staff representing 23 coffee enterprises from across the country participated in these trainings.

To oversee this and related work, Root Capital has hired two experienced agronomic advisors, one for Central America and Mexico and the other for Peru. Their role is to reduce risk for both clients and Root Capital by ensuring the technical feasibility of R&R loan proposals. This involves evaluating plans for establishing nurseries and organic fertilizer plants, conducting farm-level monitoring visits, and facilitating agronomic training on topics related to R&R.

Investing in Community Nurseries

SOPPEXCCA, a Root Capital client since 2003, is a Fair Trade and organic-certified coffee cooperative located in the forested mountains of northern Nicaragua. The enterprise aggregates production from 650 members, 80 percent of whom were affected by leaf rust in 2013.

The cooperative accessed a $2 million long-term renovation loan from Root Capital — the first approved under CFRI — for its members to renovate approximately 1,000 hectares. Though SOPPEXCCA is in many ways a model cooperative, the organization faced barriers to implementing a comprehensive coffee renovation plan, leading the manager to apply for a grant from the Resilience Fund. With this funding, SOPPEXCCA has expanded its team of agronomists, constructed a seedling nursery, and developed new technology platforms to monitor farmer performance.

28 Root Capital, "Investing in Resilience: A Shared Value Approach to Agricultural Extension," 2015.

INVESTING IN INCOME DIVERSIFICATION

The leaf rust outbreak underscores the fragility of livelihoods dependent on a single crop. Typically, farmers have not sufficiently diversified their production or their income streams to remain resilient amid shocks. Indeed, a recent Catholic Relief Services survey of coffee cooperatives in Central America that collectively represent more than 6,800 farmers revealed that only 23 percent had access to income-generating activities besides coffee farming.[29]

However, coffee production may no longer be a viable source of income for millions, as changing climatic conditions affect the types of crops that can be cultivated in different agro-ecological zones and altitudes. More immediately, income-diversification initiatives can strengthen food security as households absorb the shock of lost income tied to leaf rust and endure the two- to three-year "valley of death" between the time they uproot diseased trees and when new trees become productive.

Training and investment to support income diversification is a critical component of smallholder resilience. With the financial support of the Resilience Fund, enterprises have turned to the development and launch of small side businesses — from apiculture and aquaculture to fertilizers and fruit trees — as a complementary income-generating and food security strategy.

From the project design standpoint, a key lesson has been that successful income diversification initiatives must originate from a real identified need and must be led and at least partly funded by farmers and farmer organizations themselves. In some regions, coffee cultivation is inextricably linked to local culture, and farmers have had difficulty envisioning themselves as anything other than coffee growers. Additionally, finding suitable candidate organizations willing to commit time and resources to deploy and/or scale an alternative income-generating initiative has proven challenging. Market access for the produce of income-diversification initiatives has also been difficult for farmer organizations; in some cases, we have seen farmers and cooperatives commit substantial time and resources to launching a new product only to struggle to find interested buyers. For these reasons, it is prudent for income-diversification initiatives to start small and grow in response to market demand.

Aquaculture in the Andes

Since 2006, the CAPEMA cooperative has helped 250 smallholder coffee farmers in northern Peru sell high-quality coffee to buyers in North America and Europe.

After years of strong revenue growth, the spread of leaf rust led to a 50 percent decline in volume of coffee delivered to the cooperative in 2013.

Contributing roughly $5,000 of their own funds, CAPEMA constructed freshwater aquaculture ponds for the production of tilapia and tambaqui fish, building on the cooperative's history of investing in income diversification and capitalizing on increasing demand in the aquaculture market. Under the project, CAPEMA hired two technical advisors and trained 20 families to manage the ponds.

29 Sheridan, Michael, "Coffee Rust: What's Below the Surface?" CRS Coffeelands, April 24, 2014.

INTRODUCING MOBILE TECHNOLOGY TO RURAL ENTERPRISES

Disbursements for renovation loans require that producers comply with the terms and conditions in the original plan presented to Root Capital by the enterprise. However, both Root Capital and our clients often have limited visibility into farm-level practices and performance. Therefore, as part of CFRI, our team has supported the implementation of mobile platforms to improve farm-level agronomic inspection and overall information management.

In doing so, we have observed strong demand among clients for mobile technologies and analytical data platforms. They seek to learn what types of systems are available, how much they cost, what tools are most appropriate for their business needs, and how to actually go about introducing them into their existing processes, which are often only paper ledgers.

For example, in Nicaragua, our advisory services team partnered with coffee cooperatives to design and introduce mobile agronomic monitoring capabilities. This included digitizing the collection of agronomic information at the farm-level and GPS-mapping of reported incidence of leaf rust, enabling analysis of agronomic practices and performance vis-à-vis targets to guide credit disbursements and inform technical assistance.

We have also fielded requests for support from certified coffee cooperatives in Peru that are interested in developing a mobile inspection program. To maintain sustainability certification, these enterprises are required to conduct internal inspections of all farms once per year. Their desire for more automated systems was driven by the perceived ease of use and the ability to accurately capture and analyze information without the time-consuming (and error-prone) process of entering data into a computer after the fact. Under CFRI, we have piloted a business advisory service to help certified businesses digitize their internal inspection forms, perform tablet-based inspections with suppliers, and finally aggregate and analyze supplier information using simple data visualization platforms.

We have offered this service to three coffee cooperatives in Peru, which have conducted more than 1,200 farm inspections to date using iFormBuilder, a data-collection software platform for mobile devices. Initial results indicate that the mobile inspection process has achieved the following:

- **Improved data quality** by reducing the margin of error during data entry from up to 30 percent under the paper-based method to less than 1 percent under the digital method.
- **Increased data relevance and usefulness** by shortening the time lag between data collection and analysis and making the data easier to manipulate and analyze.
- **Saved staff time** by reducing the time required to aggregate supplier data from around two months (with two or more inspectors entering data) to less than four hours.

A client used geo-information data to map the coordinates of its members who are renovating. The above map illustrates the incidence of leaf rust among more than 100 producers.

Using data collected by the cooperative's team of agronomists, a client in Nicaragua can now track the progress of its members who are renovating and analyze their performance.

SUMMARY OF RECOMMENDATIONS

1. Leverage Blended Finance
2. Identify Scalable Distribution Channels
3. Expand Risk Management Solutions
4. Bundle Credit with Capacity Building
5. Strengthen Enabling Environment for Farm Renewal

What We're Learning

In an effort to contribute to the dialogue around blended finance approaches to R&R specifically, and investing in smallholder agricultural more broadly, this report shares details of the public-private partnership model Root Capital has developed, what we've done over the first two years of the initiative, and what we're learning. Drawing from existing literature and on-the-ground observations from Root Capital loan officers, financial trainers, and agronomic advisors, as well as our partners in the initiative, the report offers five practical recommendations for conducting R&R at scale.

1. **Leverage blended finance structures and incorporate targeted subsidies to finance R&R.** While there is now unprecedented interest in agricultural investing, private markets have generally failed to deliver financing for smallholder R&R, and for smallholder agriculture more broadly. Given the risks inherent in agriculture, coupled with the limited availability of adequate insurance and hedging products in these markets, the cost of commercial capital to fund R&R over a seven-plus year time horizon would exceed what most smallholder farmers can afford. It is therefore unrealistic to expect that smallholder R&R can be financed on purely commercial terms and deliver risk-adjusted returns to investors.

   Rather, we believe that for R&R to happen at scale with smallholder farmers — whether in coffee or other value chains like cocoa — what is required is a blend of capital with different risk/return expectations and impact objectives, as well as targeted subsidies for accompanying technical assistance. When designed and implemented in ways that align incentives, mechanisms such as partial loan guarantees, risk-sharing facilities, reserves for first-loss capital, and technical assistance funds can mitigate risk and expand impact. This type of targeted subsidy, if further scaled, can also help lower barriers to entry for other lenders and mobilize capital from a range of sources.

2. **Identify and strengthen scalable aggregation points for channeling capital to smallholders.** The vast majority of the world's smallholder farmers — estimates suggest up to 90 percent — do not participate in tightly organized value chains.[30] Rather, they are unorganized and lack strong, consistent relationships with buyers — as well as limited access to finance, farm inputs, agronomic training, and other support services that often accompany those relationships.

   Even within the coffee sector, which is generally considered to be among the most well-organized and transparent agricultural value chains, a majority of the world's 25 million producers are not aggregated into formal enterprises. For instance, there are an estimated 220,000 coffee farmers in Peru, which has one of the most highly developed coffee sectors of the 20 countries in which Root Capital works, but only 30 percent of them are affiliated with some type of organization.[31]

   To date, Root Capital has delivered renovation financing to farmers almost entirely through aggregators, including producer organizations, private mills, and exporters. Delivering credit through these channels helps to overcome common barriers to rural finance (e.g., the high transaction cost of reaching

DISTRIBUTION CHANNELS

- Farmer Cooperatives & Associations
- Processors & Exporters
- Traders
- Local Financial Institutions

30 Dalberg, Catalyzing Smallholder Agricultural Finance, September 2012.

31 Peru Ministry of Agriculture and Irrigation, presentation by Juan Manuel Benites Ramos at the 2015 Specialty Coffee Association of America annual conference.

individual farmers directly) and mitigate some of the risks associated with R&R lending. But this approach inherently limits our reach, and we know that there is substantial need for R&R among the broader population of smallholder farmers. In fact, smallholders who are not affiliated with an aggregator may be the most strongly affected and have the greatest need.

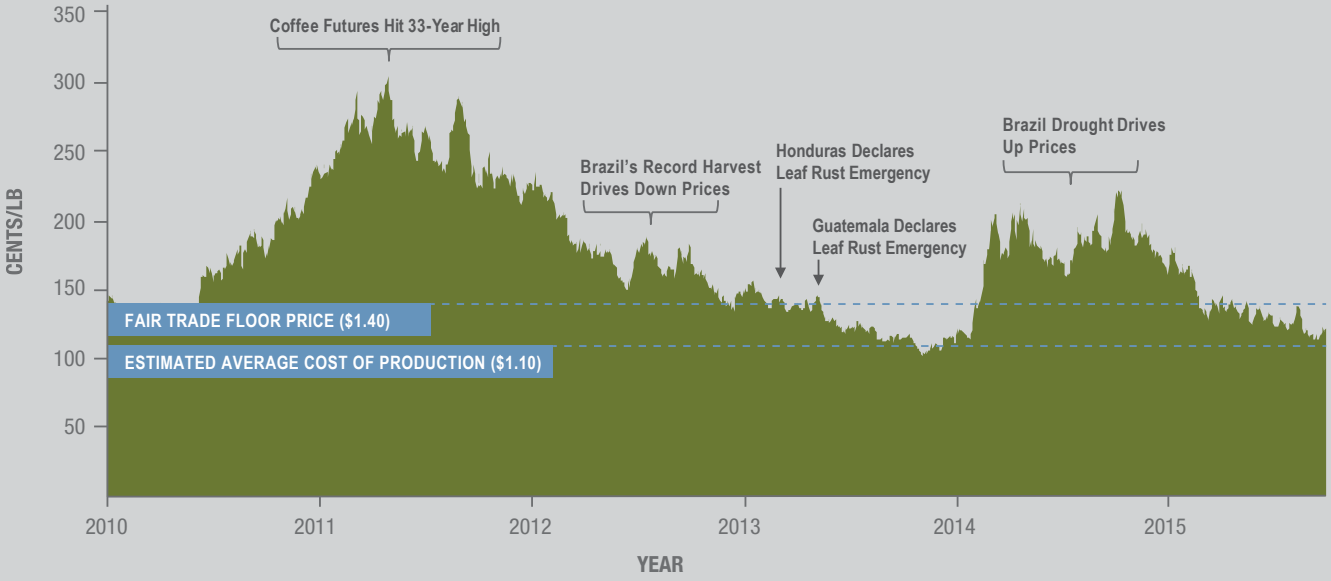
New channels are needed to efficiently deploy capital to smallholders beyond those connected to well-organized producer organizations and private enterprises. Opportunities exist to channel capital through local microfinance institutions, savings and loan cooperatives, and commercial banks. For instance, under CFRI, Root Capital provided financing to Crediflorida, an agriculturally focused savings and credit cooperative in Peru that is on-lending credit to help approximately 125 producers to renovate rust-affected coffee trees. However, institutions like Crediflorida that have a combination of financial and agronomic expertise are rare. While financial institutions typically have strong internal lending systems, their slow and uneven expansion into rural areas means that they may lack an understanding of agricultural finance, such as seasonal cash flows. Therefore, supply-side technical assistance is needed to help these institutions adapt their urban and peri-urban models of short-term lending to meet the financial needs of smallholders.

3. **Expand risk management solutions to benefit individual producers.** As coffee growers recover from leaf rust and are confronted with a decision as to whether and how much to invest in R&R, they do so amid an increasingly volatile coffee market. After surging 50 percent to $2.20 per pound in 2014, the benchmark price of Arabica retreated throughout 2015. In early 2016, the most actively traded futures contract price declined to $1.11 per pound — a two-year low and only slightly above Central America's estimated average cost of production. At the same time, exceptionally strong El Niño conditions are provoking further uncertainty, with potential disruptions to the timing and volume of rainfall in several coffee-producing countries.

This is the context in which smallholder coffee producers are deciding whether or not to make 10–plus–year investments in their farms: what may appear to be a smart, rational decision to invest one year may prove otherwise the next. In the case of one Root Capital borrower, the number of hectares that producers were renovating using their own funds dropped by 80 percent from 2014 to 2015 as the global benchmark price for coffee fell. And despite the extent to which both public and private sector actors have embraced the concepts of resilience and sustainability, it is the producers who still take on a disproportionate share of the risks. They remain most vulnerable to and least able to cope with shocks and stresses and the boom-and-bust price cycles that often follow.

Arabica Futures Price Since 2010 – New York "C" Price

While this report does not directly address current price volatility, we include the topic here to remind readers of the complex and constantly evolving market in which farmers and coffee enterprise managers are deciding whether or not to undertake R&R investments. Note that coffee enterprises that conduct renovation with their affiliated farmers typically do so only after a period of several months of agronomic and financial preparations, during which time the market price may fluctuate in ways that dramatically increase or decrease demand for renovation financing from the farmers. Thus, market volatility introduces additional complexity to an already challenging decision.



Therefore, in addition to focusing on increasing production, policymakers and practitioners should devote equal attention to designing and deploying effective risk management solutions that are both accessible and applicable to farmers and farmer enterprises. This can include early warning systems — such as the one recently developed in Honduras by IHCAFE and others — and crop insurance schemes to protect farmers from downside risk, especially in times of natural disasters and widespread crop failure. In addition, specialty buyers whose business is linked to specific flavor profiles and origins can offer incentives and rewards for quality with price premiums and long-term contrcts that partly insulate farmers against market volatility.

4. **Bundle financial and non-financial support to increase the absorptive capacity of enterprises and individual farmers to qualify for and manage credit.** The opportunity for individual farmers to invest in R&R will largely be determined by the strength and capacity of the institution administering R&R financing on a local level. While more commercial banks and microfinance institutions may provide financial products and services for R&R in the future, aggregators — producer cooperatives and private exporters in Root Capital's experience — continue to play this role. Today, these organizations are the conduit through which most financing reaches individual producers. Yet more often than not, lack of capacity, limited technical knowledge, and weak internal controls at the aggregator level become the biggest bottleneck to scaling renovation financing. For this reason, it is critical to bundle credit with technical assistance. This support can significantly lower transaction costs for loan underwriting while reducing risks for borrowers and lenders alike.

To date, much of Root Capital's advisory services have focused on strengthening producer organizations' internal credit system (a micro-loan fund managed on the enterprise's balance sheet for the benefit of its affiliated farmers). Generally, these internal credit funds are designed to provide small, short-term loans to producers in order to smooth otherwise lumpy and seasonal cash flows. With capacity building to ensure appropriate internal controls and loan monitoring, internal credit funds can offer long-term loans for renovation, although doing so entails additional risks that must be well managed.

Similarly, because many rust-affected farmers are reluctant to take on multiyear financial commitments in the current context of extreme market volatility and unpredictable growing conditions, more advanced decision-support tools are needed to remove the guess-work and help producers objectively evaluate potential financial returns. This includes robust cost–benefit analyses to determine the financial viability of renovation, as well as detailed yield projections that are informed by climate scenarios mapped at various altitudes and with different production systems.

For smallholder farmers and the enterprises that aggregate them, it is rarely the case that both capital and technical assistance are available (and often neither is available). Bringing the two together is essential for expanding the addressable demand for R&R finance, as well as for reducing risk and motivating financial institutions to invest responsibly.

5. **Strengthen the overall enabling environment by ensuring consistent access to high-quality planting material and information about coffee varieties.** Experts urge growers to carefully consider several aspects of their production system when selecting an Arabica coffee variety for renovation: altitude, hours of sunlight, and shade management, among others. The decisions farmers make about which varieties to plant could likely impact their livelihoods for the next 20 years or more. However, decision-making is often incidental rather than strategic, and coffee farmers rarely have enough information to make choices based on what is optimal for their local conditions.[32] Today, limited information and a lack of consensus on varieties presents one of the most formidable challenges to successful renovation.

   Recent sensory trials conducted by Catholic Relief Services in collaboration with the International Centre for Tropical Agriculture (CIAT) and World Coffee Research (WCR), found that while there are differences in flavor between the Catimor and Caturra varieties, there are no significant differences in the overall quality.[33] (This is especially important in the rapidly growing specialty coffee sector, where licensed graders evaluate attributes beyond flavor, such as acidity, body, balance, and fragrance, to arrive at a score that often translates into significant price premiums paid to enterprises and producers). Despite these recent findings and an ongoing focus on improving coffee quality, the debate over the relative merits of rust-resistant and non-rust-resistant varieties continues, leaving many farmers with mixed messages.

   Meanwhile, quality control at the seedling production phase has been inadequate. Farmers often produce their own seedlings, typically with poor results, and many of the nurseries run by coffee enterprises on behalf of their affiliated farmers are not well managed. Seemingly small and easily overlooked details, such as the origin and quality of coffee tree seedlings, make a significant difference in the success of a renovation program. In some cases in Peru, we have found up to one-third of seedling mortality after transplantation to the field, mostly due to root problems originating at the nursery stage. Well-managed nurseries typically experience mortality rates of less than 5 percent. In other cases, nurseries mistakenly mixed seedling varieties. Farmers may not realize these mistakes until a year or more after planting. These and related quality-control issues not only increase the cost of renovation but also reduce productivity and depress farmer incomes, thereby jeopardizing loan repayments.

   There is an immediate need for better coordination throughout the value chain, as well as varietal recommendations for farmers and enterprise agronomic teams; some of this is well underway thanks to ongoing work by WCR through its Coffee Variety Intelligence project. This research is essential in providing alternatives to traditional coffee varieties.[34] Alongside variety research, R&R initiatives must place a strong focus on technical training, capacity building, and transparent reporting related to nursery management and seedling production.

32 Neuschwander, Hanna, "The Importance of Research and Investing in the Future," Specialty Coffee Chronicle, October 30, 2015.

33 Catholic Relief Services, 2015 Presentation on Colombia Sensory Trial

34 World Coffee Research, "Why Genetic Diversity Matters," July 2015.

Looking Ahead

The swift and immediate impact of leaf rust has been felt throughout the coffeelands in Latin America: on households struggling through the hunger season; on laborers whose main income is generated during the harvest season; on enterprises that offer critical services, training, and market access for farmers; and on the agricultural economies of Latin America that depend on coffee for domestic employment and export earnings.

For economically vulnerable coffee producers and laborers living at the margins on less than $2 per day, shocks and stresses such as these can quickly push them deeper into poverty. When the global coffee market collapsed in 2001 and prices dropped to $0.45 per pound, the day-to-day realities of coffee farmers started to attract wide public attention. Many in the industry recognized that low prices and short-term price volatility in the futures market can have long-term consequences at the farm gate.

Today, private sector companies are investing in the sustainability of their supply chains in ways that deliver shared value for all participants. Meanwhile, demand for sustainably produced commodities is growing; consumers are expressing unprecedented interest in the social, economic, and environmental aspects of agricultural production and trade. And after decades of underinvestment, national governments and multilateral institutions are recognizing the fact that, when designed with smallholders in mind, investment in agriculture is among the most powerful forces for achieving inclusive economic growth.

Yet smallholder farmers and the rural enterprises on which they depend are still unable to reach their full economic potential. Price volatility and the unpredictable growing conditions that come with climate change have and will continue to jeopardize smallholder farmers' livelihoods. Indeed, it is likely that coffee leaf rust will plague producers for years to come. Rarely are there simple solutions to these challenges, and our work has addressed but a minute fraction of the estimated need.

However, we are seeing some encouraging signs of progress — from well-managed renovation plans to income diversification projects — across our broader lending portfolio of 115 coffee enterprises, directly reaching approximately 100,000 farmers throughout Latin America. At the same time, we're also seeing many cases of farmers simply waiting to see what happens to their trees, or abandoning their land in desperation and migrating to work elsewhere.

In the spirit of not letting a crisis go to waste, we find compelling opportunities to support producers in overcoming these challenges and to strengthen the value chain for all participants. We hope that the Coffee Farmer Resilience Initiative can provide insights to inform emerging models for building farmer resilience and prosperity in the coffee sector as well as in other agricultural value chains.

With targeted investment in renovation and rehabilitation — including blended finance, targeted subsidies, and accompanying technical assistance — more of the world's farmers will be able build and realize a sustainable future.

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