

Maraba Cooperative, Rwanda
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IMPACT STUDY

CLIMATE ACTION EVALUATION SERIES | MAIN REPORT

Financing Climate Resilience

Evidence on Building Resilience for Agri-SMEs and Smallholder Farmers

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Executive Summary

Study Overview

With the support of the IKEA Foundation, this study evaluates the impact of Root Capital's climate finance initiatives, specifically Climate Action Loans (CLs) and Climate Resilience Grants (RGs), on the climate resilience of 30 coffee agricultural small and medium enterprises (agri-SMEs) and their farmers across six countries. The evaluation uses a quasi-experimental, mixed-methods design and a newly developed Climate Resilience Index (CRI) to measure how targeted capital translates into adaptation at both the organizational and producer levels.

Key Quantitative Insights: The Causal Impact of Climate Finance

Our evaluation confirms that Root Capital's climate finance is achieving its intended goal: to act as a critical external enabler for climate resilience for our clients and their affiliated producers. While agri-SMEs and farmers possess high climate awareness, their ability to adapt is often hindered by structural barriers, most notably a persistent financing gap.

Providing capital through CLs effectively addresses this barrier. At the agri-SME level, our analysis shows that businesses accessing these loans saw their climate resilience increase by 22.6 percent compared to the comparison group. These gains were driven primarily by the Capacities and Enablers dimension of climate resilience, proving that access to capital allows businesses to implement resilience strategies that were previously financially out of reach.

The evaluation further validates that the climate resilience gains achieved at the enterprise level can successfully reach the individual producer. Farmers affiliated with agri-SMEs receiving a CL showed a 7.0% improvement in their resilience scores, specifically driven by economically and statistically significant effects on the Realized Resilience dimension. Importantly, these findings demonstrate that enterprise-focused climate finance can generate benefits beyond the direct borrower, strengthening resilience throughout the broader agricultural value chain.

Due to agricultural seasonality and unforeseen operational delays, only one RG was fully implemented within the strict boundaries of the observation period. However, looking across the broader evaluation data, the intervention yielded highly successful results: smallholder farmers achieved a 12.8 percent increase in climate resilience relative to the control group.

Key Qualitative Insights: From Awareness to Adaptation

Our qualitative evidence from coffee cooperatives in Uganda reveals that climate finance bridges the gap between awareness and tangible action. Institutional investments in climate-smart infrastructure, including solar processing units and centralized nurseries, have become essential engines of resilience for agri-SMEs like ACPCU and Rubanga. These assets provide a structural foundation that allows cooperatives to stabilize production against threats such as prolonged droughts and unseasonal rainfall. By centralizing resources, agri-SMEs can scale technical solutions, such as drying infrastructure or resilient coffee seedings, that would be physically or financially inaccessible for individual farming families to access or maintain on their own. This demonstrates that targeted capital does more than just de-risk a business; it fundamentally transforms the physical landscape of the coffee supply chain.



Musasa Cooperative, Rwanda
Credit: Patricia Alvarado Núñez/ Root Capital


ASOBAGRI Cooperative, Guatemala
Credit: Root Capital

Despite the improvements demonstrated in technical solutions, the qualitative research identifies profound human and operational constraints that complicate the path to full resilience for both farming households and agri-SMEs. The labor gap is gendered, with acute effects for female and elderly producers who lack the physical strength or the financial liquidity to hire the external workers required for labor-intensive practices like digging water retention trenches to build resilience to drought.

Furthermore, many households navigate difficult internal trade offs, where the desire to invest in long-term climate tools, such as shade trees, is stifled by the immediate need to prioritize food crops on small plots. These insights underscore that while capital removes the primary financial barrier, scaling impact requires deeper engagement with the specific labor realities and land constraints of farming families to ensure they can optimally capitalize on the tools and resources provided by the enterprise's adaptation programs.

The Reality of Uptake: Operational & Financial Barriers

Despite the clear resilience gains associated with climate finance, adopting a CL remains a complex and demanding process. For agri-SMEs operating on thin margins, incurring additional debt for long-term environmental returns requires navigating significant hurdles. Our findings serve as a reminder that while these investments may be the right strategic choice for the long-term, they are often impractical given our clients' immediate constraints. It is difficult to prioritize a multi-year Return on Investment when faced with the urgent pressure of securing the next harvest.

Our findings suggest that to be effective, climate finance must also address the "internal readiness" of the enterprise, ensuring it possesses the organizational capacity and financial stability needed to manage debt for high-impact, long-term resilience investments. To target this constraint, Root Capital complements its capital provisioning with no cost technical advisory services and subsidized interest rates to lower the barrier to entry for long-term investments. Yet, we acknowledge that deeper structural barriers remain; making climate finance genuinely affordable and accessible for agri-SMEs will continue to be a core priority moving forward.

Conclusion

The evidence demonstrates that climate finance can strengthen resilience by addressing one of the primary barriers to adaptation: access to capital. Across both the quantitative and qualitative findings, enterprises that successfully accessed climate finance translated existing climate awareness into tangible investments, stronger organizational capacities, and measurable resilience gains. Importantly, the evaluation also shows that these benefits can extend beyond enterprises, generating meaningful resilience improvements among affiliated farming households.

At the same time, resilience building is not a linear process. The pathway from financing to impact is influenced by enterprise readiness, implementation timelines, and the practical realities faced by farming households. Ultimately, these findings suggest that scaling climate resilience requires more than simply increasing the supply of capital. It requires improving how capital is designed, deployed, and evaluated to ensure that financial products and implementation support align directly with the operational realities of agricultural value chains.

Contents

Introduction 1

Root Capital's Climate Finance Products 1

Strategic Deployment: Climate Priorities and Levels of Investment 2

Evaluation Objectives 2

The Evaluation Cohort: Pipeline Strategy and Operational Realities 3

Pipeline Strategy 3

Pipeline Execution Challenges and Research Adaptations 5

Methodology 7

The Evaluation Logic: A Mixed-Methods Approach 7

Integrated Measurement: The Climate Resilience Index (CRI) 8

Key Findings 9

Quantitative Findings: Client and Farmer-level Impact 9

Qualitative Findings: Operational Context and Farm Realities 10

Boundaries and Limitations 12

Evaluation Synthesis: Core Insights & Lessons Learned 12

The "Awareness vs. Capital" Paradox 13

Pipeline Attrition as Diagnostic Evidence 13

From Enterprise Investment to Household Resilience 13

The Way Forward 14

Lessons for Monitoring and Evaluating Climate Finance 14

Align Evaluation Design with Implementation Milestones 14

Tailor Monitoring to Different Climate Investment Pathways 14

Future Outlook: Increasing access to Climate Finance for Rural Communities 15

Establishing the Business Case: Farm Transformation Partnerships 15

Strengthening Client Capacity: Integrated Advisory Modules 15

Evolving our Loan Products: Flexible, Right-Sized CAPEX Financing 16

The Next Frontier: Scaling Through Root Ventures 16

Conclusions 17

Introduction

For millions of smallholder coffee farming families, the climate crisis is not a distant threat; it is a daily reality that erodes livelihoods through erratic rain cycles, intense pest outbreaks, and falling crop yields. Agricultural small and medium enterprises (agri-SMEs) are the natural anchors of these rural economies, uniquely positioned to drive community-wide adaptation. Yet, a persistent global financing gap routinely stalls their potential, leaving passionate enterprise leaders without the liquidity required to scale meaningful defenses.

Supported by the IKEA Foundation, Root Capital launched a multi country initiative across Mexico and Central America (MAC) and Africa (AFR) to deploy specialized climate finance products, specifically Climate Action Loans (CLs) and Resilience Grants (RGs), alongside targeted technical assistance. This report presents a comprehensive evaluation of that initiative, moving beyond abstract technical data to demonstrate how tailored capital successfully transform climate awareness into permanent, structural resilience from the agri-SME balance sheet down to the individual farm.

Root Capital's Climate Finance Products

While agri-SMEs and smallholder families face an acute financing gap to adapt to escalating climate shocks, they possess high awareness of climate change and a strong desire to protect their ecosystems and livelihoods. Supported by the IKEA Foundation, Root Capital's climate finance products act as critical external enablers, bridging the gap between baseline awareness and scalable action. The initiative deploys two complementary financial mechanisms tailored to different stages of an enterprise's resilience journey.

1. Climate Action Loans: The Engine for Structural Adaptation and Resilience

These credit facilities provide agricultural enterprises with the liquidity needed to invest in climate infrastructure and adaptation support for farmers.

Mechanism: Disbursements vary from $25,000 to $600,000 (median in the evaluation pipeline: $131,000). These loans offer flexible repayment terms ranging from one to five years to ensure they align with agricultural timelines and cooperative cash flow constraints.

2. Climate Resilience Grants: Seeding Foundational Capacity

These non-repayable capital allocations are engineered to mitigate immediate vulnerabilities, test new adaptation interventions, and fund critical technical support for farmers, ultimately building organizational readiness for scaled investment in climate resilience.

Mechanism: Individual allocations range from $8,000 to $30,000 (median in the evaluation pipeline: $20,000) with an evaluation pipeline median of $20,000. Designed to fund new or scaled climate-smart business activities co-created with Root Capital's Agronomic and Climate Resilience Advisory (ACRA) team, these grants largely cover the target funding need in full, requiring only a small business cost-share.

Root Capital utilizes these two, complementary financial products to tailor climate finance to the operational capacity of an enterprise. For early-stage organizations or untested climate interventions, RGs absorb the financial risk of piloting new climate investments. For more mature organizations and tested climate interventions, CLs finance business-level adaptation infrastructure or farmer adaptation services ready to scale. When strategic alignment allows, Root Capital deploys these mechanisms in tandem or succession, building holistic resilience across both the internal management and the producer networks of our client enterprises.

Strategic Deployment: Climate Priorities and Levels of Investment

Root Capital focused its climate finance programming on advancing regenerative agriculture practices through three specific climate priorities: Resilient Soils, Resilient Crops, and Resilient Businesses. CLs and RGs are channeled through partner enterprises and operate at either the enterprise level or the farm level:

- Interventions at the enterprise level typically focus on investments in infrastructure over the long-term to reduce greenhouse gas emissions or adapt to changing climate conditions. Within this evaluation, both studied interventions in Africa operated at this organizational level.

- Investments at the farm level generally focus on seasonal support for inputs and labor to implement regenerative farming practices that reduce greenhouse gas emissions and support adaptation to changing climate conditions. In MAC, all interventions, including both CLs and RGs, were deployed at this individual farm level.



Maraba Cooperative, Rwanda
Credit: Root Capital

Evaluation Objectives

To facilitate the translation of research findings into actionable intelligence for global practitioners, impact investors, and local communities, this evaluation was designed around three core strategic pillars:

- **Isolate Attributable, Causal Impact:** Isolate and measure the specific impact directly attributable to Root Capital's climate finance services. The evaluation separates the tangible effects of our capital injections from external confounding factors, including volatile market prices and regional weather fluctuations, to determine the true causal link between our services and changes in agribusiness and household climate resilience.

- **Understand the Mechanisms that Enhance Climate Resilience:** Leverage qualitative research to go beyond causal effects and uncover the operational realities of farmers and agri-SMEs. By looking behind the quantitative data, we evaluate how real-world field dynamics (including land fragmentation, business operational constraints, and gendered labor realities) influence, mediate, or bottleneck the rollout of climate solutions.

- **Inform Future Product Design:** Capture hard won operational insights from pipeline management, credit uptake, and regional variance to guide future product design. By documenting these experiences, the evaluation helps Root Capital and the broader development sector engineer more agile, responsive climate financial instruments for vulnerable value chains.

The Evaluation Cohort: Pipeline Strategy and Operational Realities

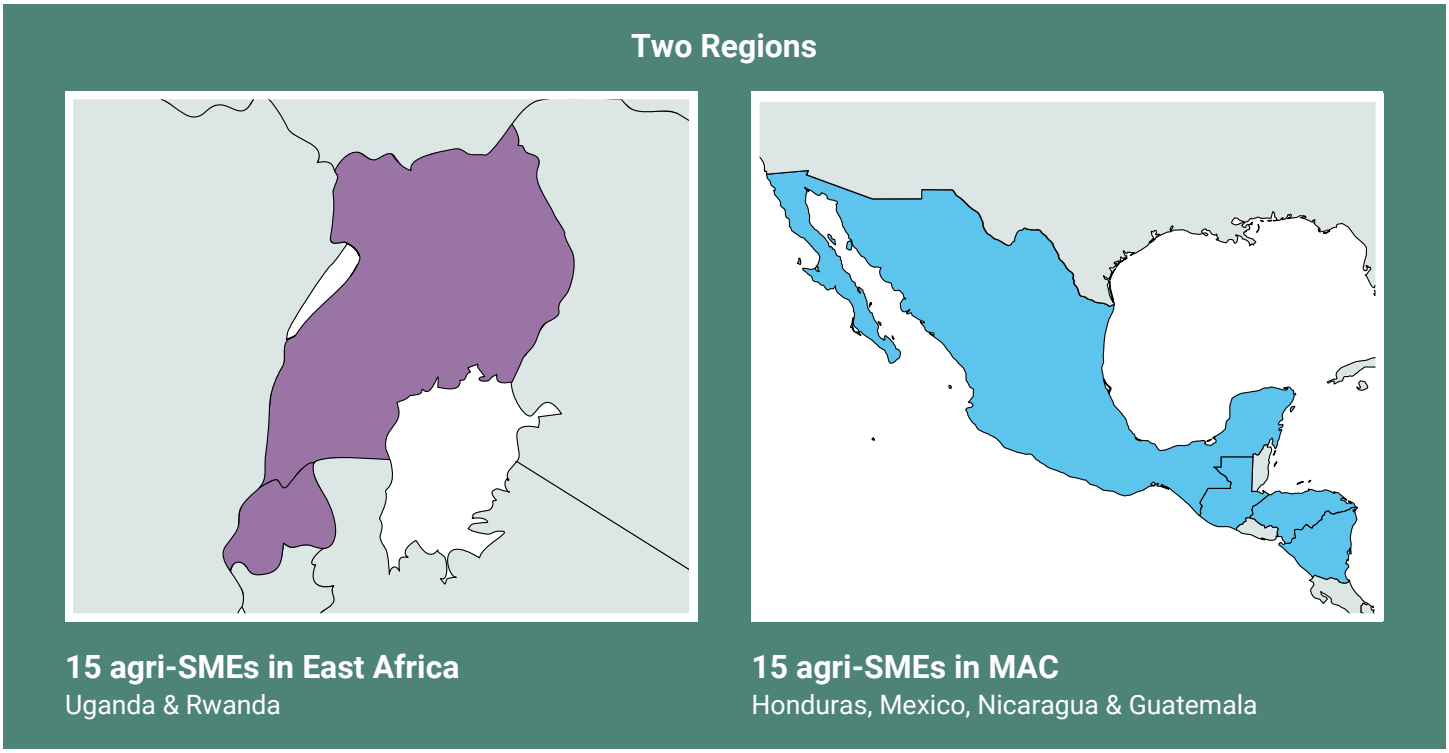
Pipeline Strategy

To isolate the causal effects of specialized climate finance, the evaluation framework tracks a strategic pipeline of 30 active agribusinesses identified in 2023 across six countries, as illustrated in Figure 1. This pre-qualified cohort was compiled based on organizational eligibility and a demonstrated appetite for climate action, establishing a high baseline probability of medium-term credit adoption across the entire group.

While the research design anticipated that market dynamics would prevent some clients from closing loans within the strict evaluation window, the baseline probability of adoption remained structurally comparable across the cohort. Every participating agribusiness successfully cleared three foundational benchmarks prior to the evaluation:

- **Rigorous Compliance:** Passed Root Capital's comprehensive social, environmental, and governance due diligence.
- **Advisory Engagement:** Received institutional training via ACRA services.
- **Demand Validation:** Expressed formal, documented interest in accessing climate finance.

Figure 1. Geographic Coverage of the Evaluation



In practical terms, this pipeline represents a dynamic operational cohort rather than a static research sample. Agri-SMEs within this group that successfully closed a CL or received a RG, along with their affiliated smallholder farmers, constitute the treatment group for the study. Conversely, the agribusinesses that did not receive climate finance from Root Capital during this window serve as the control group. The baseline geographic distribution of these 30 enterprises across AFR and MAC regions, along with the final operational delivery of lending and grant products, detailed in Table 1. By balancing this operational pipeline, the framework ensures that the comparison and treatment groups share equivalent organizational maturity and strategic intent, thereby safeguarding the empirical integrity of the study.

Table 1. Descriptive Profile of the Evaluation Cohort at Agri-SME and Farmer Levels

a) Agri-SME Level (2024)		
	AFR	**MAC**
Operational Reach		
Average Number of Affiliated Producers	8,530	315
Average Producers Land Area (Hectares)	4,769	818
Women-Inclusive Business (%)	90.91%	54.55%
Financial Indicators		
Average Yearly Sales (USD)	2,899,744	2,636,072
Average Yearly Payments to Producers (USD)	2,036,697	2,358,910
Root Capital Interventions		
# Average ACRA days (yearly)	5.03	4.24
# CLs disbursed within evaluation observation period	2	7
# RGs started implementation within evaluation observation period	0	1
Climate Shock Vulnerability		
Experienced a severe climate shock (%)	100%	91%
Recovered from severe climate shock (%)	8%	20%
Climate Resilience		
Climate Resilience Index Score (0-1)	0.53	0.66

b) Farmer Level (2024)		
	AFR	**MAC**
Household Demographic		
Proportion of Women (%)	21%	29%
Average Age (Years)	51.29	48.97
# Average of Children in the Household	2.76	2.59
Farm Profile and Institutional Connection		
# Years Affiliated with the Cooperative	7.90	11.57
Average Cultivated Land Area (Hectares)	1.82	3.07
Shock Exposure and Livelihood Recovery		
Experienced a Severe Climate Shock (%)	68%	75%
Fully Recovered from the Climate Shock (%)	52%	54%
Returned Better Off After the Shock (%)	3%	2%
Climate Resilience		
Climate Resilience Index Score (0-1)	0.58	0.51



Maraba Cooperative, Rwanda
Credit: Root Capital

Pipeline Execution Challenges and Research Adaptations

The evaluation was designed around a pipeline of agri-SMEs with a high likelihood of adopting climate finance. However, as implementation progressed, market conditions and operational realities influenced both the pace and scale of uptake. Table 2 summarizes the key milestones and adaptations that shaped the evolution of the pipeline between 2022 and 2025.

A major challenge emerged in 2023 when the global macadamia market experienced a sharp downturn. Several enterprises in the original East African pipeline shifted their focus from long-term adaptation investments to short-term business continuity, reducing demand for CLs. In response, Root Capital diversified its pipeline across geographies strengthening engagement with coffee enterprises in Rwanda and Uganda while leveraging established climate finance portfolios in MAC.

As implementation expanded, two broader barriers to climate finance adoption became evident. First, many agri-SMEs faced limited debt capacity, making it difficult to assume additional long-term obligations while managing immediate business needs and short-term climate, market, and political risks. Second, enterprises often lacked localized evidence demonstrating the financial returns of climate adaptation investments, increasing their reluctance to borrow for relatively new climate-focused activities.

To address these constraints, Root Capital adapted the initiative's strategy. The experience demonstrated that climate finance cannot be deployed through a one-size-fits-all approach. For many agri-SMEs, climate investments required highly tailored loan structures, including appropriate sizing and concessional terms that reflected their debt capacity and risk profile. Concretely, Root Capital introduced interest rate discounting for loans without a clear 3-year payback period to make it easier for businesses to invest in long-term resilience, and we started considering climate loans below our traditional minimum loan size. At the same time, the role of Resilience Grants (RGs) was expanded to support adaptation activities that were not yet suitable for debt financing. Together, these adjustments enabled agri-SMEs to continue investing in resilience while generating practical evidence on the benefits and financial viability of climate-smart investments.

These operational realities also required adjustments to the evaluation framework. Two enterprises originally included in the African sample exited the study following the macadamia market shock. To preserve statistical power, the evaluation expanded farmer-level sample sizes across the remaining 13 active clients in Uganda and Rwanda, ultimately securing more than 1,000 smallholder observations. In addition, two new Ugandan agribusinesses were incorporated into the research cohort, both of which subsequently progressed from advisory support to successfully closing CLs.

The gradual adoption of these specialized financial products also created a temporal challenge for the evaluation. Because climate loan uptake proceeded more slowly than initially anticipated, a standard two-year research timeline would have created the risk of portfolio truncation, with the study concluding before a sufficient number of enterprises had received climate finance and implemented the corresponding project activities to allow for meaningful impact measurement. To address this challenge and preserve the evaluation's ability to assess the effects of climate finance, Root Capital extended the research framework through 2025 and added a third round of data collection at the farmer level in Africa.

Importantly, these experiences generated valuable strategic learning. The evolution of the pipeline demonstrated that climate finance adoption depends not only on the availability of capital, but also on enterprise readiness, debt capacity, and the alignment of financial products with the operational realities of agricultural businesses. These lessons directly inform Root Capital's future climate finance strategy and the optimization framework presented in the final section of this report.

Table 2. Chronological Pipeline Evolution & Evaluation Adjustments (2022-2025)

2022

Launch & Sector Selection

Objective: Deploy 35 CLs in Africa.
Risk: High pipeline concentration in the Kenyan macadamia sector.

2023

Macro Shock & Operational Pivot

Challenge: Macadamia market downturn slows climate loan uptake.
Response: Diversified across geographies and value chains (MAC, Rwanda, and Uganda coffee).

2023-2024

Programmatic Rebalancing

Insight: Limited debt capacity and uncertain returns constrain adoption.
Response: More tailored climate loans (right-sizing and concessional terms) and expanded RGs from 15 to 20–28.

2024-2025

Evaluation Alignment & Extension

Challenge: Slow uptake and client attrition.
Responses:

- Added two Ugandan agri-SMEs and expanded farmer sample sizes.
- Added a third data collection round in AFR (farmer-level) to extend the evaluation through 2025.

Methodology

The Evaluation Logic: A Mixed-Methods Approach

To build a comprehensive understanding of impact, the evaluation framework utilizes a multi-year, mixed-methods design. This approach intentionally pairs robust econometric modeling with qualitative field insights. The quantitative analysis measures the exact magnitude of causal change (what occurred and to what extent), while the qualitative analysis uncovers the underlying structural and human mechanisms behind those numbers (answering why and how those changes took place). The structural rationale behind this mixed-methods framework, including the specific focus areas and key learning questions for both arms of the study, is mapped in Figure 2. For a more detailed description of the quantitative and qualitative methodologies, as well as a comprehensive breakdown of the data collection process, readers can consult the standalone Quantitative Impact Analysis Report and the Qualitative Evaluation Report.

The study tracks changes over time across a multi-year data collection timeline, comparing treated cooperatives and farmers against a balanced control group. The complete evaluation schedule, illustrating the chronological flow of data collection rounds, is detailed in Figure 3.

Figure 2. Integrated Mixed-Methods Evaluation Framework and Core Research Dynamics

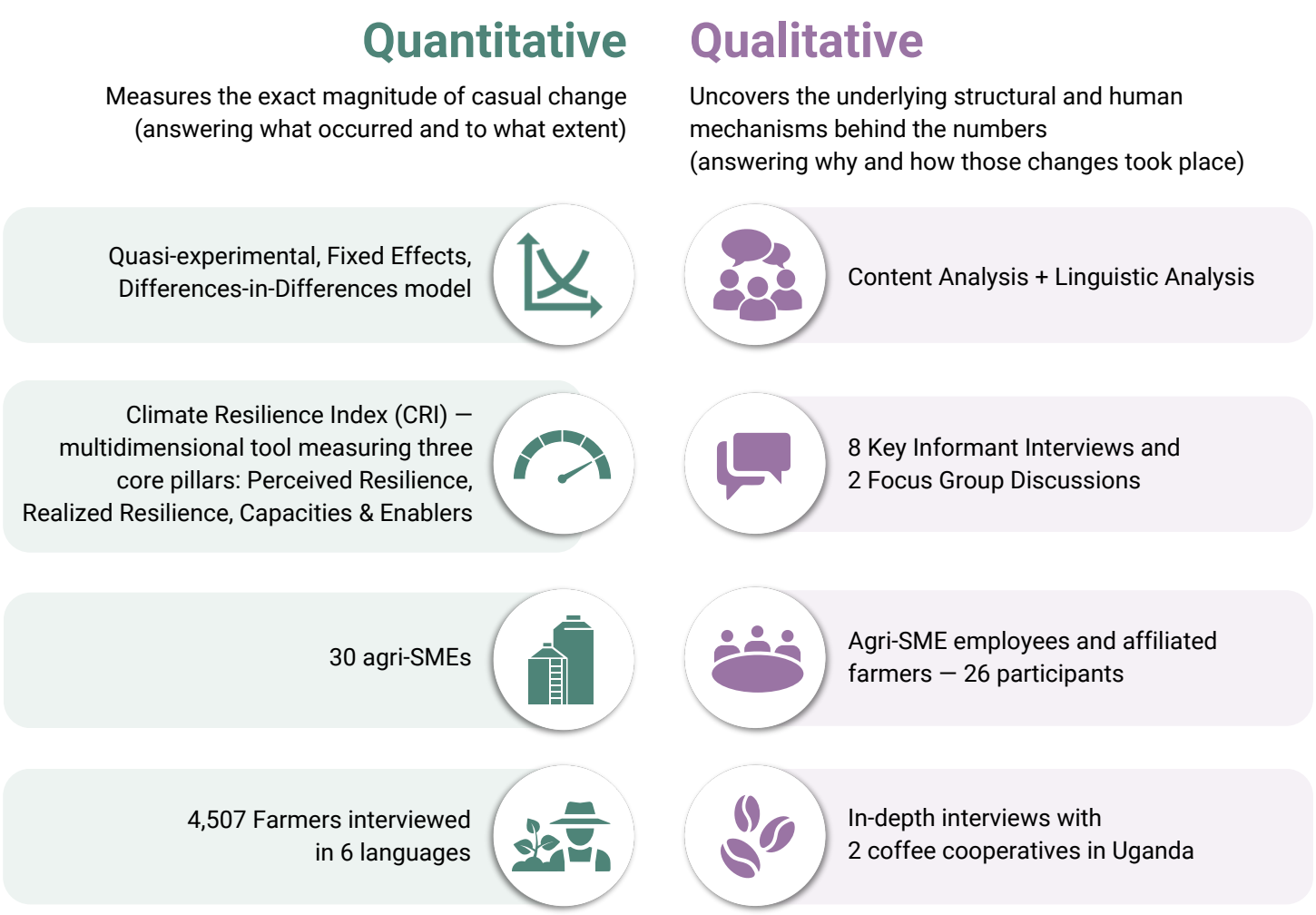
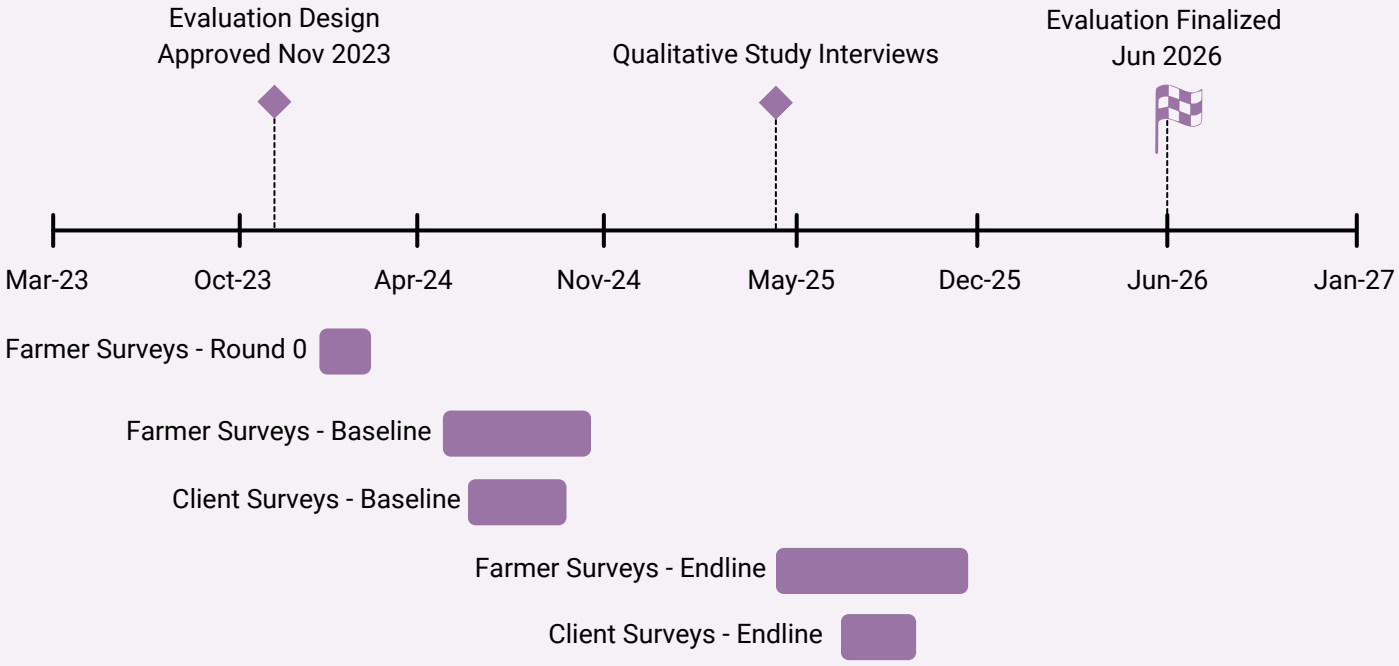


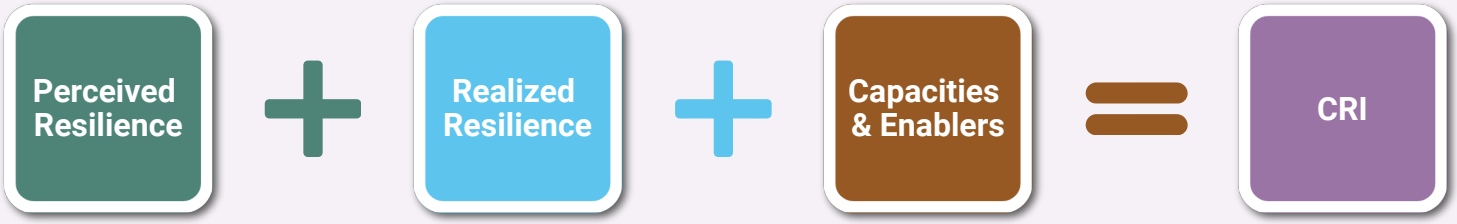
Figure 3. Multi-year Evaluation Timeline and Data Collection Rounds (2023 to 2025)



Integrated Measurement: The Climate Resilience Index (CRI)

To translate the multi-faceted nature of adaptation into a measurable outcome, Root Capital developed an original Climate Resilience Index (CRI). Rather than relying on isolated indicators, the CRI holistically assesses resilience as a composite outcome. The framework is inspired by established global methodologies, including the FAO RIMA II model, USAID's Market Systems Resilience framework, and the 60 Decibels Climate Resilience Assessment tool, but it is contextualized to the coffee industry and originally synthesized by Root Capital, modeled after our Enterprise Development Index (EDI) framework. Every indicator, together with the specific survey questions included in the CRI, can be consulted in the appendix of the Quantitative Impact Analysis Report.

Figure 4. Climate Resilience Index (CRI) Dimensions



The CRI evaluates climate readiness across three core dimensions:

- **Perceived Resilience:** Quantifies an organization's or household's confidence in their adaptive capacity by assessing their subjective ability to prepare for, mitigate, and recover from future environmental shocks.
- **Realized Resilience:** Captures how households and enterprises actually fared during recent climate events, measuring the concrete impact of shocks on agricultural productivity and operational continuity.
- **Capacities and Enablers:** Tracks the structural presence of assets, tools, and practices proven to facilitate long-term resilience, such as regenerative agriculture, crop insurance, extension services, and formal credit.

Key Findings

Quantitative Findings: Client and Farmer-Level Impact

The findings in this evaluation establish a robust, causal link between targeted climate finance and tangible adaptation outcomes across the coffee value chain. While product deployment is often slower and more operationally complex than initially modeled, the empirical results demonstrate that once capital is put into practice, it produces significant, measurable gains for both agribusinesses and smallholder farming families.

The pooled causal impacts of these climate lending interventions across the entire evaluation cohort are illustrated in Figure 5. To provide a more granular understanding of how these dynamics operate across different geographies, Figure 6 presents the same causal impact metrics disaggregated at the regional level for both AFR and MAC. The specific point estimators and levels of statistical significance for every parameter estimated across these models can be consulted directly in the standalone Quantitative Impact Analysis Report.

Figure 5. Causal Impact of Climate Finance on Enterprise and Farmer Climate Resilience

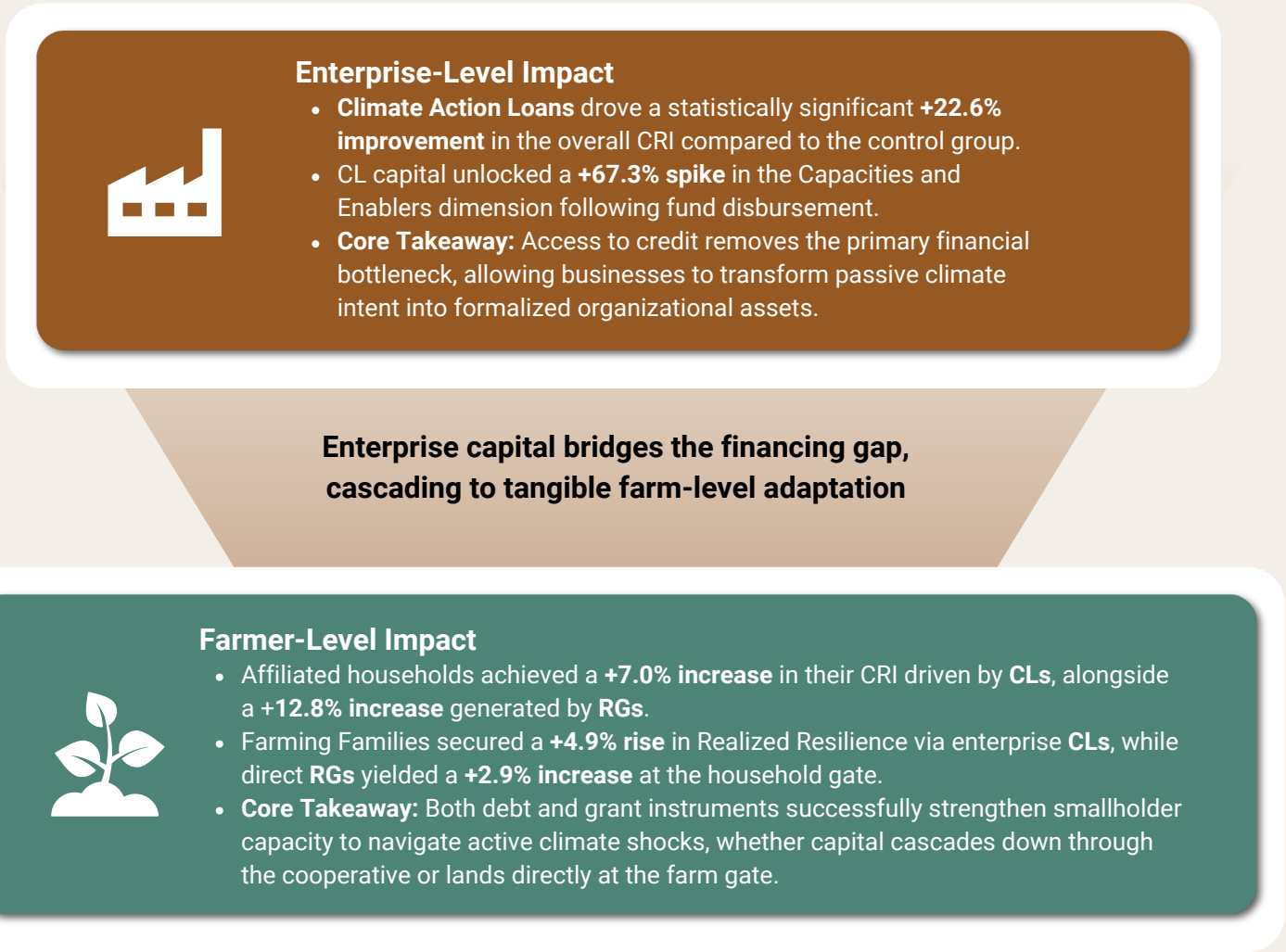


Figure 6. Causal Impact of Climate Finance Disaggregated at the Regional Level

MAC

Climate Loans generated a **+12.2% improvement** in overall CRI

Resilience Grants delivered a parallel **+12.8% increase** in the region's composite index

Among households experiencing climate shocks, households achieved a **+5.5% rise** in Realized Resilience through loan capital channels

Climate Loans also drove a strong **+42.8% growth** in Capacities and Enablers

Resilience Grants generated increases across all three dimensions of climate resilience: **Realized Resilience, Perceived Resilience, and Capacities and Enablers.**

Core Takeway: In the MAC region, both financial mechanisms actively move the needle, showing an especially powerful ability to scale baseline operational Capacities and Enablers.

EAST AFRICA

Core Takeway: In the Africa region, the positive effects are only observed at the client level. At the farmer level, we did not find statistically significant effects of CLs on climate resilience at the farmer level. This likely reflects the strategic focus of climate loan investments in Africa, which financed agri-SME infrastructure rather than farmer-level interventions.

Qualitative Findings: Operational Context and Farm Realities

> We used to have known seasons for our farming activities, but the seasons have changed, when we would be planning to plant beans is when the season becomes too hot... This is all because of the change in the weather patterns.
>
> **Farmer at Rubanga**



Musasa Cooperative, Rwanda
Credit: Patricia Alvarado Núñez/ Root Capital

The qualitative evidence gathered across this evaluation offers a vital lens into the numbers, contextualizing the quantitative trends by capturing the human and operational realities of climate adaptation. While econometric models isolate what changes occurred, these narrative insights reveal how and why those changes unfolded, illustrating the exact field-level mechanisms, trade-offs, and socio-economic dynamics that dictate how agribusinesses and smallholder families experience climate finance.

The qualitative insights are organized around two core themes. Figure 7 illustrates how smallholder households experience localized climate shocks and the subsequent support mechanisms provided by their cooperatives. Figure 8 maps the systemic structural barriers enterprises face during project execution, alongside their future outlook for long-term climate resilience. For a deeper look into the specific case studies, focus groups, and interview transcripts from individual cooperatives, practitioners can consult the standalone Qualitative Field Study Report directly.

Figure 7. Climate Shocks and Cooperative Support

The Systemic Threat: Intense climate shocks—specifically prolonged drought and irregular rain—cause **widespread crop failure** (e.g., flower abortion), **threatening smallholder farmer survival** and the ability of cooperatives to **fulfill export contracts.**

Cooperatives as Resilience Engines: Climate loans enable cooperatives to act as vital intermediaries, **translating high-level climate resources and technical knowledge into actionable farm-level support.**

Rubanga (Direct): Invests in proximal farm assets like irrigation, nurseries and solar driers to provide producer-level benefits.

ACPCU (Indirect): Prioritizes institutional resilience via solar infrastructure to secure business continuity and reduce processing costs.

Figure 8. Structural Barriers and Future Outlook

Critical Structural Barriers: Resilience is often limited by a **physical and financial labor gap for women and aging farmers,** alongside the logistical difficulty of scaling "big farm" solutions on small, fragmented plots.

Loan Cycle Mismatch: There is a fundamental **mismatch between short-term loan cycles and the multi-year maturation period** required for new, drought-resistant coffee trees.

Operational Friction: While targeted finance is essential to de-risk the sector, the **path to securing these funds is marked by significant administrative and regulatory challenges** for cooperative management.

Strategic Outlook: **Capital alone is not a standalone solution.** Scaling impact requires deeper engagement with **cooperative operational capacity** and the **specific labor and land constraints of smallholder farmers** to ensure strategies are both commercially viable and socially sustainable.

Boundaries and Limitations

As with any impact evaluation conducted in dynamic agricultural markets, several factors should be considered when interpreting these findings.

First, the pace of climate finance deployment constrained the number of treated enterprises available for analysis. Although the evaluation was designed around a pipeline of 30 prequalified agri-SMEs, external market shocks, evolving client priorities, and implementation timelines reduced the number of CLs closed within the observation period. Similarly, while multiple RGs were approved during the study, only one grant-funded intervention had begun implementation within the evaluation window. As a result, findings related to RGs should be interpreted as evidence from a single implemented intervention rather than as representative of the broader grant portfolio.

Second, the farmer-level analysis faces several data constraints. Because surveys were conducted by phone, the sample may overrepresent farmers with greater assets and more reliable network access. In addition, the Realized Resilience dimension of the CRI can only be measured among farmers who experienced a climate shock during the observation period, reducing the sample available for some analyses. While these constraints may limit the generalizability of the findings, they do not alter the underlying causal relationships identified within the study sample.

Finally, the qualitative component focused on two coffee cooperatives in Uganda selected to explore the mechanisms through which climate finance translates into resilience outcomes. While these case studies provide valuable insights into implementation pathways and farmer experiences, their findings should not be interpreted as representative of all clients in the evaluation. To strengthen credibility, the study employed multiple data collection methods, semi-structured interviews with neutral questioning, and systematic triangulation across qualitative and quantitative evidence.

Taken together, these limitations primarily affect the extent to which findings can be generalized across contexts rather than the credibility of the results within the study sample. Additional methodological detail is provided in the standalone quantitative and qualitative reports.

Evaluation Synthesis: Core Insights & Lessons Learned

Across both the quantitative and qualitative components of the evaluation, a consistent message emerged: when climate investments are successfully deployed, they contribute to stronger resilience outcomes for both agricultural enterprises and smallholder farming households. Agri-SMEs that accessed climate finance strengthened the organizational capacities needed to anticipate, manage, and adapt to climate-related risks, while affiliated farmers demonstrated improvements in their ability to translate adaptation practices into tangible household-level resilience. Although the evaluation captured a limited number of implemented interventions (particularly regarding Climate Resilience Grants), the evidence consistently points toward positive resilience gains once climate investments move from design to active implementation.

At the same time, the findings confirm that resilience-building is not achieved through capital alone. The qualitative research reveals that the benefits of climate finance are shaped by daily realities faced by enterprises and farming families, including labor constraints, competing livelihood priorities, and the time required for climate investments to yield measurable results. Together, the evidence suggests that climate finance is most effective when it is paired with tailored implementation support and delivered in ways that reflect the operational realities of both agri-SMEs and smallholders. In this sense, the evaluation demonstrates not only that climate finance can strengthen resilience, but that the pathway from investment to impact depends entirely on addressing the practical barriers that influence how adaptation measures are adopted and sustained over time.

The "Awareness vs. Capital" Paradox

Our qualitative field studies highlight a profound reality: smallholder cooperatives and agri-SME managers already possess deeply sophisticated awareness of climate change. From Africa to Mexico and Central America, enterprise leaders do not need to be convinced of the climate threat; they witness its impacts on their supply chains daily.

Instead, the principal barrier to adaptation and mitigation is often access to appropriate financial resources. This finding is reinforced by the quantitative results, which show a 67.3% increase in the Capacities and Enablers dimension among enterprises that successfully accessed climate finance. Together, the qualitative and quantitative evidence suggests that tailored capital acts as a critical bridge between climate awareness and climate action. When enterprises gain access to financing aligned with their needs and capacities, they are able to convert existing knowledge into concrete resilience investments and organizational change.

Pipeline Attrition as Diagnostic Evidence

The operational bottlenecks observed throughout pipeline development, including the attrition of the Kenyan macadamia cohort and broader barriers to climate loan uptake, should be viewed as important findings rather than implementation challenges alone. They provide direct evidence that accessing climate finance is itself a significant institutional hurdle.

Moving an enterprise from initial interest to a closed Climate Action Loan requires organizational capacity, financial readiness, and sufficient debt capacity. The slowdown in loan uptake following the macadamia market downturn demonstrated how external shocks can quickly shift priorities away from long-term adaptation investments toward short-term business continuity. In this sense, pipeline performance serves as a useful diagnostic of enterprise readiness, revealing barriers that must be overcome before capital can support climate resilience.

From Enterprise Investment to Household Resilience

One of the evaluation's most significant findings is that climate finance directed primarily toward agricultural enterprises generated measurable resilience gains among smallholder farmers. This demonstrates that investments in climate-resilient supply chains can create meaningful downstream benefits for producers, both through enterprise-level improvements that eventually reach farmers and through financing that directly support farm-level adaptation.

At the same time, the evaluation shows that translating enterprise climate investments into household resilience is neither immediate nor automatic. Certain interventions require time before benefits materialize at the farm level, particularly investments focused on enterprise infrastructure, service delivery, or longer-term adaptation strategies. Furthermore, even when financing directly supports farm-level adoption, the ultimate impact depends heavily on farmers' ability to implement and sustain climate-smart practices amid the realities of their daily lives.

The qualitative research in East Africa highlights several factors that influence this process. When implementing resilience practices, households frequently face labor constraints, competing livelihood priorities, and difficult land-use decisions.

Female and elderly farmers often encounter steeper barriers when adaptation activities require substantial manual labor or hired workers. Similarly, households managing small or fragmented plots must constantly balance long-term resilience investments, such as shade trees or soil conservation measures, against immediate food security and income needs. For example, bananas are often viewed as a dual-purpose shade and food crop, but introducing larger, permanent shade trees reduces the ground-level sunlight and soil nutrients required to grow vital understory food crops like beans and groundnuts. On micro-plots, adding canopy trees can force an unacceptable trade-off with the diversified food crops a family relies on for daily subsistence.

These findings underscore that while access to capital is essential, it is ultimately only one component of successful adaptation. Recognizing the importance of labor availability, Root Capital's Climate Action Loans in MAC included financing for labor to facilitate farmer adoption of more regenerative practices.

The Way Forward



Musasa Cooperative, Rwanda
Credit: Patricia Alvarado Núñez/ Root Capital

Lessons for Monitoring and Evaluating Climate Finance

Reflecting on three years of implementation and evaluation, this study highlights two practical lessons for future climate finance evaluations.

Align Evaluation Design with Implementation Milestones

A central lesson from this evaluation is that climate finance interventions rarely follow fixed research timelines. After financing is approved, agricultural enterprises often require months or years to procure equipment, distribute inputs, complete infrastructure investments, and support farmer adoption. Many climate adaptation investments also depend on biological processes (such as seedling growth, soil regeneration, or tree maturation) that take additional time before measurable outcomes emerge.

Future evaluations should therefore align data collection with operational and implementation milestones rather than predetermined calendar dates whenever feasible. Baseline surveys should be conducted as close as possible to implementation, while follow-up rounds should allow sufficient time for activities and expected outcomes to materialize. Tracking intermediate indicators of implementation progress can also help evaluators understand whether investments are on track to generate future resilience gains. Aligning evaluation timelines with implementation realities reduces the risk of measuring impacts before interventions have had a realistic opportunity to take effect.

Tailor Monitoring to Different Climate Investment Pathways

Climate finance products support a highly diverse portfolio of interventions, spanning from renewable energy systems to regenerative agricultural practices to climate-resilient processing infrastructure. Grouping these distinct investments under a single broad category can mask critical differences in how resilience outcomes are actually generated on the ground.

As climate finance portfolios continue to mature, monitoring systems must place greater emphasis on the specific uses of funds. Categorizing investments according to their intended adaptation or mitigation pathway will improve organizational learning, strengthen donor accountability, and facilitate more meaningful comparisons across interventions.

Building on the concrete lessons from this evaluation, Root Capital will continue strengthening its impact monitoring, evaluation & learning framework for climate loans and grants by establishing targeted outcome indicators and MEL methodologies for key investment categories, including clean energy transitions, climate-resilient infrastructure, and the use of soil regeneration agricultural practices. This tailored approach will help ensure that future evaluations capture not only whether climate finance works, but precisely which types of investments generate the greatest resilience benefits under different operating conditions.

Future Outlook: Increasing access to Climate Finance for Rural Communities

With a clear strategic focus sharpened by the evidence that targeted climate finance drives tangible adaptation outcomes, Root Capital is actively expanding and evolving its climate resilience products. To continue to bridge the gaps in global climate finance and drive deeper farm-gate resilience, we are refining our model to make climate capital significantly more attractive, affordable, and accessible to a broader ecosystem of rural borrowers.

Establishing the Business Case: Farm Transformation Partnerships

While compelling aggregate data exists regarding the benefits of solutions like solar irrigation, organic fertilizers, and biodigesters, limited localized data on the business case can stunt demand for climate loans among agri-SMEs. To overcome this barrier, Root Capital is launching a new strategic initiative, Farm Transformation Partnerships, to vet promising climate solutions and directly connect solution providers with agricultural enterprises.

Under these partnerships, we co-design and co-fund rigorous field trials to generate localized data on financial returns for both smallholders and agri-SMEs. Currently, we are running collaborative field trials on organic fertilizers and small-scale irrigation pumps with over eight enterprises across Kenya and Uganda. By sharing these data-backed trial results across our broader portfolio, we aim to de-risk adaptation strategies and catalyze increased investment from farmers, our clients, and climate funders alike.

Some Farm Transformation Partnerships have the potential to address the physical and demographic constraints to adaptation discussed above, especially for vulnerable women and youth. By connecting agri-SMEs and farmers to external technologies that right-size and automate labor-intensive practices (such as low-labor irrigation or high-density soil amendments), we can help smallholders overcome the physical limitations of adaptation.

Strengthening Client Capacity: Integrated Advisory Modules

Climate finance represents the newest frontier in the missing middle of smallholder agricultural finance, creating a distinct need for an even tighter coupling of capital and capacity building. While advisory tools like ACRA remain foundational, Root Capital recognizes that maximizing long-term resilience requires a more holistic approach to technical assistance.

Moving forward, Root Capital is shifting away from isolated advisory offerings toward advisory “modules” that integrate multiple advisory services to serve a common client need, including, a client's "internal readiness" for climate finance. For example, farmer data collected via our Digital Business Intelligence Advisory will actively feed into a client’s climate adaptation plan developed with our ACRA team, which will include a financing plan supported by our Business Management Advisory. Throughout, advisory team members will work with inclusive design in mind, looking for opportunities to include and deepen impact for women and youth. This integrated approach will allow Root Capital to better help agri-SMEs align their farmer services with climate objectives, transforming theoretical adaptation plans into data-backed, bankable, inclusive investment strategies.



ASOBAGRI Cooperative, Guatemala
Credit: Root Capital



ACPCU Cooperative, Uganda
Credit: Root Capital

Evolving Our Loan Products: Flexible, Right-Sized CAPEX Financing

To directly address the operational friction identified in this study, specifically the tension between short-term repayment cycles and multi-year crop maturation timelines, Root Capital is actively adapting its core loan structures.

First, we are reinforcing our commitment to long-term patient capital when the payback period of the asset demands it. For instance, our recent climate loan to the Rubanga Cooperative is structured with a five-year tenor specifically to allow their climate-resilient nursery sufficient time to mature and bear fruit before the loan is due.

Second, to make infrastructure investments more accessible for smaller or less capitalized agri SMEs, we are introducing small ticket CAPEX loans valued under $150,000 USD. These right sized products feature streamlined due diligence, reduced monitoring requirements, and flexible terms for borrowers (such as waiving collateral requirements typically associated with CAPEX loans). Lowering these structural barriers allows smallholder enterprises to affordably access the capital needed to acquire localized adaptation technologies without taking on prohibitive institutional risk.

The Next Frontier: Scaling Through Root Ventures

To pull these product innovations, advisory models, and market expansions into a single cohesive vision, Root Capital is launching Root Ventures, a specialized, risk-buffered venture debt facility designed to close the massive climate finance gap in smallholder agriculture.

Root Ventures will first scale climate financing for agri-SMEs, recognizing the ongoing importance of these businesses in building prosperous, resilient farmer livelihoods. But in a strategic evolution, Root Ventures will also invest in a broader range of businesses building climate-resilient agricultural communities: local financial service providers and climate solution providers. Across all three borrower profiles, we will focus on financing that increases the resilience of soils, crops, and businesses, based on years of experience listening to local demand for climate finance, including this evaluation.



ASOBAGRI Cooperative, Guatemala
Credit: Root Capital

The decision to expand our target market beyond traditional agri-SMEs was informed by the recognition that closing the pervasive climate finance gap for smallholders requires an ecosystem approach. No one actor can provide farmers with all the financing, inputs, training, technologies, or market connections needed to build resilient livelihoods. As this evaluation highlights, regional differences in value chain structures heavily dictate how effectively capital flows from agri-SMEs to farmers. While strong internal credit funds successfully drive farm-level loan uptake in Latin America, this mechanism is often absent in Africa.

To bridge this regional divide, Root Ventures will offer tailored climate loan products directly to rural Savings & Credit Cooperative Organizations (SACCOs) and other microfinance entities serving smallholder farmers. Because these financial institutions are deeply embedded within rural African communities, and in some cases legally associated with our agri-SME partners, expanding climate credit to SACCOs provides a proven, alternative pathway to get financing to farmers. By funding these localized financial nodes, Root Ventures will ensure that flexible climate capital reaches smallholders precisely when and where it is needed most.

Ultimately, Root Ventures seeks to unlock $100M+ in new climate finance for local communities by 2035. During the first six months of Root Ventures' operations, we have approved $2.5M in climate finance to 14 agri-SMEs, who collectively reach over 10,000 farmers in Africa and Latin America.



Conclusions

This evaluation provides strong evidence that climate finance can effectively strengthen resilience among agri-SMEs and smallholder farmers. Across both the quantitative and qualitative analyses, the findings consistently show that access to capital enables enterprises to translate existing climate awareness into tangible investments, stronger organizational capacities, and measurable resilience outcomes. Importantly, the evaluation demonstrates that these benefits can extend beyond the enterprise itself, generating meaningful resilience gains among affiliated farming households.

At the same time, the evaluation highlights that resilience-building is not a linear process. The pathway from financing to impact is shaped by enterprise readiness, debt capacity, implementation timelines, and the practical realities faced by farming households. While climate finance can support adaptation throughout agricultural value chains, the pace and magnitude of resilience gains depend on both the design of the investment and the conditions under which enterprises and farmers are able to adopt and sustain climate-smart practices.

The operational lessons generated through pipeline development further demonstrate that access to climate finance remains a significant challenge in its own right. Market conditions, organizational capacity, and competing business priorities can all influence whether enterprises are able to move from climate awareness to climate investment. These barriers underscore the importance of pairing financial products with implementation support, evidence generation, and monitoring systems that reflect the realities of agricultural adaptation.

Taken together, these findings suggest that the future of climate finance lies not only in expanding access to capital, but also in improving how capital is designed, deployed, and evaluated. By aligning financing models with implementation realities, strengthening evidence on the business case for adaptation, and tailoring monitoring systems to different investment pathways, climate finance can play an increasingly important role in building resilient agricultural systems and rural livelihoods.

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Root Capital is an impact investor that provides financing and business training to agricultural enterprises in Africa, Asia, and Latin America. As these businesses succeed and scale, they become engines of impact for local communities, raising incomes, creating jobs, expanding opportunities for women and young people, preserving nature, and building rural prosperity. To learn more, contact us at info@rootcapital.org.

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