

COFFEE CLIMATE FINANCE INITIATIVES – LATAM STUDY CASES

CASE STUDY 3:

COMSA AND CLIMATE- SMART COFFEE IN HONDURAS



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Prepared by
LUCIA BALLESTEROS



www.ethiolatincoffee.com

Contents

1. Background and Context	1
2. The COMSA Model: Agroecology and Carbon Readiness	1
3. Alignment with NAMA Café Honduras	2
4. Climate-Smart Practices and Co-Benefits.....	2
5. Comparative Framework Dimensions.....	4
6. Policy and Institutional Framework	5
7. Art. 6 Readiness and Regional Cooperation	5
8. Project Sustainability	6
9. References.....	7

Tables

Table 1: Key Indicators and Outcomes: COMSA, Honduras 3

Figures

Figure 1: Project site 1

Figure 2: UN Climate Change 6

1. Background and Context

Honduras is the largest coffee producer in Central America, with more than 110,000 farming families, of which approximately 95% are smallholders managing less than seven hectares. Coffee cultivation contributes around 3.5% of national GDP and supports the livelihoods of over one million people, making it the cornerstone of rural economies and national exports. However, the country's coffee landscapes are increasingly exposed to climate variability, including prolonged droughts, temperature increases, and recurrent outbreaks of coffee leaf rust (*Hemileia vastatrix*), all of which have reduced yields and degraded soils in recent years.

Although not yet fully documented, rising forest fires across Honduras have caused considerable damage to mountain ecosystems, including coffee-growing landscapes. Prolonged droughts and rising temperatures have increased fire frequency in forested slopes near coffee farms, resulting in shade loss, soil erosion, and declining habitat quality. These events highlight the growing vulnerability of coffee regions, threatening both ecological integrity and smallholder livelihoods. Strengthening socio-ecological resilience—through diversified agroforestry, soil restoration, and community-based fire management—has become essential to sustain Honduras's coffee landscapes under a changing climate.

In response to these challenges, the cooperative **Café Orgánico Marcala S.A. (COMSA)**—founded in 2001 in Marcala, La Paz—has emerged as a regional leader in regenerative and climate-smart coffee production. COMSA integrates organic farming, agroforestry, and social innovation to restore soil fertility, reduce greenhouse gas emissions, and enhance farmer resilience. Its production model goes beyond certification, embedding education, social equity, and ecological stewardship into every stage of the coffee value chain.

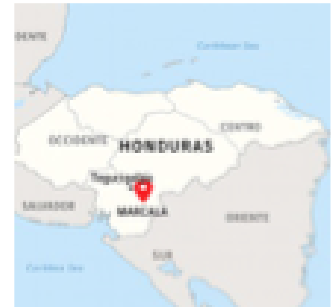


Figure 1: Project site

The cooperative's work exemplifies Honduras's transition toward low-emission rural development under the NAMA Café Honduras and the country's Nationally Determined Contribution (NDC) commitments. By linking smallholder agroecology with access to climate finance, COMSA demonstrates how cooperative-led governance can translate national climate strategies into tangible benefits for farming families and ecosystems.

2. The COMSA Model: Agroecology and Carbon Readiness

COMSA's production system is grounded in organic and biodynamic principles, completely avoiding synthetic fertilizers and pesticides. Farmers apply biofertilizers, compost, and microbial inoculants made from locally available materials such as coffee pulp, livestock waste, and forest microorganisms. This circular nutrient economy minimizes dependence on external inputs and significantly reduces nitrogen-related emissions.

The cooperative operates solar-powered coffee dryers, water-efficient wet mills, and promotes shade diversification through the planting of native and fruit trees that enhance biodiversity, regulate microclimates, and achieve estimated carbon sequestration rates of 5–7 tCO₂e ha/yr (CIAT, 2018). These practices directly contribute to Honduras's national climate targets while strengthening local ecosystem services.

Human capital development is a cornerstone of COMSA's approach. Its educational center, La Fortaleza School, provides continuous training for producers and youth in soil microbiology, regenerative agriculture, and cooperative entrepreneurship. This investment in knowledge and innovation ensures the continuity of agroecological practices across generations. COMSA's guiding philosophy—the “**Five Ms**” (Mind, Matter, Money, Movement, and Mother Earth)—expresses its holistic understanding of sustainability, linking ecological awareness with financial discipline, social values, and collective wellbeing.

3. Alignment with NAMA Café Honduras

The Nationally Appropriate Mitigation Action (NAMA) for the Coffee Sector of Honduras, coordinated by the Secretariat of Natural Resources and Environment (SERNA), the Honduran Coffee Institute (IHCAFE), and the Central American Bank for Economic Integration (CABEI), serves as the country's flagship mechanism for transforming coffee production into a low-emission and climate-resilient system. The initiative targets a cumulative reduction of approximately 320 Gg CO₂e between 2019 and 2023, through interventions in agroforestry expansion, fertilizer efficiency, renewable energy use, and improved post-harvest processing.

Within this framework, COMSA represents a pioneering example and implementation platform. Its organic and biodynamic production systems already meet or exceed NAMA sustainability benchmarks, combining zero synthetic inputs, circular waste management, and solar-powered coffee dryers. These technologies contribute directly to GHG mitigation and energy efficiency goals under the NAMA framework, while enhancing farm productivity and ecosystem resilience.

Institutionally, COMSA collaborates with **SERNA** and **IHCAFE** to strengthen Measurement, Reporting, and Verification (MRV) procedures at cooperative level, ensuring that emissions reductions from agroforestry, composting, and renewable energy are quantified and traceable. Through CABEI's Resilient Coffee Fund (RCF), the cooperative is eligible for concessional finance and technical support to expand its regenerative practice.

As such, COMSA not only aligns with the strategic objectives of NAMA Café Honduras but also demonstrates operational readiness for integration into international carbon finance mechanisms. Its participatory governance model, digital recordkeeping, and MRV protocols make it a credible example of how smallholder cooperatives can serve as localized nodes for national climate action and contribute to Honduras's long-term low-emission development pathway.

4. Climate-Smart Practices and Co-Benefits

The case of Honduras – COMSA illustrates a holistic approach to climate-smart coffee production that addresses the three pillars of Climate-Smart Agriculture (CSA) — productivity, adaptation, and mitigation — while reinforcing social inclusion and cooperative governance.

- **Adaptation and productivity:** COMSA farmers implement shade diversification, biochar application, soil mulching, and the use of rust-resistant coffee varieties such as *Parainema* and *IHCAFE-90*. These practices improve soil structure, reduce moisture loss, and mitigate temperature extremes. On-farm water harvesting systems and contour planting reduce erosion and enhance soil organic matter, leading to yield stability under variable climatic conditions.
- **Mitigation and carbon benefits:** Through diversified agroforestry systems, COMSA sequesters an estimated 5–7 tCO₂e ha/ yr while lowering fertilizer-related nitrous oxide

emissions. The cooperative's solar-powered dryers and composting operations further cut energy use and methane emissions from coffee pulp. Together, these interventions contribute directly to Honduras's national mitigation goals under the NAMA Café framework.

- **Socio-economic and gender co-benefits:** The cooperative's inclusive governance structure promotes equitable participation of women and youth. As of 2024, 32 % of members are women, many leading value-added enterprises such as organic fertilizer production and nurseries. The “Youth in Coffee” program trains more than 400 young farmers in regenerative agriculture and entrepreneurship, improving generational continuity and innovation capacity.
- **Biodiversity and ecosystem services:** COMSA maintains over 40 native and fruit tree species in its shade systems, enhancing habitat connectivity and pollinator diversity. Bird and insect monitoring, conducted in partnership with local universities, has recorded a 25 % increase in species richness in restored coffee landscapes. These results demonstrate the compatibility of biodiversity conservation and sustainable coffee production.
- **MRV and verification readiness:** Participatory monitoring systems document changes in soil carbon, biomass growth, and shade cover. Field data collected by cooperative technicians are validated through remote sensing and compiled within the forthcoming NAMA Café MRV platform coordinated by SERNA. The estimated monitoring cost of USD 0.40–0.50 per tCO₂e—equivalent to 8–10 % of total carbon revenues—shows that smallholder-based MRV can remain both affordable and technically robust.
- **Safeguards and grievance handling:** COMSA applies a Social and Environmental Management System (SEMS) aligned with IFC Performance Standards¹. A grievance mechanism allows farmers to raise complaints via cooperative assemblies or digital forms, all of which are reviewed by the ethics committee within 30 days. Independent audits verify compliance with labour, gender, and environmental safeguards, ensuring continuous improvement and accountability.

Together, these interventions demonstrate how climate finance and cooperative innovation can jointly enhance productivity, carbon sequestration, and socio-ecological resilience. COMSA's experience confirms that smallholder organizations can serve as effective platforms for implementing regenerative agriculture and landscape management in Central America's coffee regions.

Table 1: Key Indicators and Outcomes: COMSA, Honduras

Indicator	Baseline	By 2023	Outcome (2025)
Participating farmers	0 (pre-project)	2,500 producers engaged	4,000+ smallholders consolidated under cooperative agroforestry program
Area under agroforestry (ha)	<500 (pilot organic plots)	2,000 ha under diversified shade systems	3,500 ha under regenerative agroforestry and NAMA Café MRV monitoring
Tree species planted	–	25 native and fruit species introduced	>40 species established, enhancing habitat diversity

¹ IFC- International Finance Corporation (World Bank Group)

Verified Carbon Removals (tCO ₂ e/ha/yr)	0 (conventional monoculture)	5 – 7 tCO ₂ e verified	8 – 10 tCO ₂ e expected with mature tree growth
Biodiversity index (Gini–Simpson)	0.40	0.55	> 0.65 (restored ecosystem equilibrium)
Total CRUs	–	8,500 cumulative CRUs verified	20,000+ CRUs expected under expanded certification
Soil organic carbon (%)	1.5 – 1.7 % average	2.0 – 2.3 % (+20–25 %)	2.6 – 2.8 % (+40 %)
Average household income (USD/year)	2,600 – 3,000	3,600 – 3,900 (+25–30 %)	4,200 – 4,600 (+45–50 %)
Women participation (%)	<10 %	25 %	32 % (leadership in nurseries and compost labs)
Youth engagement (individuals)	<50	400 trained in agroecology and MRV	600+ engaged in regenerative coffee and entrepreneurship

5. Comparative Framework Dimensions

The following section examines Case Study 3 – COMSA Honduras in relation to the seven analytical dimensions outlined in Prof. Gezahegn’s comparative framework.

Governance and institutional architecture: The cooperative’s democratic structure and collaboration with IHCAFE, SERNA, and CABEI under the NAMA Café Honduras initiative reflect an effective multi-level governance system.

MRV systems: COMSA’s participatory monitoring and digital data collection enable transparent and verifiable accounting of emission reductions and carbon removals, aligned with national MRV requirements.

Social inclusion: Gender and youth engagement are embedded in cooperative governance, with women leading productive units and more than 400 youth trained in regenerative agriculture and entrepreneurship.

Finance and market access: The cooperative leverages concessional financing from CABEI’s Resilient Coffee Fund (RCF) and is preparing for voluntary carbon-market certification to diversify income streams.

Safeguards and grievance mechanisms: A Social and Environmental Management System (SEMS) aligned with IFC Performance Standards ensures environmental integrity, equitable benefit-sharing, and accountability across operations.

Outcomes and co-benefits: Quantifiable gains include increases in soil organic carbon (+25 %), improved biodiversity indicators (+25 % species richness), and higher household income (+30 %).

Article 6 readiness: COMSA’s transparent MRV and cooperative governance contribute to Honduras’s readiness for participation in international cooperative approaches under Article 6 of the Paris Agreement.

COMSA- Honduras Case Study represents a replicable model of cooperative-based climate governance that bridges local innovation with national policy implementation. Its progress across the seven dimensions underscores Honduras's growing capacity to integrate smallholder-driven carbon mitigation into national and global climate-finance frameworks.

6. Policy and Institutional Framework

Honduras has progressively advanced a policy architecture for low-emission rural development, integrating agriculture, forestry, and climate finance within its national strategies. The Climate Change Law (2013) provides the overarching legal framework for mitigation and adaptation, while the Nationally Determined Contribution (NDC, 2021 update) commits to reducing national greenhouse-gas emissions by 15 % by 2030 and restoring one million hectares of degraded land. Within this context, the NAMA Café Honduras, jointly coordinated by **SERNA**, **IHCAFE**, and **CABEI**, serves as the flagship program for decarbonizing the coffee sector.

COMSA's approach directly contributes to these policy objectives. By adopting organic agroforestry systems, renewable energy, and circular nutrient management, the cooperative provides a tangible example of how smallholder organizations can operationalize the NDC and NAMA Café commitments at the territorial level. Its participatory monitoring and transparent governance structures complement Honduras's emerging Measurement, Reporting, and Verification (MRV) framework, enabling the traceability of emission reductions and removals from coffee landscapes.

Financially, COMSA is positioned to benefit from the Resilient Coffee Fund (RCF) managed by CABEI, which provides concessional loans and technical assistance for low-carbon production, reforestation, and waste valorization. The cooperative's MRV and environmental accounting systems also make it compatible with voluntary carbon-market standards, offering a pathway to monetize verified carbon removals while maintaining community ownership.

At the institutional level, coordination between IHCAFE, SERNA, and the cooperative sector has been key to scaling climate-smart coffee. IHCAFE's **SICA-Café** platform compiles production and environmental indicators, while SERNA oversees national MRV and climate-finance integration. This multi-level collaboration ensures policy coherence between local initiatives and international climate commitments.

7. Art. 6 Readiness and Regional Cooperation

Honduras is strengthening its institutional and technical capacity to participate in the international carbon market mechanisms established under Article 6 of the Paris Agreement. The Ministry of Environment and Natural Resources (**SERNA**)—with support from the UNFCCC Regional Collaboration Centre (**RCC-LAC**) and the Central American Bank for Economic Integration (**CABEI**)—is developing a **National Carbon Registry** and guidelines for authorizing projects and accounting for verified emission reductions. These steps demonstrate the country's growing **Article 6 Readiness**, meaning it is building the systems required to cooperate transparently and exchange mitigation outcomes with other countries.

Article 6.2 “cooperative approaches” refer to voluntary agreements between governments that allow the transfer of Internationally Transferred Mitigation Outcomes (**ITMOs**) to help meet national climate targets. These are government-to-government mechanisms—not related to

producer cooperatives like COMSA—but they can benefit from credible, traceable data generated by local projects.



Figure 2: UN Climate Change

In this context, COMSA provides a practical example of bottom-up readiness. Its participatory MRV system, digital monitoring, and transparent governance align with the national NAMA Café framework. Verified carbon removals from COMSA’s regenerative coffee landscapes could, in the future, be recognized and registered by the government, contributing to Honduras’s NDC or potentially as part of bilateral cooperation agreements under Article 6.2.

Regionally, Honduras collaborates with **SICA**, **REDiCAP**, and **CiACA** platforms to share methodologies and build capacity for Article 6 implementation. These initiatives help Central American countries prepare to access international carbon markets and promote high-integrity, smallholder-based climate solutions such as sustainable coffee agroforestry.

8. Project Sustainability

The sustainability of COMSA’s interventions is anchored in its cooperative governance and revolving funds. A dedicated Sustainability Fund, capitalized by 5 % of annual surpluses, supports reforestation, soil restoration, and women-led agribusiness ventures. MRV protocols and digital databases are institutionalized within the cooperative and integrated into **IHCAFE’s SICA-Café** system, ensuring continuity beyond donor cycles. Ongoing partnerships with local governments and universities further embed regenerative practices and social safeguards in the region’s development planning.

Overall, the Honduran policy environment—through the synergy between NAMA Café, the Nationally Determined Contribution (NDC), CABEI’s green-finance instruments, and emerging Article 6 frameworks—illustrates a coherent pathway for scaling climate-resilient and inclusive coffee landscapes. COMSA’s regenerative model demonstrates how cooperative-based governance can bridge local innovation with national and international climate policy implementation. Honduras’s progress in institutional design, MRV integration, and regional collaboration reflects tangible advancement toward Article 6 readiness, providing a scalable foundation for aligning smallholder-driven climate action with global market mechanisms under the Paris Agreement.

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