CASE STUDY

Utilizing Supply Chains to Protect Coffee and Sacred Lands and to Sequester Carbon

This report is made possible by the generous support of the American people through the United States Agency for International Development (USAID). This guide was produced under DAI's Digital Frontiers Project (Cooperative Agreement AID-OAA-A-17-00033) at the request of USAID. The contents are the responsibility of Development Gateway and do not necessarily reflect the views of USAID or the United States Government.

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A New, Co-Designed Paradigm for Sustainable Landscape Management

The ANEI (Association of Indigenous and Campesino Agroecological coffee producers), with help from Ethos Agriculture, applied an approach where eco-centric values, bio-cultural identity, and Indigenous knowledge are woven into governance, value chain improvement, and conservation in order to reclaim sustainability from externally imposed paradigms or pre-determined governance activities. This involves aspects of Indigenous data governance and data cooperatives aiming to demonstrate a process for smallholder farmers and their communities in the Sierra Nevada, Colombia, to gain agency in defining their digital paths, data governance, and sustainability priorities and future goals. This "co-design" allows for an alignment of values to better coordinate resources. The case study gives insights into participatory processes, eco-centricity, carbon trading, data co-ops, and Indigenous data governance.

Background and main challenges

Coffee is highly vulnerable to climate change; data on organic coffee can be said to serve as a climate change "canary in the coal mine" indicator (due to the high altitude, tropical conditions, and right light exposure).[1] Coffee is, at the same time, also one of the main exports in countries like Colombia and Guatemala. Years of conflict, fueled by social and economic inequality and unequal distribution of arable land, created disadvantaged conditions for many farmers. Historically, coffee exports have been dominated by large, foreign-owned plantations. This means that the exporter or intermediary can push down prices, leaving farmers in poverty, with no alternate option to sell coffee.

Changes to land suitability for coffee production are increasingly driving deforestation and forest degradation in coffee landscapes. While to date, coffee has played a relatively small role in global deforestation, climate models and field evidence show that climate change will gradually drive production into new areas that will become suitable in the coming years and decades. Expanding coffee cultivation into these new areas—often at higher altitudes—threatens the last intact primary forests on our planet and the irreplaceable habitats of high biodiversity value and may damage critical ecosystem functions.[2]

Smallholder farmers and Indigenous communities generate social and environmental benefits that have a ripple effect beyond the coffee sector. A growing body of evidence shows that Indigenous Peoples (IPs) are the most effective guardians of biodiverse forests.[3] They typically farm in diverse, shaded agroforestry systems that contribute to biodiversity, food security, and cultural conservation,

1. Vern Long, J., Barbuto, R., (2022) As Consumer Prices Rise, Coffee is Canary in the Climate Change Coal Mine.
2. For instance, according to the Peruvian national census, 25% of deforestation in Peru is linked to coffee production due to abandoning of lands and subsequent expansion of agricultural borders.
3. Dawson, N., Coolsaet, B., Sterling E., et al. (2021) The role of Indigenous peoples and local communities in effective and equitable conservation. *Ecology and Society* 26(3):19; and see Schuster, R., Germain, R., Bennett, J., et al (2019) Vertebrate biodiversity on indigenous-managed lands in Australia, Brazil, and Canada equals that in protected areas. *Environmental Science & Policy*, 101, 1-6.

as well as climate change mitigation via carbon sequestration. Coffee farmers hold a lot of valuable knowledge, whether it is about sustainable farming or environmental change. IPs have always done research and sustainable resource management, as the first scientists and agriculturalists.

The last decade saw an influx of multistakeholder initiatives—from those reducing carbon footprint to certification and fair trade—aimed at mobilizing actors to create sustainable systems for coffee production.[4] The challenges these projects face in achieving substantive impact are vast and include a lack of aligning interests, goals, and targets; power imbalances among value chain actors; and insufficient resources and investment being managed by members of rural communities. These issues are underpinned by an inability to reconcile the sector's objective to sustain growth with the primary needs of farmers to sustain their livelihoods, ecosystems, and communities. Smallholders and cooperatives have little to no voice or power in the decisions that drive the value chain.

A variety of sustainability and data collection efforts have been initiated. As an industry, data-seeking practices are often extractive, if not exploitative. Data capture and data use do not facilitate a two-way data flow, nor do they foster empowerment—and they certainly have not helped to adequately compensate farmers. Reliable and unbiased data could improve transparency and accountability in the supply chain and reduce some information asymmetries that directly or indirectly perpetuate inequalities. An abundance of data exists to support buyers' decision making, yet there's little ability to provide crucial insight where it's needed most, among the most vulnerable actors.

Other challenges related to the case study environment

- Coffee as a commodity is highly susceptible to price fluctuations. In addition, smallholders are affected by other socioeconomic and environmental challenges and political instability. Many farmers are operating at a loss, without other viable alternatives.
- Latin America is one of the regions that will likely be most severely affected by climate change. For coffee farmers, this may mean significant reduction in land suitability.
- Most coffee actors work in silos, which is reflected in the inability to coordinate effectively towards sustainability. There is a lack of transparent information and standardization of composite sustainability indicators used for decision making.
- More consistent, longitudinal data to analyze trends or evaluate change is required. To guide transformations in support of smallholders, it is essential to have up-to-date, high-quality data. More data is needed on changes in production, driven by factors such as climate change and price fluctuations, and the ecological, socioeconomic impacts of changes for farmers.
- While there are considerable efforts to collect and store data about farmers, a lot of this is not publicly available. Even when the data or information are made public, it can take significant effort to find them.

4. E.g,, a 1.7 billion USD pledge follows a trend of increased philanthropic giving for climate change mitigation and conservation by several governments and 17 private funders over a five-year period. Over the years, about $270 million of climate finance was dedicated to forest protection each year, yet the IPs and local communities only receive $46 million.

Other challenges related to the case study environment continued

- Coffee is highly susceptible to price fluctuations and smallholders are the most vulnerable to low prices.
- There is an upsurge in sustainability investments and branding to align with a certain consumer base. Many brands still see this as a marketing opportunity and not critical to their relationship with coffee communities.

How are problems solved?

Increasing farmers' voices and participation is vital to resolving some of the most serious issues facing the coffee sector. Solving the divide between data collection and direct use by farmers and communities on the ground is one of the most serious challenges because currently, data is often not shared well—or at all. A process of co-design and learning between researchers, farmers, and others is necessary to find the most appropriate data governance approaches. Colombia is considered "in some ways, a microcosm of the digital world."[5] The USAID Colombia Digital Ecosystem Country Assessment (DECA) pilot highlighted the urban-rural digital divide. "Building a social innovation ecosystem requires time and commitment from many stakeholders."[6]

The Sierra Nevada de Santa Maria is particularly interesting here. It is home to more than 50,000 Indigenous communities (Arhuaco, Wiwa, Kogi, Kankuamo). This land is a place of worship. When a baby is born, the women plant their placenta in the roots of a newly planted tree. When an elder passes, they believe that their soul transforms into a snowflake to be added to the snow-capped mountain that overlooks their community. As guardians of the earth, the Sierra communities believe it is their duty to protect natural resources and show an ecological alternative to industrialized societies.[7] To these communities residing in the highest coastal mountain range in the world, this is the literal, beating heart of the world. The destruction caused by deforestation and climate change is not a matter of science or corporate sustainability—it is a matter of survival.

ANEI, established 27 years ago by Aurora Izquierdo, an Indigenous woman, is recognized as the first organic coffee cooperative in Colombia and now has over 700 families from Indigenous and non-Indigenous communities. Coffee is produced and certified, within a context of harmony and respect for nature, and as a sustainable alternative that generates development and well-being in communities. ANEI works with **Ethos Agriculture**, a U.S.–based nonprofit, to co-design a safe place for new thinking on data, innovation and sustainability, between themselves and actors in the sector. This has resulted in opportunities for joint learning and collective impact described below.

5. Digital Frontiers, (2020) Colombia Digital Ecosystem Country Assessment.
6. Idem. While Colombia's tech scene is growing, underserved areas have an immense need for investment and potential for innovation. There is an opportunity to support the Colombian administration's implementation of its new policies and projects to tackle this divide.
7. Climbing through many ecological zones, from wetlands and mangroves along the coast, via tropical forests, deserts and alpine tundra, until the snow-capped peaks. Because of the exceptional bio-cultural characteristics, this region is a recognized biodiversity hotspot and one of the world's most irreplaceable protected areas for conservation of threatened species.

Through this **Sacred Sierra initiative**, ANEI has become a leader in sustainability, organic farming, and protection of sacred lands. New forms of engagement were created between actors that typically work in isolation, towards a more equal approach. The initiative uses a holistic co-design or humanity-centric approach, with increased agency in design and development of initiatives placed in the control of ANEI. This includes trade, job creation, research, and technology development to build an integrated system that transforms and establishes the Sierras as a recognized center of knowledge, data, innovation, and sustainability.[8] This means going from one reality as a product supplier to a community of rural innovation, land governance, and economic prosperity. Beyond a co-designed data governance approach for coffee production, the Sacred Sierra initiative demonstrates how communities can be compensated for research, sustainability efforts, and the protection of ecosystem services.

Holistic knowledge and data governance. It is vital for farmers to have agency in the design and governance of knowledge and data, in order to ensure that measures taken are informed by their values. This initiative provides ANEI and communities with direct access to capital, information, and expertise in order to invest in their regions as partners, rather than being used as suppliers or beneficiaries. Targeting coffee production only as a variable has led to scaling partial solutions as proxies for sustainability. Certifications, public private partnerships, finance schemes, and tech solutions all are pieces of the puzzle, yet they are not quite fitting together. Traditional ecological knowledge, strengthening of customary governance systems within communities, is the missing piece. The Sacred Sierra initiative is all about demonstrating this value.

All this knowledge and data on farming, sustainability, research, and economic development play a critical role here. As most interventions are designed vertically, it is often trapped in certifications, training, and trading. Taking this data out of silos, consolidating it into a platform, and translating it into useful information for decision making is a great way to begin aligning and help farmers be recognized and compensated as custodians of critical ecosystems.

A shift from extractive data practices towards an equitable sharing of resources and meaningful inclusion of people requires understanding relevant conditions to better align actors and resources and integrate supply chains with conservation, research, and rural development via technology. This "collaborative advantage" enhances the impact of activities and provides opportunities to leverage investments.

Indigenous data sovereignty (IDS) can help understand how data stewardship may be put into practice. Data has the power to transform and uplift IPs, especially when it's collected by and for them. IDS is about shifting access, control, and ownership over data and collectively owned knowledge and information directly to IPs. This is immensely important to self-determination and justice. IDS is part of transforming relationships with local and national authorities to participate directly in decision making, as well as in ending exploitative and inaccurate practices with detrimental effects. Sovereignty isn't practiced the same way by all. This broad definition contains questions about who is counted, how it can be applied within an externally imposed paradigm, and whether communities actually have the resources to participate in their own data governance.

8. Co-design or humanity-centric design goes beyond processes that typically invite actors into a pre-decided process. This process moves beyond user-centricity, which usually does not take into account social and environmental ramifications, but is based on shared values resulting in long-term commitment of aligned partners towards common goals based on these values. Trust, transparency, and authentic relationships result from a foundation of shared values and common goals, through which a convergence of collective energy and resources can be directed.

Photo credits to: Juan Sebastián Paez Izquierdo

It involves the ideas that 1) not all data has to be or should be shared outside the community, and 2) there is a right to refusal that is inherent and in line with the Free, Prior, and Informed Consent (FPIC) rights.[9] There is a strong attention towards co-creation and enabling agency over data in ways that are led and co-designed with a range of communities, rather than designed without and imposed on, and these initiatives draw on similar insights. Based on the CARE Principles,[10] IDS helps to move invisibility of Indigenous Peoples in data systems towards a "people-and-purpose orientation to data governance" that promotes active involvement and co-creation of systems in ways that are culturally and socially relevant and sensitive. IDS approaches create opportunities for more sustainable, consistent, accurate, and relevant data management for the benefit of communities.

ANEI utilizes fair trade governance principles, in combination with decentralized decision making based on community priorities. Yet there are interesting opportunities for new data governance approaches, as the paradigm shifts into a lot more data that needs to be used for decision-making and compensation. Beyond this, the Sacred Sierra initiative provides opportunity for three innovative approaches to governance: (1) leveraging existing systems for governance as per fair trade protocol, which is ubiquitous; (2) the potential to use a new digital governance system (e.g., DAOs), and (3) decentralized decision making around types of regenerative agroforestry.

9. The principles of ILO 169 and UNDRIP are self-determined development; respect for IPs' knowledge, cultures, and traditional practices that contribute to sustainable and equitable development; and Free, Prior, and Informed Consent (FPIC). FPIC is a specific right that pertains to IPs and allows them to give or withhold consent to a project that may affect them or their territories. Once IPs have given their consent, they can withdraw it at any stage. FPIC enables IPs to negotiate the conditions under which the project will be designed, implemented, monitored, and evaluated.

10. The CARE Principles for Indigenous Data Governance reflect the "crucial role of data in advancing Indigenous innovation and self-determination. These principles complement the existing FAIR principles encouraging open and other data movements to consider both people and purpose in their advocacy and pursuits." See the Global Indigenous Data Alliance website.

Facts and figures

Smallholder coffee farmers play a vital role, producing an estimated 60% of the global supply.

- Almost 95% of coffee farms are less than five hectares, 84% of all are smaller than two hectares.
- 12.5 million farmers live predominantly in 20 countries, where the climate and soil are suitable for coffee. Colombia has over 500,000 farmers.
- The commodity is highly susceptible to price fluctuations, and smallholders are often the most vulnerable to low prices. Many farmers are operating at a loss, without other viable alternatives.
- Indigenous peoples are nearly three times as likely to be living in extreme poverty compared to their non-indigenous counterparts.
- By 2050, the demand for coffee will be tripled; many production regions will be unsuitable due to climate change, resulting in a loss of 10–20 million hectares of tropical forest, or approximately 1.65–3.3 gigatons of additional carbon emissions.[11]
- According to The Intergovernmental Panel on Climate Change (IPCC) Report, the world might run out of coffee by 2050 due to climate change.[12]
- The Zona Cafetera in Colombia used to satisfy 80% of the global demand for coffee. It has witnessed an exodus of farmers, reducing the coffee production by 10%–15% each year.[13]

Photo credits to: Juan Sebastián Paez Izquierdo

11. Panhuysen, S., & Pierrot, J., (2021) Coffee Barometer.
12. Yamanoshita, M. (2019) IPCC Special Report on Climate Change and Land. Institute for Global Environmental Strategies.
13. Eise, J., White, N. (2018) Coffee farmers struggle to adapt to Colombia's changing climate, *The Conversation*, Purdue University.

Important factors that influence the local enabling environment

- Colombia's digital environment can be considered free, open, and democratic. The DECA recommends the development community seize emerging opportunities in Colombia's digital ecosystem to improve their shared development outcomes.[14]
- Insufficient internet connectivity is one of the greatest barriers to expanding digital access for marginalized groups. The current Colombian government has an ambitious connectivity agenda that prioritizes rural inclusion and social impact.[15]
- Colombia's regulator aims to lead in innovative, tech-driven financial inclusion and launched a number of initiatives that enable market entry.[16]
- It is vitally important to align with values of the communities. A lot of effort and time has gone into trust building (exercises). It is critical for those closely involved to learn cultural aspects and translate that into the works and language of the development sector.
- The Colombian government is very protective around sharing data outside Colombia.
- Colombia's recently approved Information and communications technology (ICT) Modernization Law contains many positive developments, including the modernization of regulation. However, some observers have raised concerns about the potential for political interference.[17]
- Indigenous communities have more autonomy in Colombia, including access to common land.

Financial viability and sustainability

Eco-centric values, bio-cultural identity, and traditional knowledge define sustainability goals. These goals will attract and align like-minded organizations to support the transition from ANEI from a supplier to a landscape manager. This transition aims to drive innovation, generate jobs, and attract resources to protect their lands. ANEI and Ethos believe the highest form of sustainability is based on a sacred bond manifested in a symbiotic relationship between humans and nature.

ANEI will come to represent the first of many Indigenous-led groups to capture their full data value, while developing the systems to help monitor ecosystem services, increase information flow across partners, and create local technical capacity to support the broader work of the cooperative. The sustainable coffee landscapes available to Indigenous communities offer a huge opportunity to generate significant additional incomes through the sale of carbon credits. Three essential components are available and shared by these farmer communities to create carbon credit: agroforestry, common land, and conservation.

14. The Digital Ecosystem Country Assessment (DECA) is a decision-making tool to help USAID missions, their partners, and other stakeholders identify the opportunities, maximize the benefits, and manage the risks associated with digital technology.
15. Idem.
16. Idem.
17. El Futuro Digital Es De Todos/The Digital Future Belongs to Everyone—Plan Information Technologies and Communications 2018–2022, Colombia Ministry of Information Technologies and Communications (MinTIC), n.d.

When farmers and the broader development sector acknowledges and applies traditional agricultural knowledge and practices, carbon sequestration can increase and greenhouse gas emissions related to the operations and life cycle of wood processing are reduced. The demand for carbon credits greatly outweighs the supply—all major coffee companies (traders, roasters, and retailers), as well as the energy sector, are looking for locations where they can insert or offset their carbon emissions. These investments in "carbon neutral cooperatives" is an application of emissions trading. Market mechanisms are used to allocate the emissions among a group of regulated sources and drive industrial and commercial processes in the direction of less carbon-intensive approaches. Since projects generate credits, this can be used to finance carbon reduction schemes between trading partners.

The collection of accurate data from, for example, satellite imagery, land use, and/or the number of trees can serve as crucial evidence. In this model, substantial capital can be lent to smallholder farmers and cooperatives, with the help of development banks, based on future carbon credits, using the investment to set up this system, with close to no interest loans. Ultimately, this means that the value gained from the carbon credits flows directly back in the hands of the farmers.

What is the impact?

Many sustainability programs, with the best of intentions, still perpetuate paternalism and fail to acknowledge the cultural, ecological, and spiritual dimensions associated with the rural communities they trade with, invest in, or design projects for. Based on these dynamics, and the growing realization of limitations of current approaches, the case provides for a perfect opportunity to explore how this type of transition can lead to a more eco-literate coffee sector—allowing the Sierra Nevada to become an innovation center for designing and testing holistic sustainability approaches. This means going from one reality as a supplier of products to a community of rural innovation, land governance, and economic prosperity. With this in mind, ANEI and Ethos are co-designing the transition from the dominant coffee paradigm to alternative ones built on principles of shared social, ecological, and financial values as the foundation of trade and development relationships with local communities.

The Sacred Sierra model will be shared with organic coffee, cocoa, and cotton cooperatives via Ethos Agriculture to demonstrate how to utilize values to guide commercial activities, tech land management, and governance. Empowering smallholder farmers and their communities to make better decisions based on timely information, knowledge of best practices, and data-driven storytelling capabilities supports their efforts to secure financing, generate local jobs, and foster sustainability of their lands for generations to come.

What lessons can be learned?

To create genuine partnerships like these requires a deep understanding of historical and cultural points of views—an investigative research of past, present, and future perspectives of communities that go beyond Western concepts. This inherently means a lot of hard and often unseen work is needed—time and resources usually not available in similar situations. Benefits of a partnership like the Sacred Sierra initiatives include: a greater shared understanding of key values in a production region to better align sustainability, a way to channel financial resources to areas of need and shape policy to positively impact smallholder communities, and more transparent monitoring of socioeconomic and environmental change over time with demonstrable impacts.