Smallholder Farmer Engagement in Carbon Credit Projects

Views from the Field to Guide High-Integrity Projects

Authors: Yifan Powers, Ellie Chen, Abraham Salomon, Eric Njue

PxD
PRECISION DEVELOPMENT

May 2025

Table of Contents

Executive Summary 1

Section 1: The Importance of Smallholder Farmer Engagement throughout the Carbon Credit Project Lifecycle 3

Section 2: Insights from the Field 5

Section 3: Best Practices for a Smallholder Farmer-Engagement Strategy 8

References 10

Appendix: Common Smallholder Farmer-Engagement Models in East Africa-Based Carbon Credit Projects 12

Endnotes 14

Acknowledgements

Precision Development would like to thank the many stakeholders in voluntary carbon markets who shared important market insights with us throughout the development of this paper. In particular, we thank the carbon credit projects that facilitated our research with their participant farmers. We would also like to thank our funder, the Swiss Re Foundation, without whom this work would not have been possible. This paper is not a consensus document and all errors are our own.

About Precision Development (PxD)

Precision Development (PxD) is a global non-profit organization that harnesses technology, data science, and behavioral economics to build digital services that empower people to change their own lives. We build low-cost information systems at scale to share knowledge with the world's poorest and most disadvantaged people. Our pioneering model of digital development is implemented in collaboration with partner organizations to maximize scale. We continuously experiment, iterate, and gather evidence on our impact to improve service delivery and demonstrate our value. Most of PxD's services deliver customized digital agricultural advisory to smallholder farmers, with more than 18 million users using these services in 2024. Given the many constraints facing these farmers, PxD is investigating the application of our platforms and core competencies to deliver advisory in new informational fields, including climate change adaptation and mitigation, as the effects of global warming ripple through the agriculture sector.

Executive Summary

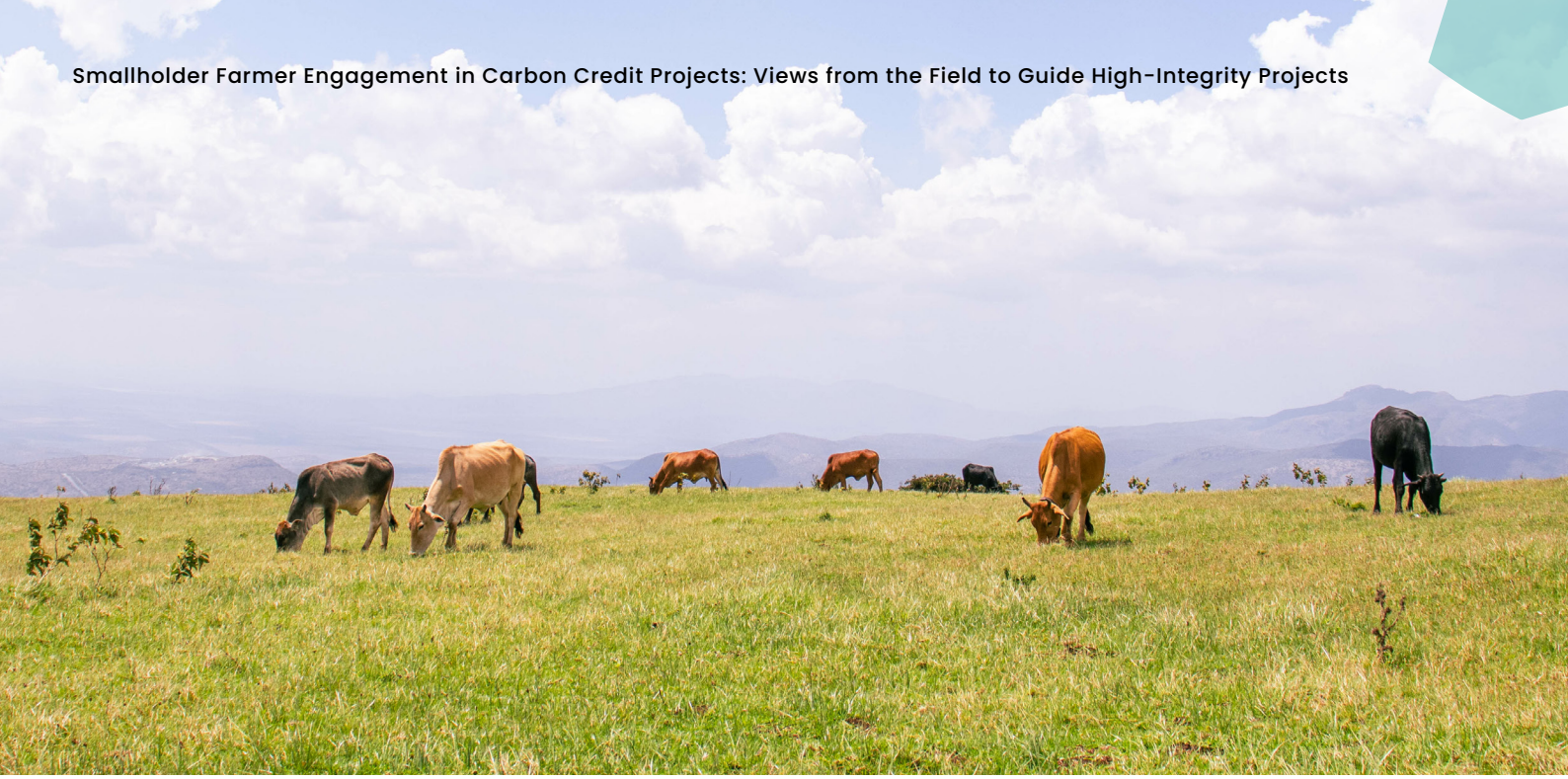
Smallholder farmers are one of the groups most vulnerable to the effects of climate change. Smallholders, typically working on less than 10 hectares of land[1] in low- and middle-income countries, depend on agricultural activity to sustain their livelihoods. The effects of climate change – not only shocks like the higher incidence of flood or drought but also gradual effects like water or heat stress – are increasingly rendering these livelihoods precarious. However, financial support for strengthening the climate resilience of smallholder farmers is limited. Although smallholders contribute as much as 34% of the total global food supply,[2] they receive about 20%, or USD $5.53 billion,[3] of the climate finance that flows to the agrifood sector. This existing climate funding is only a fraction of what is needed; the Climate Policy Institute estimates a sevenfold gap between what is needed for the agrifood sector and current finance flows.[4]

Voluntary carbon markets – worth about $1.4 billion in 2024[5] – provide a unique opportunity to diversify climate funding streams for the agrifood sector, particularly for small-scale agriculture. These decentralized markets, driven by voluntary commitments to net-zero targets by corporations,[6] facilitate the purchase of carbon offsets – either carbon avoidance or carbon removal offsets – to help entities meet their greenhouse gas (GHG) emissions goals. Carbon credit project developers can use the revenue from the sale of these offsets to support farmers' transition to sustainable agricultural practices which, in addition to reducing or removing GHG emissions, have the potential to improve farmers' productivity and climate resilience.[7]

A range of sustainable agricultural practices, such as conservation agriculture and agroforestry, are used in agriculture-focused carbon credit projects.[8] The commonality in these projects is that they depend on farmers' adoption of the practices to achieve the project's stated outcomes for the reduction of GHG emissions.

However, due to the emerging nature of regulation in voluntary carbon markets, the projects' transparency, scope, and quality of engagement with smallholder farmers to ensure adoption is highly variable. This variability contributes to several of the challenges found in leveraging carbon finance to support smallholder farmers. A particular challenge is to establish that the GHG emissions outcomes reported by such projects are real (have actually occurred), additional (would not have been achieved without the project), and verifiable (are measurable).[9] Efforts are being made at the policy level, for example by the Integrity Council for the Voluntary Carbon Market, to establish guidelines for how projects should work with local communities to ensure project integrity.

PxD, with support from the Swiss Re Foundation, set out to improve the market's understanding of how projects should work with farmers to ensure adoption of the sustainable agriculture practices necessary for achieving carbon outcomes. PxD used qualitative research on smallholder farmers participating in ongoing carbon credit projects, engagement with key stakeholders in an advisory group, and desk research to develop insights into the best practices for engagement with smallholder farmers, in order to strengthen the market for agriculture-focused carbon credit projects in low- and middle-income countries.



Findings from PxD's research are:

1. Project co-benefits, which are additional benefits from a project beyond its GHG emissions outcomes,[10] such as productivity increases and access to agricultural services, are farmers' primary motivation for project participation, rather than cash incentives from carbon credit revenue sharing.
2. Project co-benefits also drive continued farmer investment in sustainable agriculture practices, creating a positive feedback loop between farmer co-benefits, farmer investment, adoption of practices, and realization of GHG emissions outcomes.
3. Farmers understand the long-term nature of agriculture-focused carbon credit projects and change their practice adoption behavior if the project's incentive structure, particularly regarding co-benefits, no longer suits their needs.
4. Communication gaps are a key driver of negative perceptions about projects; farmers' misconceptions about how carbon credit projects operate and work can spread quickly in communication gaps.

These findings suggest best practices for engagement with smallholder farmers, to support the integrity of carbon credit projects:

1. Incorporate co-benefits into the carbon credit project's theory of change.
2. Involve all project stakeholders in operationalizing the project's theory of change.
3. Connect co-benefit measurement with carbon monitoring, reporting, and verification (MRV) systems.
4. Ensure projects have clear and consistent communications systems with farmers.

Implementing these best practices will require financial investment by projects. However, current market conditions do not incentivize these kinds of investments. The low prices of carbon credit projects leveraging natural climate solutions – which have been below $10/tCO2e in recent years[11] – means projects have limited room for capacity building and technical assistance. Projects working with smallholder farmers must therefore continue to build the evidence base for why investments in smallholder farmer engagement are critical for the success of carbon credit projects. We recommend that projects share this evidence publicly and transparently to inform policy developments in voluntary carbon markets, as the markets continue to mature and evolve.

Section 1: **The Importance of Smallholder Farmer Engagement throughout the Carbon Credit Project Lifecycle**

In carbon credit projects involving smallholder farmers, it is crucial to engage participating farmers meaningfully throughout the project cycle.[12] They are the owners and stewards of the land utilized in a project, making them critical stakeholders during the origination and design processes of the project. The farmers are also integral to the implementation of the project, as a project's stated greenhouse gas (GHG) emissions outcomes cannot be achieved without the adoption of sustainable agricultural practices by the farmers.

Existing regulations provide a fairly standardized structure for how projects should engage with Indigenous Peoples and Local Communities (IPLC) during the first phase of the carbon credit project cycle, i.e., project design.[13] For example, most carbon credit certifying programs require that projects establish detailed processes for farmer recruitment and consultation, to secure appropriate farmer land tenure and Free, Prior, and Informed Consent (FPIC),[14] amongst other project design considerations.

There is, however, less guidance for how projects should engage with smallholder farmers during project implementation to ensure that project activities – which generate the project's GHG emissions outcomes – are conducted as envisioned.[15] For example, project co-benefits –the additional benefits, usually sustainable development outcomes for local communities, that a carbon credit project generates – form a key part of the farmers' incentive to adopt sustainable agricultural practices. However, few carbon crediting programs have guidance on how these co-benefits should be incorporated into a project's theory of change, or how they should be designed or measured.[16] Without a clear strategy to engage smallholder farmers, to support their adoption and ongoing use of sustainable agricultural practices, these projects cannot achieve their carbon outcomes. It is thus crucial for projects to invest in the engagement of smallholder farmers during project implementation, beyond the project design phase. Doing so could address many of the challenges to the integrity of agriculture-focused carbon credit projects in smallholder settings.

Supporting Carbon Outcomes Measurement

A persistent challenge for agriculture-focused carbon credit projects is proving their GHG emissions outcomes are real, additional, and verifiable. It can be difficult to create cost-effective measurement, reporting, and verification (MRV) systems for natural carbon credit projects, such as sustainable agriculture, as various environmental and social factors can impact carbon outcomes.[17] Many carbon crediting programs therefore allow projects to use models of GHG emissions to estimate the amount of carbon removed by the project. A clear smallholder farmer-engagement strategy, which articulates how a project will work with smallholder farmers to facilitate and motivate sustainable agricultural practices, can provide valuable ground-truth data, e.g., practice-adoption rates or farm-management practices, to support these models. The more ground-truth data[18] available to customize a project's GHG emissions model for its context, the more robust the model's estimates can be. For example, by incorporating context-specific data about farm management practices by project participants, a project can refine the emissions factors in its GHG emissions models.

Improving Project Transparency

Currently, most carbon credit buyers are corporate entities needing to ensure the credits they procure can stand up to close scrutiny by both internal and external stakeholders. The transparency of the operation of a project is thus a key attribute that carbon credit buyers look for in voluntary carbon markets, as transparency "provide[s] palpable evidence of credit quality and impact".[19] In agriculture-focused carbon credit projects with smallholders, this transparency can be difficult to effect as there are often multiple stakeholders working together to execute one project. In addition to the project developer and the farmers, there are usually one or more local implementing partners who facilitate the project's activities on the ground. Aligning all project stakeholders with a clear smallholder farmer-engagement strategy creates more transparency amongst internal stakeholders about project operations. This internal alignment then enables the project to better showcase its operational transparency to buyers and investors.

Ensuring Co-Benefits

Carbon credit projects involving smallholder farmers can have a variety of benefit-sharing agreements, which are mechanisms to ensure all stakeholders involved in a carbon credit project can receive the benefits it generates.[20] These benefit-sharing agreements are crucial for the success of agriculture-focused carbon credit projects, as they provide farmers with the incentive to participate in the project and adopt the sustainable agricultural practices which will avoid or remove GHG emissions.

Sharing a portion of carbon credit revenue with participating farmers is a common form of benefit sharing in smallholder farming carbon credit projects. However, given current market conditions, the payment that farmers receive from credit sales is small compared with their farm incomes.[21] As such, the minimal payouts from carbon credits are often not the main motivating factor for smallholder farmers to participate in projects. Other benefits, like access to agricultural services, or the environmental and productivity benefits of transitioning to sustainable agriculture practices, are more relevant in the smallholder context. A robust smallholder farmer-engagement strategy is therefore the basis for a practice-adoption incentive structure that not only contributes to carbon outcomes but also provides smallholders with co-benefits.

Section 2: **Insights from the Field**

By presenting farmer-level insights into what works on the ground for smallholder farmer engagement, PxD aims to support broader-level policy initiatives, like the Core Carbon Principles of the Integrity Council for the Voluntary Carbon Market, which work to improve the integrity of carbon credit projects with respect to governance, emissions impact, and sustainable development.[22]

In 2024, PxD conducted on-the-ground qualitative research with smallholder farmers participating in carbon credit projects. This research consisted of focus group discussions with farmers participating in three different kinds of carbon credit projects in Kenya (described in Appendix). These projects spanned a variety of sustainable agriculture interventions and ranged in maturity, with some still in the project design phase and others well into implementation.

The results of this qualitative field research, as well as consultations with key stakeholders in voluntary carbon markets and desk research, generated the following insights:

1. Project co-benefits,[23] like productivity increases and access to agricultural services, are farmers' primary motivation for project participation, rather than cash incentives from carbon credit revenue sharing.

Farmers are primarily motivated to participate in carbon credit projects because of the direct benefits to their farms from implementing the project's sustainable agriculture practices and from the agricultural services the project provides.

Farmers cited the direct benefits of improved soil fertility, reduced land degradation and particularly reduced land erosion, increased income from sales of tree products, increased availability of livestock fodder, and improved water supply, among others. The exact benefits that farmers cited differed depending on the specific sustainable agriculture practices promoted by a project. Farmers viewed the impact of these benefits as helping them to decrease production costs or increase their income.

Farmers were motivated by agricultural services like improved access to inputs, particularly seeds and tools, as well as extension services, which they viewed as critical for implementing new agricultural technologies to improve their production. Farmers expressed a strong preference for extension services, as they perceived existing sources of training, particularly government-provided extension services, as inadequate for their needs. For example, farmers stated that much of the government extension training they received was conducted in large forums without practical training, and was not relevant to their personal contexts.

While farmers did mention payments from carbon credits generated by the project, the payments were described as a secondary motivation for project participation and were perceived to be subject to significant risk. In all the focus groups with farmers in projects where revenue from carbon credit sales were part of the benefit sharing agreement, farmers

expressed confusion about how payment amounts and timing were determined. Some farmers also referred to previous experiences with other carbon credit projects which failed to facilitate payments.

2. Project co-benefits also drive continued farmer investment in sustainable agriculture practices, creating a positive feedback loop between farmer co-benefits, farmer investment, farmer adoption of practices, and the realization of GHG emissions outcomes.

Sustained adoption of new agricultural practices requires investment in time, labor, and inputs. Farmers described these investment challenges for all types of sustainable agricultural practices promoted by carbon credit projects. For agroforestry-focused projects, farmers discussed the amount of labor required to plant and maintain trees in their fields, including the labor of raising seedlings, watering regularly, and controlling pests. For projects involving conservation agriculture approaches, farmers described labor challenges as well as input challenges, like obtaining recommended feedstocks to generate compost, and obtaining tools. Farmers also needed to spend significant time on training for the carbon credit project.

Farmers' willingness to undertake these investments changed over the course of the project. As farmers began to see positive co-benefits for their farm from implementing the project's sustainable agricultural practices, they became more willing to undertake investment and continue the adopted practice. Farmers also discussed how services from the carbon credit project, like access to inputs and extension, helped reduce their investment costs. For example, agroforestry-focused projects provided tree seeds, trained farmers to successfully raise nursery beds, and supported nurseries to offer low-cost seedlings to nearby farmers. In conservation agriculture-focused projects, access to necessary tools, e.g., for making compost and for intensive cultivation, as well as accessible training, e.g., using community-based trainers, made it easier for farmers to implement practices effectively season upon season.

3. Farmers understand the long-term nature of agriculture-focused carbon credit projects and will change their practice adoption behavior if the project's incentive structure, particularly around co-benefits, no longer suits their needs.

When asked to describe some of the risks of participating in carbon credit projects, the main risk identified was that agricultural co-benefits, like improved soil fertility, as well

as any potential carbon credit revenue payments, can take a significant amount of time to materialize. Accordingly, farmers understood that their investment in the project's promoted sustainable agricultural practices may take time to generate a return. Farmers discussed how there is thus a project-level risk of farmer attrition in both practice adoption and project enrollment. For example, in agroforestry-focused projects, farmers highlighted that, if the benefits expected from fruit tree production fail to meet their expectations, some farmers may cut the trees planted for the program to obtain income for their efforts. Similarly, yield declines due to a project's promoted sustainable agriculture practices carry the risk of the practice being abandoned.

The yield effects of many sustainable agricultural practices are highly context specific and can be negative in the short term.[24]

4. Communication gaps are a key driver of negative perceptions about projects; farmers' misconceptions about how carbon credit projects operate and work can spread quickly in communication gaps.

Participants in the focus groups shared both positive and negative perceptions that farmers in the community had about carbon credit projects. Positive perceptions centered on the co-benefits that projects provide. Negative perceptions centered on what the project required of participating farmers, and seemed to arise from communication gaps. Farmers shared that they received information about the project via different channels, resulting in differing accuracies of understanding. Some farmers received information about the project from meetings with community leaders, while other participants were first informed about the project by radio announcements. Many farmers learned of the project from local representatives for the implementing organization, who enrolled farmers directly or supported them to form groups to participate. However, some farmers learned about the project from family, friends, or other farmers who were already involved.

Farmers raised a common misconception amongst project participants that carbon credit projects would take the farmer's land. This misconception seemed to be driven by the collection of GPS coordinates of the land utilized by the program, which some community members felt could put their land at risk of theft. Another misconception was that projects would force farmers to plant trees on a large proportion of their land, leaving them little space for other crops. These negative perceptions were often held at the start of the projects, but tended to improve as farmers became more familiar with how the project functioned.

Section 3: **Best Practices for a Smallholder Farmer-Engagement Strategy**

The above insights from PxD's qualitative research on farmers in carbon credit projects inform our recommendations for best practices to include in a smallholder farmer-engagement strategy.

1. Incorporate co-benefit generation into the carbon credit project's theory of change for GHG emissions outcomes.

Farmers in PxD's research highlighted the vital role co-benefits – primarily direct farm productivity benefits and access to agricultural services – play in both their initial motivation to join projects and their continued use of adopted practices. Co-benefit generation is thus a core aspect of projects rather than a separate activity set. As such, projects should incorporate co-benefit generation as an integral part of their theories of change for carbon outcome generation. When incorporating co-benefit generation into projects' theories of change, it is important to consider how long it will take for these co-benefits to appear. For example, yield effects of sustainable agricultural practices are highly context specific and can be negative in the short term.[25] As project co-benefit generation is variable over time, farmers' incentives for continuing their use of adopted practices are thus also variable over the course of the project. Comprehensive theories of change, which recognize how project co-benefits and GHG emissions outcomes interact, should therefore also address how this interaction can change over time.

2. Involve all project stakeholders in operationalizing the project's theory of change as farmer engagement is crucial for achieving projects' GHG emissions outcomes.

Many carbon credit projects working with smallholder farmers rely on local implementing partners to facilitate connections with smallholder farmers. As such, local implementing partners play an essential role in operationalizing project activities according to the project's theory of change. Project staff should thus work closely with, and support the capacity of, local implementing partners to secure smallholder farmer engagement. If there is no alignment between these two key kinds of project stakeholders on project activities, there is a risk that crucial activities for farmer co-benefit generation do not occur as intended, and therefore a risk exists that the project's GHG emissions outcomes cannot be achieved. It is thus crucial to ensure that what is happening on the ground with farmer engagement corresponds to the project's stated design, by working closely with all stakeholders and not relying on silo aspects of project development.

3. Connect co-benefit measurement with carbon MRV systems.

As co-benefit generation is critical to achieving projects' GHG emissions outcomes, projects should develop MRV systems that incorporate measurement of both carbon outcomes and co-benefits. Farmers will change their adoption of sustainable agriculture practices if the incentive structure for those practices changes. As such, monitoring data on project activities that generate co-benefits, and evaluation data on farmer outcomes, like farmer yield or profitability, comprise crucial information indicating whether or not the project is successfully engaging with farmers. This co-benefit data can also strengthen carbon MRV systems by providing important ground-truth data about how project activities have been implemented, to improve and customize models of GHG emissions.

4. Ensure projects have clear and consistent communication systems with farmers.

Farmers are important stakeholders in carbon credit projects, so it is crucial for a project to have a clear and consistent communication system with farmers, across the entire project cycle. Clear and consistent communication systems can help prevent misconceptions about projects, enable real-time farmer feedback, and prompt accurate farmer expectations about how they will be involved in the project. These systems should map out what communication channels will be used to disseminate information to farmers, and what kinds of project information will be shared via each channel. Information disseminated to farmers should also be developed with a human-centered design to ensure farmers understand the content and its implications for their participation in the project.

Executing these best practices for smallholder farmer engagement requires financial investment. For example, providing the agricultural services that are important for farmer co-benefit generation means that projects must add additional cost line items for these services into project budgets. Currently, the prices of agricultural carbon credit projects do not allow projects much leeway to add these items. It can also be difficult for projects to justify these expenses to investors and buyers, as strong farmer engagement may seem, at the outset, irrelevant to a project's GHG emissions outcomes. It is thus important for the supply side of voluntary carbon markets to continue building the business case for why smallholder farmer engagement is crucial for the integrity of the project's GHG emissions outcomes.

Investment in data and research on how farmers engage with projects, especially via co-benefit generation, will help build this business case. Publicly sharing this data and research can also enable market-level learning about how best to work with IPLC, like smallholder farming communities, in carbon credit projects.

Voluntary carbon markets hold the potential to entice substantial private sector investment in smallholder farmers while contributing to global climate change mitigation goals. To channel this potential in an effective way, the market needs to reconsider the role that IPLC, such as smallholder farming communities, play in carbon credit projects.

References

Buma, B., D.R. Gordon, K.M. Kleisner, et al. 2024. "Expert Review of the Science Underlying Nature-Based Climate Solutions." *Nature Climate Change* 14: 402–406. https://doi.org/10.1038/s41558-024-01960-0

Carbon Offset Guide. n.d. "Carbon Crediting Projects." Accessed March 25, 2025. https://offsetguide.org/what-are-carbon-crediting-programs

Chiriac, Daniela, Harsha Vishnumolakala, and Paul Rosane. 2023. *The Climate Finance Gap for Small-Scale Agrifood Systems*. Climate Policy Initiative. https://www.climatepolicyinitiative.org/wp-content/uploads/2023/11/The-Climate-Finance-Gap-for-Small-Scale-Agrifood-Systems.pdf

Climate TRACE. 2023, April 4. "The Bottom Line on Ground Truth Data." *News & Insights*. https://climatetrace.org/news/the-bottom-line-on-ground-truth-data

Commercial Agriculture for Smallholders and Agribusiness (CASA). 2022. *Carbon Finance for Smallholder Farmers and Agribusinesses: Analytical Briefing on Agroforestry Solutions*. TechnoServe. https://www.technoserve.org/wp-content/uploads/2022/12/Carbon-finance-for-smallholder-farmers-and-agribusinesses.pdf

Dreyfus, Gabrielle, Caitlan Frederick, Emily Larkin, and Yifan Powers. 2023. *Climate Change Mitigation through Organic Carbon Strategies*. Precision Development and the Institute for Governance & Sustainable Development. https://precisiondev.org/wp-content/uploads/2024/12/IGSDPxD-Climate-Change-Mitigation-through-Organic-Carbon-Strategies-16-02-23.pdf

Food and Agriculture Organization of the United Nations (FAO). 2013. "Smallholders and Family Farmers." *Family Farming Knowledge Platform*. Accessed March 25, 2025. https://www.fao.org/family-farming/detail/en/c/273864/

HAMERKOP. 2023, November 16. "Assessing Carbon Co-Benefit Standards: Unlocking the Value of High-Quality Carbon Projects." Accessed March 25, 2025. https://www.hamerkop.co/blog/assessing-carbon-co-benefit-standards-unlocking-the-value-of-high-quality-carbon-projects

Hatfield-Dodds, Steve, Matthew Cowie, and Emma Herd. 2024. "Essential and Still Evolving: The Global Voluntary Carbon Market Outlook 2024." EY. https://www.ey.com/en_au/insights/sustainability/carbon-market-outlook-2024

Healy, Sienna, Melanie Pietschmann, Lambert Schneider, and Ankita Karki. 2023. *Assessing the Transparency and Integrity of Benefit Sharing Arrangements Related to Voluntary Carbon Market Projects*. Öko-Institut. https://carbonmarketwatch.org/wp-content/uploads/2023/11/Assessing-transparency-and-integrity-of-benefit-sharing-arrangements-related-to-voluntary-carbon-market-projects.pdf

The Integrity Council for the Voluntary Carbon Market. n.d. "The Core Carbon Principles." Accessed March 25, 2025. https://icvcm.org/core-carbon-principles/

Lamula, Khulile M., and Robin Barr. 2024, July 2. "Safeguards: The Importance of Robust Free, Prior and Informed Consent (FPIC) for Climate Justice." *Nature For Justice*. Accessed March 25, 2025. https://www.nature4justice.earth/safeguards-the-importance-of-robust-free-prior-and-informed-consent-fpic-for-climate-justice/

Ponce de León Baridó, Paulina, Jesper Nielsen, Anders Porsborg-Smith, John Pineda, Bayo Owolabi, and Matt Gordon. 2023. *In the Voluntary Carbon Market, Buyers Will Pay for Quality*. Boston Consulting Group, and Environmental Defense Fund. https://web-assets.bcg.com/29/f5/3b36e7cb4ad49df-092de00c9792d/bcg-in-the-voluntary-carbon-market-buyers-sept-2023-2.pdf

Precision Development (PxD). n.d. "*PXD and IGSD Climate Change Mitigation Initiative*." Accessed March 25, 2025. https://precisiondev.org/project/pxd-and-igsd-climate-mitigation-initiative/

Ricciardi, Vincent, Navin Ramankutty, Zia Mehrabi, Larissa Jarvis, and Brenton Chookolingo. 2018. "How Much of the World's Food Do Smallholders Produce?" *Global Food Security* 17: 64–72. https://www.sciencedirect.com/science/article/pii/S2211912417301293

Shah, Keshinee, Ash Berman, Caroline Kimani, and Clinton Shamakamba. 2024. *Unlocking Local Value: Rethinking Benefit Sharing in African Carbon Projects*. Climate Action Platform Africa. https://fsdafrica.org/wp-content/uploads/2024/08/CAP-A-Benefit-Sharing-Report-23.08.24_FINAL.pdf

Sides, Trey. 2024. "The Carbon Credit Lifecycle Explained." *Carbon Direct*. Last updated June 28, 2024. Accessed March 25, 2025. https://www.carbon-direct.com/insights/the-carbon-credit-lifecycle-explained

Sylvera. 2022. "Co-Benefits of Carbon Offsets." Accessed April 7, 2025. https://www.sylvera.com/blog/carbon-offsets-co-benefits

Turner, Guy, Jamie Saunders, Utkarsh Akhouri, and Jamie Lambert. 2025, January 6. "Frozen Carbon Credit Market May Thaw as 2030 Gets Closer." MSCI. https://www.msci.com/www/blog-posts/frozen-carbon-credit-market-may/05232727859#f1

United Nations Development Programme (UNDP). 2024. *High-Integrity Carbon Market Initiative: Frequently Asked Questions (FAQs)*. https://www.undp.org/sites/g/files/zskgke326/files/2024-11/undps-high-integrity-carbon-markets-intiative-faq.pdf

World Bank. 2024a. "Climate-Smart Agriculture." Last updated February 26, 2024. Accessed March 25, 2025. https://www.worldbank.org/en/topic/climate-smart-agriculture

World Bank. 2024b. *State and Trends of Carbon Pricing 2024*. World Bank. DOI: 10.1596/978-1-4648-2127-1. https://documents1.worldbank.org/curated/en/099081624122529330/pdf/P50228315fd8d1050186341ea02e1c107bc.pdf

Appendix: **Common Smallholder Farmer-Engagement Models in East Africa-Based Carbon Credit Projects**

The three carbon credit projects that participated in PxD's qualitative study engaged with smallholder farmers through sustainable land and livestock management practices. There were similarities and some differences in how the projects supported farmers to implement practices that generate carbon credits.

One project focused on supporting farmers to generate carbon credits both by increasing carbon stored in tree biomass, and by increasing soil carbon sequestration. The program supported increased tree and soil carbon storage by providing seeds, training, and tools for farmers to begin implementing practices that lead to greater living-tree biomass and greater dead biomass application to soil. Farmers were onboarded by having one of their plots georeferenced into the project management information system, and by enrolling in one of the participating groups. This project grouped farmers in a geographically defined area. The members of a group elected a lead farmer to be the main point of contact with the project. Each field staff member supervised a zone consisting of several groups. The lead farmers in each group attended monthly meetings with project staff, in which training, written materials, and programmatic information were provided. The lead farmers used this information to provide in-person support to members of their groups by visiting them individually and through regular group meetings. These lead farmers were also part of the project-monitoring data-collection effort, and they provided both technical backstopping for practices implemented by farmers and information about program activities to members. Project staff, supported by lead farmers, also led regular training sessions with farmers. These training sessions were sequenced over the project lifetime and introduced key concepts and practical demonstrations about implementing the encouraged practices.

The second project included in this study had many similarities to the project described above. In addition to the components of increased carbon storage in tree biomass and soil carbon, this project also promoted practices that mitigate emissions from livestock. This project operated through a similar model of enrolling farmers in geographically distinct groups, each with a farmer elected to be the local community facilitator for the project. These community facilitators played the same role as the lead farmers in the project described above, and project field staff followed the same training model in which they led periodic training sessions on key program modules that were backstopped by community facilitators in the communities. One difference was that the community facilitators in this project were more highly involved in program monitoring, especially of the livestock-emissions mitigation component which required regular data collection from participating farmers.

Finally, the third project included in the study focused only on promoting carbon credit generation from increased tree biomass production. Similar to the other two projects, local people in communities were the last-mile representatives of the project. However, in this project these representatives were not elected by the farmer groups, but were chosen by the project staff

as local agents that could be effective in engaging farmers. These local representatives were not necessarily farmers; they could be running small businesses in the community, such as grain trading, dealing in agricultural inputs, or running seedling nurseries. These representatives facilitated the enrollment of farmers in the program, mobilized farmers for training sessions led by project staff, and provided information to farmers about project activities and services, such as when and how seedlings would become available to participants.

These three projects all shared the model of project staff coordinating a number of local community-based representatives who provided last-mile service delivery to groups of farmers. This was seen by project staff as the most viable way to reach the number of participants targeted by the program, while being able to deliver training in a practical way and get regular feedback and monitoring information from the field.

Endnotes

1. Food and Agriculture Organization of the United Nations (FAO) 2013. Smallholders and Family Farmers.
2. Ricciardi et al. 2018. How Much of the World's Food Do Smallholders Produce?
3. Chiriac et al. 2023. The Climate Finance Gap for Small-Scale Agrifood Systems.
4. Ibid
5. Turner et al. 2025. Frozen Carbon Credit Market May Thaw as 2030 Gets Closer.
6. Hatfield-Dodds et al. 2024. Essential and Still Evolving: The Global Voluntary Carbon Market Outlook 2024.
7. World Bank 2024a. Climate-Smart Agriculture.
8. Precision Development (PxD) n.d. PxD and IGSD Climate Change Mitigation Initiative.
9. United Nations Development Programme (UNDP) 2024. High-Integrity Carbon Market Initiative.
10. Sylvera 2022. Co-Benefits of Carbon Offsets.
11. World Bank 2024b. State and Trends of Carbon Pricing 2024.
12. Sides 2024. The Carbon Credit Lifecycle Explained.
13 Carbon Offset Guide n.d. Crediting Project Cycle.
14. Lamula, and Barr 2024. Safeguards: The Importance of Robust Free, Prior, and Informed Consent (FPIC) for Climate Justice.
15. HAMERKOP 2023. Assessing Carbon Co-Benefit Standards: Unlocking the Value of High-Quality Carbon Projects.
16. Healy et al. 2023. Assessing the Transparency and Integrity of Benefit Sharing Arrangements Related to Voluntary Carbon Market Projects.
17. Buma et al. 2024. Expert Review of the Science Underlying Nature-Based Climate Solutions.
18. Climate TRACE 2023. The Bottom Line on Ground Truth Data.
19. Ponce de León Baridó et al. 2023. In the Voluntary Carbon Market, Buyers Will Pay for Quality. p. 8.
20. Shah et al. 2024. Unlocking Local Value: Rethinking Benefit Sharing in African Carbon Projects.
21. Commercial Agriculture for Smallholders and Agribusiness (CASA) 2022. Carbon Finance for Smallholder Farmers and Agribusinesses: Analytical Briefing on Agroforestry Solutions.
22. The Integrity Council for the Voluntary Carbon Market n.d. The Core Carbon Principles.
23. Sylvera 2022. Co-Benefits of Carbon Offsets.
24. Dreyfus et al. 2023. Climate Change Mitigation through Organic Carbon Strategies.
25. Dreyfus et al. 2023. Climate Change Mitigation through Organic Carbon Strategies.

PxD
PRECISION
DEVELOPMENT

precisiondev.org