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Institutional innovations in African smallholder carbon projects

CLIMATE CHANGE AGRICULTURE AND FOOD SECURITY

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Front cover photo

Smallholder agroforestry in Southern Africa. A farmer plants fertilizer trees in his maize and fruit field. Photo: Charlie Pye-Smith, World Agroforestry Centre.

Table of Contents

List of Tables

List of Figures

Abbreviations & Acronyms

AFOLU – Agriculture, Forestry, and Other Land Uses
CBO – Community Based Organization
CCI – Cocoa Carbon Initiative
CDM – Clean Development Mechanism
CIG – Community Interest Group
ECOTRUST – Environmental Conservation Trust of Uganda
ERPA – Emissions Reduction Purchase Agreement
GHG – Greenhouse Gas
NGO – Non-Governmental Organization
PES – Payments for Ecosystem Services
REDD – Reduced Emissions from Deforestation and forest Degradation
SLM – Sustainable Land Management
TIST – The International Small Group Tree Planting Programme
UNFCCC – United Nations Framework Convention on Climate Change
VCS – Verified Carbon Standard
WVAU – World Vision Australia
WVE – World Vision Ethiopia

Abstract

This paper synthesizes the insights of six African agricultural carbon project case studies and identifies institutional innovations among these projects that are contributing to long-term project success while maximizing benefits and minimizing risk for participating farmers. We review project organization and management, the structure and role of community groups within the projects, costs and benefits for managers and farmers, strategies to manage risks to farmers, and efforts to support women's participation.

Projects have developed organizational systems for financial management, agricultural extension, and carbon monitoring. All of these were managed by project management entities, with farmers implementing practices and supporting monitoring systems. Most projects engaged farmers in small groups and larger clusters of groups, which enabled broad participation, efficient contracting, timely communication, provision of extension services, benefit-sharing, and gender-focused activities. Direct carbon payments to farmers were low. Consequently projects needed to manage expectations around benefits carefully, support more efficient systems of aggregation and ensure non-cash benefits for farmers. Managing power dynamics within and among farmer groups was a significant challenge to ensuring equitable decision-making and participation. Mechanisms for settling conflict over land and benefits were also critical. We present action research questions that emerged from the first phase of this work and discuss the future of the initiative. Case studies about each agriculture carbon project from which our analysis is drawn can be downloaded from the CCAFS website (see below).

Case studies

This study is based on six African agricultural carbon project case studies, which can be downloaded at the links below.

Sustaining Agriculture through Climate Change (SACC): CARE International Case study. Seth Shames (EcoAgriculture Partners) with Geoffrey Onyango (CARE International).
Available at: http://hdl.handle.net/10568/21219

Cocoa Carbon Initiative. By Winston Asante, Eunice Anim, and Rebecca Asare,Cocoa Carbon Initiative.
Available at: http://hdl.handle.net/10568/21217

Trees for Global Benefit Program: Environmental Conservation Trust (ECOTRUST) of Uganda. Moses Masiga (ENR Africa Associates) with Polycarp Mwima and Lillian Kiguli (ECOTRUST Uganda).
Available at: http://hdl.handle.net/10568/21218

Humbo Ethiopia Assisted Natural Regeneration Project. By Byamukama Biryahwaho (Nature Harness Initiatives) and Michael Misiko (CGIAR Research Program on Climate Change, Agriculture and Food Security) with Hailu Tefera and Assefa Tofu (World Vision Ethiopia).
Available at: http://hdl.handle.net/10568/21220

The International Small Group Tree Planting Program (TIST) Kenya. Moses Masiga (Ecoagriculture Partners) with Christine Yankel and Charles Iberre (TIST).
Available at: http://hdl.handle.net/10568/21216

Western Kenya Smallholder Agriculture Carbon Finance Project: Vi Agroforestry. Seth Shames (EcoAgriculture Partners) with Amos Wekesa and Emmanuel Wachiye (Vi Agroforestry).
Available at: http://hdl.handle.net/10568/21215

1. Introduction: The challenges of engaging smallholder farmers in carbon projects

There is growing interest globally in the development of agricultural carbon projects[1] that can sequester large amounts of carbon dioxide from the atmosphere to mitigate climate change, while contributing to sustainable agriculture and land management for smallholder farmers. However, these projects face numerous challenges, especially in their inherent complexity, high costs of project development, and challenges of risk management and securing benefits for smallholder farmers (Shames et al. 2011).

The project-level institutions of these agricultural carbon initiatives have received little attention, and yet were critical to the success and replication of these highly complicated projects. They involved numerous actors, including large numbers of farmers as well as professionals in law, technology, monitoring, and finance, whose services consumed a large share of the financial benefits of carbon that could otherwise have gone to farmers. The costs of aggregating, consulting with, and disseminating benefits to large numbers of smallholders also reduced the cash benefits received by farmers. Significant financing was needed for up-front investment, yet carbon revenues were usually received only after carbon is demonstrated to have been sequestered. Poorer farmers and women were often excluded from decision-making and benefits in these projects.

Globally, the number and scale of these projects have been small in both regulated and voluntary carbon markets. An inventory of African agricultural carbon projects identified 81 project initiation efforts in 24 countries. In roughly one-third of these projects money had exchanged hands, and the rest were in development (Shames and Scherr 2010). But even in cases where projects have been established, their size was miniscule compared to the potential for climate change mitigation and farmer participation.

Despite limited experiences globally and within Africa, lessons on the development and management of projects for the benefit of the climate, project developers, and farmers have been drawn from the last decade of community forest carbon projects (Bracer et al. 2007) and the last few years of agricultural carbon projects (Shames and Scherr 2010). However, much more needs to be learned about these projects for the sake of current project managers, future managers and developers, as well as policy makers working to create more supportive enabling environments for future projects.

This paper summarizes the findings of a research initiative led by international NGO EcoAgriculture Partners with the support of the Climate Change, Agriculture and Food Security (CCAFS) Research Program and in partnership with managers of six African projects. It is designed to generate insights useful to each of these audiences by conducting an in-depth analysis of the structure and institutional innovations of these projects. The objective of this initiative is to better understand mechanisms that can improve projects' viability and impacts on the rural poor, and thereby generate lessons for project developers, managers and policymakers. We review project organization and management, the structure and role of community groups within the projects, costs and benefits for managers and farmers, strategies to manage risks to farmers, and efforts to support women's participation. The final section presents conclusions and plans for future action research. The following section introduces the intellectual foundation upon which this study is built and presents the research methodology.

[1] The term *Agricultural carbon project i*n this paper is used broadly to include carbon market projects in which farmers participate and benefit.

2. Conceptual foundations and research methodology

The starting point of this project was the assumption that smallholder agricultural carbon projects needed to yield not only carbon, but also livelihood benefits to farmers, if the projects were to be sustainable. Yet most projects did not monitor these benefits or provided a baseline that would enable them to understand their impact. Understanding how to improve the benefits to farmers should support wider adoption and maintenance of mitigation practices.

We therefore examined project design features as the primary instruments by which benefits could be managed, especially in the short-run. Project design factors that should affect general carbon project success—including benefits to communities—according to economic and institutional theory include (1) incentives that outweigh opportunity costs that are communicated clearly to project participants, (2) cost-effective structures for implementation, monitoring and enforcement (3) contextual appropriateness – reinforcing local norms and garnering the support of stakeholders at both the local and national levels (Reynolds 2012). In addition to project design, micro drivers (at the level of communities and individuals) and macro drivers such as international policy and markets also influence project outcomes (Reynolds 2012).

To inform this study, we focused on the project design and implementation principles expected to be most important for improving benefits to farmers. We used prior institutional analyses of smallholder agricultural carbon projects in Africa, since 2006 to generate the principles. This work included analysis of poverty and payments for ecosystem services (Bracer et al. 2007; Scherr et al. 2007); the scoping of an African Agricultural Carbon Facility (Forest Trends et al. 2010); and the aforementioned inventory of agricultural carbon projects in sub-Saharan Africa that contained a characterization of the elements of design for all projects, with special attention to their institutional arrangements, along with five case studies (Shames and Scherr 2010).

Insights from this body of work yielded five key project design and implementation principles affecting overall project success and benefits to farmers (Shames et al. 2011):[2]

1. Overall project costs are reduced by building on previous institutional efforts and working at large scales.
2. Farmers receive both short-term and long-term benefits from yield improvements, cost savings or new income resulting from GHG mitigating interventions.
3. Farmers benefit from participating in decision making throughout the project design and implementation processes.
4. Projects reduce risk by incorporating flexibility for farmers, empowering farmers in negotiations and contracting, strengthening land tenure and carbon rights, and supporting upfront project financing opportunities for farmers.
5. Projects benefit from strong, positive relationships with communities and the capacity to implement technologies in accordance with locally appropriate processes and values.

The primary challenge for agricultural carbon projects from a design and implementation perspective lies in the ability of project developers and managers to control project implementation costs and to ensure that farmer participants experience livelihood improvements while being shielded from risk. To accomplish this, carbon projects require successful systems for (1) financial management, (2) agricultural extension, and (3) carbon monitoring. An understanding of how the design principles are applied in these specific systems can help to predict the success of projects and the extent to which they will benefit farmers. These ideas provided a point of departure for analysis of carbon projects and informed the development of research questions for this project.

Projects have been able to manage costs largely by leveraging pre-existing institutional capacity and working at scale, particularly by employing landscape-level approaches.[3] Given the relatively low price of carbon, the principle benefits of carbon projects to farmers are long-term crop yield increases, cost reductions or new income sources, rather than the cash payments from carbon offsets (Smith and Scherr 2003; Tennigkeit et al. 2010). Thus, project developers and managers who are best placed to work with farmers on these projects are those that already possess the institutional capacity and infrastructure required to implement sustainable land management interventions that yield direct benefits to farmers while also contributing to climate change mitigation. Pre-existing, long-term institutional arrangements and technical experience also often create a foundation of positive, trust-based, relationships with farmers that enable productive communication and collaboration.

2 The following discussion of design and implementation principles is a summary of Shames et al. 2011.

3 Key characteristics of a landscape approach to bringing agriculture carbon projects to scale include: 1) Managing land use diversity through landscape design to optimize the location of mitigation enhancement activity in ways that capture ecosystem service co-benefits, advance the potential for linking agriculture carbon projects with REDD initiatives, and reduce the need for rigid permanence rules; 2) Linking projects in ways that lower the cost per unit for Measurement, Reporting and Verification (MRV) and stimulate investment in landscape MRV; and 3) Engaging in transparent multi-stakeholder forums for decision-making and agreement-setting to coordinate land use management and institutional support.

The principle of working at large scales is rooted in the notion that project costs per carbon credit tend to go down as the number of aggregated farmers in a project increases. Working at scale also provides opportunities for projects to link with landscape-scale planning processes to generate livelihood and ecosystem co-benefits. The importance of leveraging pre-existing institutions and working at scale is demonstrated by projects when they link with large-scale aggregators of farmers, build carbon projects on existing sustainable land management (SLM) extension systems, streamline carbon measurement techniques, and concentrate on transferring cash efficiently to farmers.

Smallholder farmers do not have an asset base to absorb carbon project risks, such as unexpectedly low returns, delayed returns or high labour requirements, in exchange for a promise of future carbon payments. They also struggle to access surplus capital to invest in tree seedlings, labour or other inputs required to establish agricultural carbon projects. Due to these limitations, smallholders can only commit to long-term participation in carbon projects if these GHG mitigating interventions minimize their exposure to project risks and clearly promise to improve their livelihoods.

To improve the conditions for farmers, projects need to ensure that farmers receive both short-term and long-term benefits from yield improvements resulting from GHG mitigating interventions. Farmers also benefit from participating in decision making throughout the project design and implementation processes and by partnering with groups that are sensitive to their needs. Farmers' insights into how best to organize projects and to implement GHG mitigating practices are critical to the projects' relevance and farmers' ownership of the process. These principles are exemplified through actions that design flexibility for farmers into projects, empower farmers in negotiations and contracting, strengthen land tenure and carbon rights, and support upfront project financing opportunities for farmers.

The task for smallholder carbon projects is to develop and improve the mechanisms by which they apply these principles. Given that experience with smallholder carbon projects is still limited, projects can speed their learning by communicating with each other and tracking the impacts of different interventions to support institutional learning.

Because managers are generally focused on project implementation, they often do not have time to reflect systematically on the effectiveness of elements of project design across multiple indicators of success beyond project profitability for the project investors. This research initiative aimed to support projects to enhance their own learning and fill these gaps.

Study Methods: An action research approach

Based on the perceived knowledge development and sharing needs for African smallholder carbon projects, EcoAgriculture Partners, in partnership with project managers, local research consultants and CCAFS researchers pursued an action research approach for the purpose of supporting the implementation of cost-effective and pro-poor agricultural carbon projects in sub-Saharan Africa (primarily focused on East Africa). In particular, the goal was to help projects to track their own institutional innovations and to support knowledge exchange among projects. For the purposes of this research, *project institutions* refer to the organization of the projects' actors (including individuals and organizations), the roles and functions of the actors, and the linkages and interactions among them.

The initiative, titled *Institutional Analysis and Capacity-Building for Agricultural Carbon Projects in Africa*, convened project participants at a knowledge sharing and research methodology development workshop in Nairobi in November, 2010. The methodology developed at this workshop was implemented jointly by EcoAgriculture Partners,[4] consultants and the carbon project managers.[5] The products of this work were six case studies that represented an institutional baseline for each project that will be used as the foundation for action research on institutional changes and impacts of interventions over time.

Selection criteria and project summaries

The first steps in the research initiative were to develop project selection criteria and to engage the carbon projects. The primary characteristic that the projects had in common was that farmers implemented sustainable land management practices that sequestered carbon. These practices included agroforestry, woodlot planting and management, agricultural soil management, and Reduced Emissions from Deforestation and

[4] The workshop organizers and lead research facilitators for this project were Seth Shames of EcoAgriculture Partners and consultants Moses Masiga of ENR Africa Associates (Uganda) and Byamukama Biryahwaho of Nature Harness Initiative (Uganda).

[5] These were mostly the attendees of the September 2010 methodology development workshop in Nairobi, and their names are listed in Appendix 1.

forest Degradation (REDD). Other than the variety of practices, the projects represented diverse socio-ecological conditions, organizational leadership and coordination approaches, and strategies for engaging farmers.

Actors and arrangements among them were highly variable and lessons drawn from the experience of this set of initiatives are expected to be relevant and informative to most smallholder carbon projects. Based on these criteria, seven projects were selected to participate in the workshop; six moved forward to the case study development portion of the initiative.[6] These projects are introduced in the text below and key characteristics are summarized in Table 1:

- The **CARE Sustaining Agriculture through Climate Change (SACC)**, based in western Kenya, focuses on land use interventions including dispersed interplanting and boundary plantings of trees, woodlots, and fruit orchards. The project uses the carbon project as an entry point for a broader sustainable agriculture intervention that includes support for agricultural adaptation to climate change. It has also developed a set of supporting activities to address equity issues within the project. Project activity is distributed across a range of locations, farming systems and land tenure arrangements within a watershed. The project includes a learning agenda and will capture and use knowledge generated by the initiative to support adaptive management as the project is implemented.

- The **Cocoa Carbon Initiative (CCI)** in western Ghana is working to improve tree cover while enhancing sustainability of cocoa production. By reforesting degraded lands with cocoa, the initiative aims to transform cocoa plantations into full shade systems. These activities are in addition to efforts to conserve the last vestiges of the remaining intact forests.

- The **Humbo Assisted Regeneration Project** managed by World Vision in Ethiopia will help local community groups receive direct carbon payments, and allow them to benefit from agro-ecosystem restoration based on the Farmer Managed Natural Regeneration (FMNR) approach. Humbo is the first large scale African afforestation/reforestation project to be registered under the Clean Development Mechanism (CDM) of the UN Framework Convention on Climate Change (UNFCCC).

- In Clean Air Action Corporation's (CAAC) **International Small Group and Tree Planting Program (TIST)** project in Kenya, farmers plant trees on their farms and are paid based on the number of trees planted and conserved. TIST works through small groups of farmers to organize the tree planting with a goal of not only generating carbon payments, but also to improve livelihoods through ecosystem rehabilitation. TIST also works in India, Tanzania, Uganda, Honduras and Nicaragua. The Kenya project was validated and verified in 2011 through the Verified Carbon Standard (VCS) and also by the Climate, Community and Biodiversity standard (CCB).

- The **Trees for Global Benefits Program** of the Environmental Conservation Trust of Uganda (ECOTRUST), an environmental NGO, coordinates this project which encourages small landholders in four socio-ecologically diverse districts of Uganda to plant trees on their farms for carbon sequestration. An aim of this registered Plan Vivo project is to develop and operationalize a model for carbon trading with smallholders and to enhance technical capacity of participating institutions to implement carbon projects.

- The **Western Kenya Smallholder Agricultural Carbon project**, funded by the Swedish NGO, Swedish Cooperative Centre-Vi Agroforestry (also known as Vi Agroforestry), is the test case for the first Voluntary Carbon Standard (VCS) methodology which allows for soil carbon on small farms. The project mainly promotes the adoption of a wide range of sustainable agricultural land management practices, with a particular focus on degraded land. Smallholder farmers are expected to access carbon markets and receive additional revenues through the adoption of productivity enhancing practices and technologies. In November 2010, the Vi Agroforestry Project became the first African project to sell carbon credits generated in part from soil sequestration. In December 2011, the project's methodology – Sustainable Agricultural Land Management (SALM) – was granted final approval by the VCS.

Methodology development workshop and field work

Research project participants developed an analytical framework for the case studies to accommodate the diverse project actors and approaches to smallholder agriculture carbon development. During the November 2010 workshop, staff from the participating carbon projects shared the

6 The Nile Basin Reforestation Project in Uganda did not participate in the methodology implementation portion of the initiative.

Table 1. Summary of project partners

Project title	Location	Project manager	Other key actors	Project scale target (ha)	Start date of project planning	Mitigation activities
CARE Sustaining Agriculture through Climate Change (SACC)	Middle and lower Nyando river basin, Kenya	CARE Kenya	CARE International, World Agroforestry Centre (ICRAF), CBOs, Rockefeller Foundation	100,000	2009	Agroforestry, woodlots
Cocoa Carbon Initiative (CCI)	Bosambepo, Ghana	Nature Conservation Resources Centre (NCRC), Katoomba Incubator; Ghana Forestry Commission (FC); Traditional Councils	Community Resource Management Areas (CREMA) Board, Cocoa industry stakeholders	110,000	2008	Increasing carbon stocks of non-cocoa trees (shade trees) on farm and within agricultural landscape
Humbo Assisted Regeneration Project	Humbo, Ethiopia	World Vision Ethiopia, World Vision Australia	Woreda (district) Bureau of Agricultural & Rural Development (MoARD), Forestry Development Coordination Office (ARDFCO); Community Forest Protection and Development Cooperative Societies	2,728	2004	Farmer Managed Natural Regeneration (FMNR)
International Small Group and Tree Planting Program (TIST)	Meru, Kenya	TIST	Clean Air Action Corporation, USAID	4,597 already accomplished, with plans to grow	2005	Agroforestry, woodlots
Trees for Global Benefits Program	Hoima, Bushenyi and Masindi, Uganda	ECOTRUST	ICRAF; Edinburgh Centre for Carbon Management (ECCM), Plan Vivo Foundation, District farmers associations	1000	2003	Agroforestry, woodlots
Western Kenya Smallholder Agricultural Carbon project	Kisumu and Kitale, Kenya	Vi Agroforestry	World Bank Biocarbon Fund, Swedish International Development Agency (SIDA), CBOs	45,000	2007	Sustainable Agricultural Land Management (SALM) including minimum tillage, crop residues on fields, livestock enclosures, composting, agroforestry

institutional summaries of their projects, based on a template provided beforehand (see Appendix 1 for a full list of workshop participants). Building from these presentations, workshop participants developed the research methodology for case study development, which was subsequently implemented during fieldwork in the following months by the research facilitator team, EcoAgriculture Partners' staff, consultants, the project partners and a CCAFS researcher, in collaboration with staff from the carbon projects.

The research methodology was divided into three major areas. The first covered the nature of mitigation practices employed by projects, their modes of implementation, the organization of the projects' monitoring systems and their progress towards reaching their goals. The next section focused on the organization and strength of the institutions involved in the projects. This component covered the organization of project participants, the dynamics of the community groups involved, project process and timeline, strength of project management entities and interactions with landscape scale processes. The final section was designed to assess the project finances and benefits for farmers. These topics included the design and functioning of financing mechanisms, costs and benefits for projects, and costs and benefits for farmers. The research themes were framed as questions within the methodology, and indicators and means of measure were jointly developed during the workshop to guide the data collection process. The major questions and sub-questions are summarized in Appendix 2.

Responsibilities to gather information were assigned among the research facilitators. Field work was conducted at the six project sites, with the research facilitators spending between 1.5 to 3 days in each site. In one case, the Cocoa Carbon Initiative in Ghana, project managers completed their own institutional baseline without a visit by the research facilitators. The other cases were written by the research facilitators with the support of the project partners, and are included as a supplement to this report.[7] During field work, key informant interviews were organized by project managers. Interviewees were selected based on their ability to answer the research questions developed during the methodology workshop. Interviewees included, project staff, community-based organization representatives, farmer group representatives and relevant representatives from government and the private sector. Full lists of interviewees are included in the case studies. In addition to field interviews, research questions were also answered with project documents and data provided by project managers.

The nature of the close research partnership between research facilitators and project management provided opportunities and challenges. The collaboration provided for efficient access to internal project information and critical field research support. With projects as partners in the methodology development and data collection process, research was designed to reflect project priorities and is more likely to be useful to them. However, this approach also comes with limitations. There is potential for a lack of objectivity in the findings, particularly the ways in which projects are not meeting their objectives. Each project has an incentive to portray themselves in the best possible light to the public, which could bias findings.

Not all questions were fully answered by all projects, but sufficient information was gathered to allow the case study reports to adhere to roughly the same structure and for their key findings to be synthesized. The following two sections present a synthesis of findings from the cases. The first section covers project management and organization and the second covers project finance and social equity.

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[7] The case study authors: CARE – Seth Shames with input from Geoffrey Onyango; CCI –Winston Asante, Eunice Anim, Rebecca Asare ECOTRUST – Moses Masiga with Polycarp Mwima and Lillian Kiguli; Humbo – Byamukama Biryahwaho and Michael Misiko with Assefa Tofu and Hailu Tefera Ayele; TIST – Moses Masiga with Christine Yankel and Charles Iberre; Vi Agroforestry – Seth Shames with Amos Wekesa and Emmanuel Wachiye.

3. Findings: Project organization and management

Information in this section highlights key findings across the cases on project organization and management. First is a review of projects' organizational models, which includes a discussion of project structure and relationships among project actors. This is followed by a presentation of findings on project management strategies, which includes the central role of international NGOs and the ways that local actors build capacity to take on project management responsibility over time. The section concludes with the organization and functions of the community groups, which includes findings on the carbon project-related community or farmer group formation and group structure.

Project organization

The long-term sustainability of these projects will be based on the strength of the organizations managing them and those implementing the practices, as well as the strength and fairness of the relationships of these groups to each other. Additionally, as projects mature they may begin to link to other initiatives within the landscape.

Project structure

The organization of a generic agricultural carbon project includes the roles of field program manager (referred to in this paper as project managers), project developer, farmer or community organization, carbon technical capacity provider, and credit buyer (Figure 1) (Shames and Scherr 2010). This can be compared against the organograms from the Vi Agroforestry and World Vision case studies in Figures 2 and 3, respectively. The general structure of these projects was similar to that in Figure 1, although the scope of the roles and the structure of the entities filling them varied.

The project managers and the community groups, the key entities in each project from an organizational perspective, were at the core of Figures 1-3. All projects maintained systems for financial management, agricultural extension, and carbon monitoring which were overseen by the project manager. The community groups, which were multi-tiered structures often including small groups and larger clusters, served as aggregators of carbon credits and representatives of the farmers' interests. The responsibilities and dynamics between and within the project management and community groups resulted in differences in the organization of each project, with corresponding implications for community participation in decision-making.

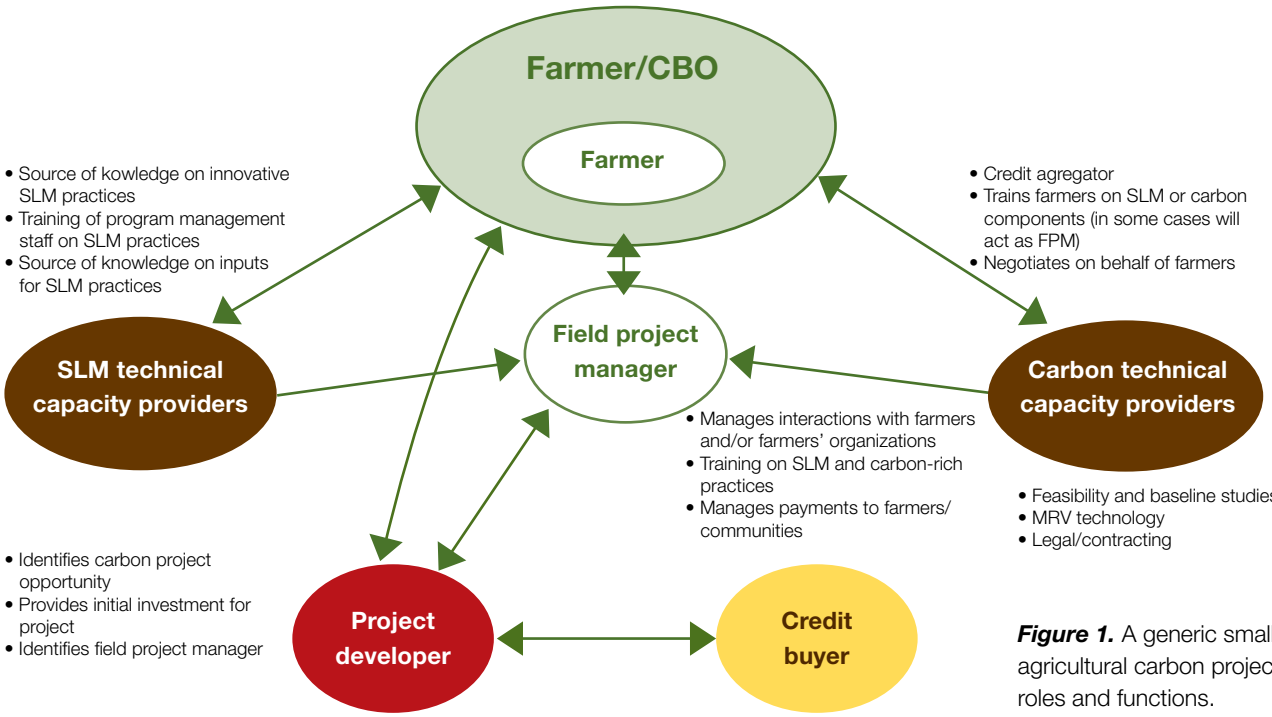

Figure 1. A generic smallholder agricultural carbon project: Key roles and functions.
Source: Shames and Scherr 2010.

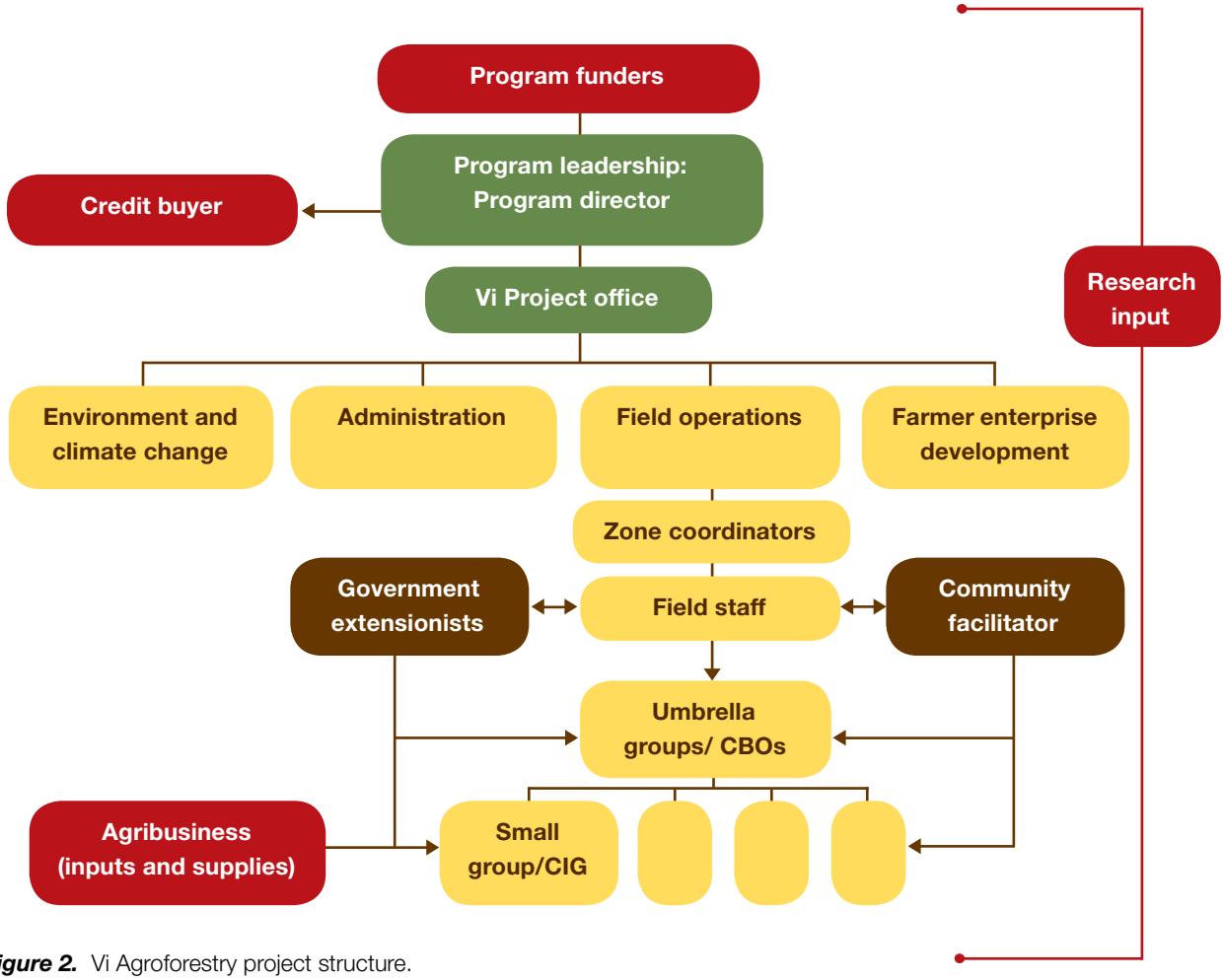

Figure 2. Vi Agroforestry project structure.

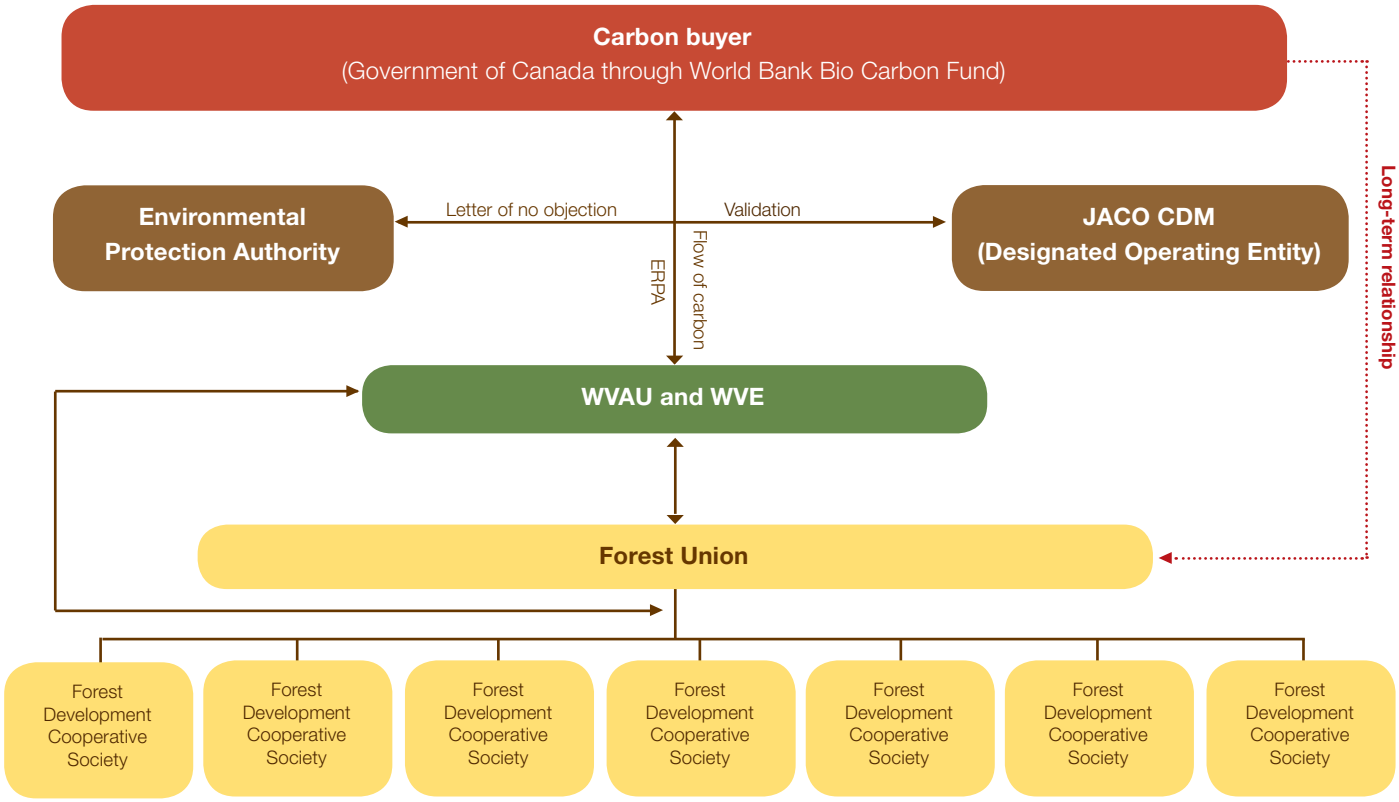

Figure 3. World Vision Humbo Project Structure.

Upscaling

This first generation of agricultural carbon projects has begun to move from relatively small-scale projects (e.g. ECOTRUST) to larger ones that are setting goals of reaching tens of thousands of farmers (e.g. Vi Agroforestry , CARE, TIST, CCI). However, these larger projects were still concerned primarily with their own internal functions to maintain project survival and had not yet concentrated significantly on consolidating the benefits that large scales could afford them, such as more efficient administration and the ability to integrate their activities into wider landscape or watershed planning and management processes. For instance, the Vi Agroforestry and CARE projects are both located within the Lake Victoria Basin, which is under substantial environmental threat from agricultural land degradation, among other causes. As they grow, both could work with groups such as the Lake Victoria Environmental Management Program (LVEMP), designed to improve collaborative management of the basin. The benefits of this engagement could return to the farmers participating in the project through improved watershed functions.

Opportunities to take advantage of these benefits of scale will come as projects are able to maintain their core functions through periods of rapid growth. For some projects this growth is planned to occur with project structures similar to the one that currently exists, while others plan to modify them to reduce the role of the current project management entity over time and to empower local institutions to take on greater responsibility (see Transition of management responsibility to local actors).

Project management

The project management entity oversees the systems of financial management, agricultural extension, and carbon monitoring, which are the foundational components of an agricultural carbon project. The project manager is the central entity conducting the day-to-day operations of a project with roles that included engaging with farmers and farmer organizations, negotiating contracts with buyers, managing transactions of carbon payments to farmers, providing technical assistance to farmers on sustainable land management practices, facilitating greenhouse gas monitoring, and implementing field measurements of carbon with farmers. Insights from the comparisons of the projects' management efforts were that NGOs in general, and international NGOs in particular, were the primary actors and that attention in all of the projects was focused on supporting local capacities to take on larger project management roles in the future.

The central role of NGOs in project management

Among the six case studies, four are currently being managed by international NGOs (Vi Agroforestry, CARE, World Vision, CCI). In the TIST case, while the Clean Air Action Corporation (CAAC) is a private carbon developer, TIST is technically an NGO which is supported, in part, by international development funds. ECOTRUST was the only project that is a fully nationally-based NGO project.

International development NGOs are well placed as early actors in the agricultural carbon space because the on-the-ground implementation of these projects are similar to agricultural development projects. These particular NGOs had deep experience with rural development and a longstanding local presence in the areas in which they were implementing the carbon projects. In the international NGO cases, they had been operating in the general vicinity of the project areas before the development of the carbon projects. These pre-carbon project activities allowed them to engage with communities with a foundation of trust and rapport that was critical to rapid establishment of a smallholder carbon project. They also reduced the initial investment and transaction costs required to establish the project, as the carbon element was an activity added to an existing project.

Transition of management responsibility to local actors

Other than the project managers' ability to efficiently carry out their roles of financial management, agricultural extension and carbon monitoring, long-term success of projects in the international NGO cases will rely on their ability to transfer management authority to local actors over time so that project activities are institutionalized locally. These local actors may include community-based organizations, government agencies, local companies or some combination of these. Project managers recognized the need for this management transition, but in most cases these processes were in the early stages.

The project that made the most progress in this transition was the World Vision Humbo project, which had plans to cede project management control to the Farmers' Forest Cooperative Union, the cluster group of the smaller community forest development cooperative societies, by the end of 2012. World Vision Ethiopia (WVE) had plans for this arrangement since the beginning of the project. The leadership of the Union was drawn from the seven cooperative societies that WVE had been training since the project's inception. The goal is for the Union to be run by cooperative society representatives, along with a team of technical professionals established as a steering committee. As needed, the Union may hire additional technical experts, and WVE will continue to play an advisory role. This arrangement will be strengthened by the role of local government, which maintains an office dedicated to monitoring and supporting the activities of cooperative societies. In fact, the Humbo Woreda (district) office was instrumental in developing the bylaws that govern the cooperative societies and in training them on institutional governance and financial management.

In the other international NGO cases, projects also demonstrated movement towards greater local management responsibility. Vi Agroforestry was studying options to significantly reduce its presence over the next few years and planned to rely on the Community Facilitators, their primary liaisons with the community groups, as the linchpin of this handover process. CARE was also searching for potential local partners to take on management even as they designed the project. CCI planned to eventually devolve project management responsibility to a national organization of cocoa producers.

While TIST did not have plans to change the structure of their engagement with communities, the organization already relied heavily on local capacity for training and measurement. It has been particularly successful in working with Community Quantifiers to reach high levels of measurement precision at relatively low cost.

For ECOTRUST, the motivation to devolve came from a lack of capacity to expand. The demand from communities to participate in the ECOTRUST carbon projects far outpaced their ability to mobilize resources to carry out project initiation activities. ECOTRUST began to address this need by identifying local partners that could take on some of the responsibilities that had previously been handled by ECOTRUST staff.

The chances of success for smallholder carbon projects to succeed over the short term, when outside groups are managing them, as well as over the long term, when they will be institutionalized more strongly at the local level, will rest to a large extent on the success of community groups. The next section examines their current structures and functions.

Organization and functions of community groups

In the case study projects, the farming household or individual farmers decided whether or not they wanted to participate and which practices to implement. Individuals or farm families did not have a direct influence on the project's strategic management decisions. The farmer's link to the project managers came through engagement in small groups and larger clusters of groups, which enabled broad participation, efficient contracting, timely communication, efficient provision of extension services, and carbon benefit-sharing.

The small groups and clusters were the mediators between the farmers and the project managers. In the projects that had advanced to the stage of contact design, with the exception of ECOTRUST, all signed contracts with small groups and not with individual farmers. The small groups committed to the project management to implement certain practices. Individual farmers were beholden to the small groups, not the project management. The small groups were the arbiter of who gets paid and how, and therefore, the structure and governance of these groups were critical to ensuring that project benefits were distributed equitably among participants.

Small group and cluster formation

In some cases, these farmer groups and clusters existed before the development of the carbon project, serving other social, livelihood, or religious functions. In others, small groups were created at the request of the project manager specifically for aggregating carbon credits. Vi Agroforestry suggested that the training, monitoring and cash distribution from carbon markets had the potential to disrupt existing community structures and that their ideal was to work with members of democratically run community groups to integrate new activities into pre-existing structures.

They have been largely successful in outreach to these groups.[8] The small groups ranged from 10 to 50 members, and in some cases were already aggregated into larger clusters. For example, the Kimeiti farmers CBO was comprised of approximately 25 Community Interest Groups (CIGs), that supported agriculture production, marketing and financial services. A key to Vi Agroforestry's success in engaging groups on the carbon project was the previous relationship that was developed when they worked together on other activities.

In Humbo, the small groups and structures were newly created for the project, but supported strongly by a local government system experienced in forestry cooperative development. Participating farmers were direct members of the Community Forest Protection and Development Cooperative Societies that were responsible for undertaking the reforestation activities in accordance with a plan developed by the members of the Society. The Cooperative Societies carried out on-the-ground responsibilities such as establishing tree nurseries, tree planting, and protecting the trees as they grew. They also developed project plans which included the design of project benefits sharing schemes that aimed to include the whole community. The Forest Farmers' Union is an umbrella organization that brings together all seven of the cooperative societies. It was the primary link between the forest cooperatives, local government and WVE. In the future, once WVE shifts management responsibility to the Union, the latter would be the entity responsible for delivering carbon credits.

CCI described plans to implement a different model of leveraging pre-existing organizations by working entirely through the well-established national cocoa farmers cooperatives system. TIST is an example of a group that has created small groups for the purpose of engaging with the carbon project. Members of the TIST groups usually already knew each other well, as group members were required to be within walking distance of each other, but existing formal institutional structures were not explicitly targeted.

8 Groups summarized in the Vi Agroforestry case study include: The Wagai Integrated Farming Program (WIFAP); Kimeiti Farmers CBO; Inter-Christian Fellowship Evangelical Ministries, Rural Energy and Food Security Organization (REFSO),and the Ngoli Adult Learning Group.

Group structure

The small groups had formalized leadership structures. Figure 4 roughly represents the structure of the Kimeiti CBO, and is typical of many of the groups Vi Agroforestry has engaged. Officers of this, and similar, organizations at the small group and cluster levels were often democratically elected, and some groups had gender equity requirements for leadership positions.

TIST required a specific structure for each of its small groups (6-12 farmers) and clusters (40 groups or roughly 300 farmers). Each cluster had a leader, a co-leader and an accountability officer each of which was elected on a rotational basis every four months so that all farmers had a stint as an officer. The small groups were encouraged to meet weekly and the clusters monthly to discuss project business. Often, an interlocutor from the cluster level was selected to represent the interests of the farmers.

In Humbo, the structure of the cooperative societies consisted of a general assembly, an executive body (accountable to the general assembly), and subcommittees for purposes such as forest protection, forest development, and credit and saving. Each of these committees was accountable to the executive body. Officers of the executive body and subcommittees were elected by the cooperative members. The Woreda Cooperative Office supported the cooperatives in the process of developing bylaws which clearly specified objectives and activities, membership criteria, rights and duties of members, the powers, responsibilities and duties of the committees, election rules, and terms of service for committee members. The bylaws of each of the seven cooperative societies were developed by consensus and had been in effect since the initiation of the carbon project.

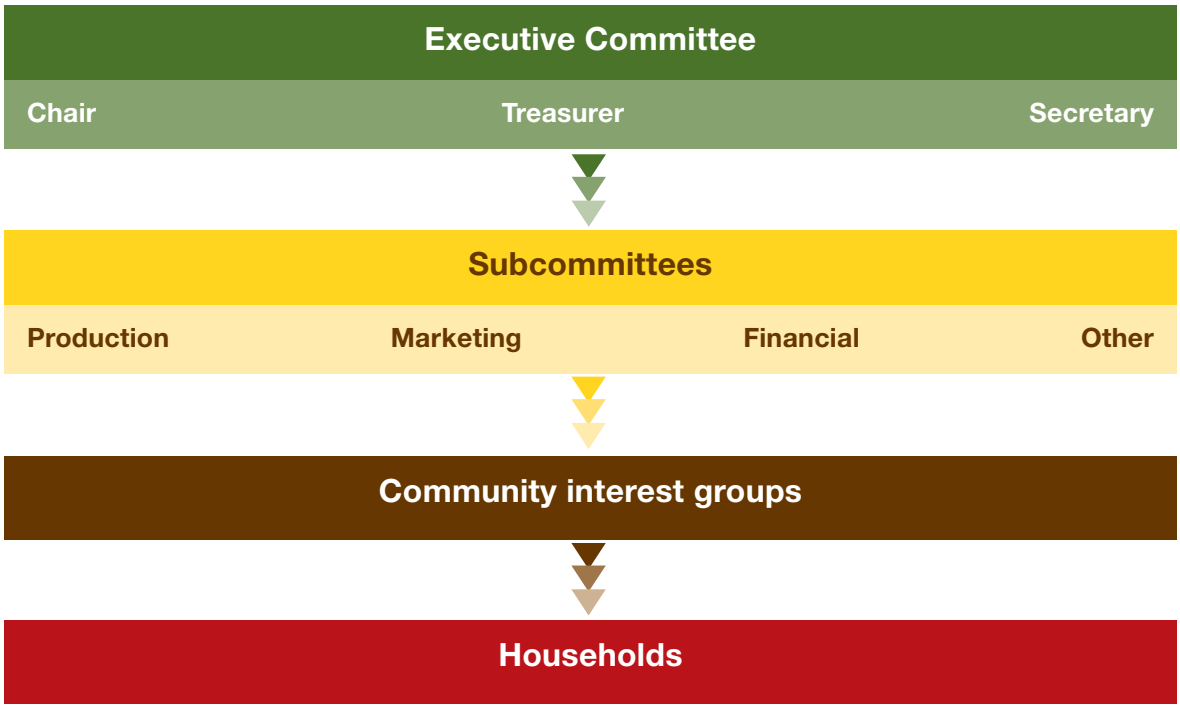

Figure 4. Small group and cluster structure of the Kimeiti CBO, typical of Vi Agroforestry small groups and clusters.

4. Findings: Project finances and social equity

In addition to describing the organization of the projects and the functions and dynamics of their participants, the case studies also explored the costs and benefits of the projects from both the project management and farmer perspective, risk management for farmers and community groups, and issues of social equity, particularly for women.

Project financing needs

Most carbon project costs occurred in the start-up and early project phases when it is necessary to develop a project design and conduct outreach to farmers. Thus Vi Agroforestry budgeted 86% of their total investment or USD 1.46 million to occur in the first 5 to 10 years of their project, mostly to cover operating costs, especially staff needs. CARE budgeted USD 600,000 for a small-scale pilot project with 1000 farmers over two years. TIST invested USD 200,000 for market development, production of a project design document, establishing a methodology and validation and verification systems, and environmental impact assessment, in addition to costs associated with administration, training, validation, verification, and monitoring. This initial financing was often shared among the project developer, a donor and farmers.

For each of the cases, projects also required substantial investment over time. CARE anticipated an estimated total investment of USD 2.4 million to reach 10,000 households and Vi Agroforestry planned to invest USD 1.188 million to reach 80,000 households.

A full costing was difficult to provide, as the implementing organization and project partners made substantial contributions by virtue of their prior involvement in the site, and other activities and capacities. Vi Agroforestry, for example, has been active in western Kenya for more than 25 years. Also, donors often provided pre-financing to get projects started, and these investments were not included in carbon project budgets. For example, the Swedish International Development Cooperation Agency (SIDA) covered 38% of Vi Agroforestry's initial costs, and TIST worked with the United States Agency for International Development (USAID) to support the work related to the carbon project.

Financial benefits project management entities

Given that most of the projects were in relatively early stages, it is also difficult to report on financial returns from carbon. However, projects had modelled expected returns. CARE estimated a net present value of the project of USD 3.9 million over 25 years, yielding an internal rate of return of 16%.

Vi Agroforestry expected returns of USD 4.95 million (or USD 1.98 million with 60% buffer set aside required by the VCS) over the course of 20 years. The revenues could increase if the price of carbon increases or if the accuracy of measurement improves.

However, these land-based agricultural carbon projects can take years before emission reductions are verified and credits are issued, and this delay creates financing gaps for projects. This ex-post credit model is the mode of operation for Clean Development Mechanism and the Voluntary Carbon Standard projects that covered all of the cases except for ECOTRUST, which operated under the ex-ante Plan Vivo standard (see discussion in the following section). These financing gaps were filled either through the pre-selling of credits, public or philanthropic funds or patient private investment in the project.

Farmers' costs and carbon benefits

The most significant costs for farmers were their time and labour. Cash needs were highest for the tree planting projects where farmers were responsible for buying their own tree seedlings. To cover these costs, TIST encouraged farmers to plant short-term intercrops for cash, such as potatoes, and facilitated loans for buying seed, farming, planting and paying school fees. ECOTRUST did not give farmers initial money to plant, but those who demonstrated engagement and commitment to the project received seedlings on credit.

Carbon returns to farmers varied depending on how the project was structured, however, in all cases carbon payments were very low compared to the total costs of implementation for the farmers. TIST paid farmers USD 0.02 per tree annually, regardless of measured sequestration. In contrast, ECOTRUST paid farmers for actual carbon credits generated per household, with a typical payment of USD 904 for a woodlot on 1 ha (the majority of participants had 0.5 to 2 ha). The price of carbon ranged from USD 6 to USD 20 per ton of CO_2e. It was not clear in all projects what proportion of the carbon funds were going to farmers, but in the example of Vi Agroforestry, the project planned to distribute 60% of revenues to farmers based on the monitoring of activities and estimated carbon delivered.[9] The project estimated that the average farmer would receive USD 2.47 per year.[10]

[9] 30% will go to Vi Agroforestry extension operations in the project area and the remaining 10% to Vi Agroforestry headquarters in Stockholm for administrative costs.

[10] Based on roughly 0.75 ha/farmer and a projected average figure of 1.37 tons of CO_2e/ha for Kisumu and Kitale, and $4 per ton of CO_2e, revenues are expected to be $4.11/farmer. Farmers only receive 60%, however. The remaining $1.64 goes to Vi Agroforestry for the extension and carbon project management services they provide.

The timing of these payments was also an important issue, and projects developed mechanisms to meet the pre-financing needs of agricultural carbon projects. TIST paid projects for their standing trees every year, and the payments were not linked directly to the verification of credits. ECOTRUST, as a Plan Vivo project, first distributed payments in year 0 as soon as the implementation of practices had been verified. In this model payments are continued in years 1, 3, and 5 and are completed in year 10. The logic behind the 10-year contract, which is significantly shorter than the other cases, is that by year 10 climate-smart interventions will be fully implemented, providing livelihood benefits for farmers, and with no incentive to revert back to the previous system.

Distribution of carbon payments was simplified by projects contracting with small groups as opposed to individual farmers. However, distributing cash to dozens or hundreds of groups was still a challenge. TIST innovated in this area by paying farmers through the Kenyan M-PESA cell phone banking system which uses text messaging to allow farmers to claim payments at local banks. Each small group designated a custodian of the group SIM card.

ECOTRUST was a leader in providing opportunities to farmers to maximize the benefits of the carbon payments. To help farmers invest money and access credit, ECOTRUST required them to have a bank account to join the project and facilitated the establishment of the account as well as informal credit institutions. Farmers considered this one of the major indirect benefits to participating in the project. The banks accepted the project's carbon finance contracts as security for loans. Savings clubs were a popular informal credit institution, particularly for women and were often found more accessible than the formal banks. ECOTRUST also planned to start a bank to pay in advance for carbon credits. Farmers had already used carbon money to invest in non-carbon income-generating activities, such as bee keeping, medicinal extracts, fodder and fuelwood.

Non-carbon benefits: the primary payoff for farmers

The most significant benefits to farmers in these projects were improved farm productivity rather than cash from the sale of carbon credits. Sustainable land management practices were expected to increase farmers' resilience to climate change by improving general soil health, water holding capacity and making soils more resistant to drought. Projects noted the benefits of diversified income, increased fodder and fuelwood, and the strengthening of local groups responsible for managing local elements of the carbon project. Group structures were often used to deliver other benefits such as marketing coordination or health training.

Even for the tree-planting projects, agricultural benefits (crop yields and soil health) were the primary motivation for farmers. ECOTRUST observed that most farmers joined the project for these farm-related benefits – in their case, rehabilitation of degraded land – rather than expected carbon payments. TIST also described the importance of farm-level benefits. They found that farm outputs increased at successful sites.

Vi Agroforestry, a project that focused more explicitly than the tree-planting-only projects on linking carbon payments to improved cropping systems, similarly expected farmers to benefit from improved crop yields, sale of tree products and reduced costs of purchased firewood. Composting and conservation tillage systems were expected to reduce farmers' costs for fertilizers and pesticides. Less tangible benefits from the project included agricultural knowledge and skills and the social benefits of community cohesion, community organization, and new opportunities for women and youth, particularly in the development of tree nurseries. CCI stated that their goal was to leverage a REDD+ project to facilitate more sustainable farming practices and land use management, as the benefits from REDD+ would not be sufficient to cover farmers' opportunity costs.

Farmer risk management

The development of smallholder carbon market projects brings risk for all of the actors in the projects including project developers and financiers, however participating farmers are far less able to absorb these than the others due to their low income, limited asset base and marginalized social position. Risks included potential conflict over land and carbon rights, trade-offs between agricultural yield and carbon credit production, and conflicts within communities over the distribution of carbon payments. Table 2 summarizes general risks observed in the case studies and mechanisms suggested for reducing them.

Important policy-related risks for farmers included vague or weak rights, and standards and rules for carbon credit generation. In some cases, the development of the carbon project led directly to solidification of tenure rights of communities. For example, Humbo faced a particular land rights challenge in Ethiopia in that all land is considered public. Before the project began, the project area was managed in an open access regime, and although the communities used the land, they did not hold legal title. Due to the carbon project development process, the communities, through the previously described Cooperative Societies, were granted user certificates which granted them control of the resources in the project area including the trees and the carbon they sequestered.

The formalization of rights regimes can also lead to community conflicts, as competition can develop where it did not previously exist. These conflicts can arise among households or within them (see Gender Issues). Projects indicated that legitimate community decision-making processes were needed to handle these risks. Ideally these would be linked to pre-established conflict resolution systems. For example,

Table 2. Risks for farmers and innovation for risk mitigation

Risks for farmers	Innovations to reduce risks
Formalization of land and carbon rights can lead to conflict within communities and families.	Links established to pre-existing, legitimate community conflict resolution systems.
Trade-offs between agricultural yield and carbon credit production.	Focus on climate-smart practices that improve yields while providing mitigation and adaptation benefits.
Financial barriers.	Early payment schemes; formal credit and insurance options; village level financing such as village banks and revolving funds. Lower production costs by farmers using own labour seed sourcing.
Carbon price volatility low carbon prices.	Clear communication with farmers; guarantee payment amount throughout duration of the project; international advocacy to develop more stable land-use carbon markets.

in the area of the Vi Agroforestry project, most land conflict resolution was handled by the local provincial governments. Clan elders worked under the chiefs, and each clan had a chairman who dealt with land disputes. This system was said to resolve roughly 70% of the cases. In cases where this system was insufficient, tribunals of elders were established. These institutions could be utilized for intra-community conflicts arising from the carbon projects just as they have been used for other issues.

Even with systems for conflict management, carbon projects can create unintended consequences, particularly in situations that encourage large-scale tree planting on agricultural land. In an example from TIST, prior to the introduction of the project in an area, a farmer had allowed roughly 50 local farmers to rent space on 21 ha of his land. When the landowner decided to plant trees as part of the project, the other farmers lost access to this land. This case shows how poor farmers can suffer as a result of a carbon project through the participation of large landowners nearby if they decide to take their land out of agricultural production entirely. While it is important for tree-planting projects to consider the livelihood and food security implications of their interventions, the circumstances described in the TIST example were not found widely within the cases. The more common model was one in which all project participants were smallholders and generated their own carbon credits through climate-smart agricultural practices on their own land which increases crop yields and resilience to climate change.

Livelihood risks for smallholders participating in carbon projects were a concern only in cases where trade-offs occurred between yields and expected cash returns from carbon. Smallholders did not appear to be making this trade-off in these projects (See Non-carbon benefits). For smallholder participants, the carbon payment was a co-benefit to the primary benefits of the project which occurred on-farm as a co-benefit of carbon-rich farming. Even so, these payments can be quite helpful as they provide diversification of farmers' incomes.

Even though the cash payment is not the core benefit of participation for the farmers, financial barriers and price volatility have the potential to jeopardize some farmers' ability to participate in carbon projects. Farmers are more able to participate if they have access to pre-financing through early payment or credit. This could come through formal institutions or through village level revolving loan systems. Upfront costs can be reduced when farmers are able to use their own labour and seeds. Projects recognized the importance of delivering reliable and stable carbon payments. ECOTRUST was able to confront the problem of carbon price volatility by explaining the potential for price fluctuations to new participants, and, once a price was agreed with a farmer, guaranteeing this set price throughout the duration of the project.

Beyond the projects' management innovations, they rely on international and national climate policy to improve the long-term survival prospects for the projects themselves and to ensure a continued stream of carbon benefits for farmers. Regulatory carbon regimes do not support agricultural carbon projects in Africa. If the international carbon trading system was stronger, more predictable and included more land use opportunities, investor confidence in these kinds of projects would be boosted and perhaps the carbon prices would rise. Currently, most land use projects are exchanging credits in the voluntary carbon markets, and constitute a very small fraction of global carbon markets (Peters-Stanley et al. 2011).

Gender

Gender roles were a concern throughout the implementation of the projects, particularly on issues related to land and tree tenure, labour, knowledge, benefit sharing, participation and leadership. In many African countries women cannot hold title deeds to land. In projects where contracts were signed at the household leve and women were not the official owners of land or of the trees planted, this created a barrier for women to be full participants and beneficiaries. However, in cases such as TIST where contracts were signed with small groups and not did not require land ownership for participation, women were in a better position to claim benefits. TIST also ensured that contracts included the names of the female and male heads of the household, and decisions and payments required authorization by both. An idea under consideration by CARE was to make payments using vouchers that could be used at local shops, with both female and male heads of the household being required to authorize the vouchers for any purchases.

Women (and children) provided much of the agricultural labour associated with the carbon projects' agricultural practices. Therefore, to the extent that changes in practices increase farm families' workloads, they will place a greater demand on women's time. However, one of the substantial benefits to tree planting and improved water management for women can be a reduction in the substantial amount of time spent gathering fuel wood and water.

The relative lack of education, information and services for women versus men in many communities, restricts women's ability to adopt new practices and access new opportunities such as carbon payment schemes. Project experiences revealed that investments in training that target women – hiring women community facilitators, timing visits, seminars and trainings explicitly to ensure women's participation (e.g. in the afternoon), and ensuring that women receive information directly – are strategies that have been employed to address this issue. Another innovation is to explicitly include the provision of seedlings of 'women's trees' – trees that provide firewood, fodder, shade and fruits, and not just poles and timber (desired by men). The CARE project is taking this approach.

Participation and leadership in small groups and umbrella groups are also critical for women. Several innovations to ensure women's participation included rotating leadership systems (TIST), targeting a certain number of women leadership positions within groups, and communication efforts highlighting the important role of women in these initiatives. Parallel efforts that enhance women's access to loans and insurance were being pursued by ECOTRUST.

5. Conclusion: Key challenges and next steps

This analysis of six agricultural carbon projects indicates that new institutional arrangements are emerging to enable smallholder farmers to benefit from carbon projects. Projects have successfully established systems for financial management, agricultural extension, and carbon monitoring involving a complex set of partnerships. They have established institutional relationships with farmers through small farmers' groups and clusters, which enables broad participation, efficient contracting, timely communication, provision of extension services, benefit-sharing, and gender-focused activities.

Project developers and managers face significant financial obstacles due to the high upfront costs of project establishment, the low price of carbon and the multi-year period between project establishment and credit verification in the leading carbon crediting systems. Projects have filled financial gaps with development and philanthropic funds. Due to the relatively small amount of money generated by the carbon credits, projects need to manage expectations around benefits carefully, support efficient systems of aggregation and ensure non-cash benefits for farmers. The most significant benefit of participation for farmers is not a cash payment, but rather access to extension systems that can improve crop yields. When cash payments are distributed, managing power dynamics within and among farmer groups – the distribution of payments to individual farmers in many cases – is a significant challenge. Table 3 summarizes the key conclusions from the study.

Table 3. Summary of key research findings

Project organization and management
Financial management, agricultural extension, and carbon monitoring are key organizational functions of smallholder carbon projects.
Farmers' groups with formalized leadership structures were the main link for farmers to access project managers and communicate about projects.
Pre-carbon project activities allowed projects to build a foundation of trust and rapport with communities and reduce the initial investment and transaction costs required to establish the project.
As projects upscale they will have opportunities to benefit from more efficient project administration and the ability to link to other initiatives within their landscape to create wider impacts.
Founding project managers are working to build capacities of local groups to take on increasing carbon project management responsibilities.
Community members successfully monitored carbon at high levels of measurement precision and relatively low cost.
The success of smallholder carbon projects will rest largely on the strength of community groups, which enabled broad community participation, efficient contracting, timely communication, efficient provision of extension services and carbon benefit-sharing.
Finance and benefits
Most project costs occurred in the start-up and early project phases when it was necessary to develop a project design and conduct outreach to farmers, although projects also required substantial investment over time. Projects developed mechanisms to meet the pre-financing needs of agricultural carbon projects.
Full or accurate costing of projects and comparison of costs is difficult due to prior project investments and capacities that support the implementation of carbon activities (e.g. credit schemes). Donors also often provide additional financing to start projects that is not accounted in project costs.
Models of projected financial returns demonstrate the potential of long-term project profitability.
The most significant costs for farmers were their time and labour. Cash needs were highest for the tree planting projects where farmers were responsible for buying their own tree seedlings.
Carbon returns to farmers were very low compared to costs of implementation: Vi expected to pay on average USD 2.47 per farmer per year; TIST paid farmers USD 0.02 per tree annually; ECOTRUST paid farmers for actual carbon credits generated per household, with a typical payment of USD 904 for a woodlot on 1 ha.
Payments were seen as a source for diversification of farmers' incomes and a stable albeit small income source.
Distribution of carbon payments was simplified by projects contracting with small groups rather than individual farmers.
To help farmers invest money and access credit, projects can facilitate the establishment of bank accounts as well as informal credit institutions. Farmers considered this one of the major indirect benefits of participating in the project.
Strengthening the international carbon trading system could increase investor confidence in smallholder carbon projects and encourage higher carbon prices.

Table 3 continued

Non-financial benefits
The most significant benefits were improved farm productivity rather than cash from carbon credits.
Sustainable land management practices were expected to increase farmers' resilience to climate change by improving general soil health, water-holding capacity and making soils more resistant to drought.
Projects noted the benefits of diversified income, increased fodder and fuelwood, and the strengthening of local groups responsible for managing local elements of the carbon project.
Group structures were often used to deliver other benefits such as marketing coordination or health training.
Less tangible benefits from the project included agricultural knowledge and skills, the social benefits of community cohesion, and new opportunities for women and youth, particularly in the development of tree nurseries.
Farmer risk management
Risks included potential conflict over land and carbon rights, trade-offs between agricultural yield and carbon credit production, and conflicts within communities over the distribution of carbon payments.
The formalization of rights regimes can lead to community conflicts. Legitimate community decision-making processes, linked to pre-established conflict resolution systems, are needed to handle risks.
Poor farmers can suffer as a result of a carbon project through the participation of large landowners nearby if the latter decide to take their land out of agricultural production entirely.
Smallholders did not appear to be making trade-offs between yields and expected cash returns from carbon.
Financial barriers and price volatility had the potential to jeopardize some farmers' ability to participate in carbon projects. Farmers were more able to participate where they had access to pre-financing through early payment or credit, which could come through formal institutions or through village level revolving loan systems.
Gender
Women were in a better position to claim benefits where contracts were signed with small groups and did not require land ownership for participation.
Women (and children) provided much of the agricultural labour associated with the carbon projects' agricultural practices. Therefore, where practices increase workloads they will place a greater demand on women's time.
Tree planting and improved water management can also reduce time women spend gathering fuel wood and water.
The relative lack of education, information and services for women versus men in many communities restricts women's ability to adopt new practices and access new opportunities such as carbon payment schemes.
Investments in trainings that targeted women – hiring women community facilitators, timing visits, seminars and trainings explicitly to ensure women's participation (e.g. in the afternoon), and ensuring that women receive information directly – were successful strategies.
Explicitly including 'women's trees' – trees that provide firewood, fodder, shade and fruits, and not just poles and timber (desired by men) — encouraged participation by and in-kind benefits to women.
Participation and leadership in small groups and umbrella groups was critical for women. Innovations to ensure women's participation included rotating leadership systems, targeting women leadership positions within groups, and communication efforts highlighting the important role of women in these initiatives. Enhancing women's access to loans and insurance was also viewed as important.

The experiences documented in these projects provide a foundation to develop strategies to improve them, and similar initiatives, in the future. Important areas for further action research include the following topics:

Empowerment of local institutions to take on additional project management responsibilities

A critical step for projects to ensure long-term sustainability is to build the capacities of local institutions to take on increasing roles of project management from the original project managers, often international NGOs, so that the agricultural, knowledge and financial systems that support carbon projects are institutionalized. This process will require innovations in partnership development as well as in capacity building. Projects are approaching these transitions in a variety of ways, and the dynamics of these processes need to be better understood.

Financing for establishment and expansion

The challenges of project financing from the beginning of project activities up to the issuance of carbon credits is an important limiting factor for their expansion. Some projects began payments early in the project while others waited until carbon benefits had been verified. This presents problems for developers as well as farmers. At the project level, developers can pre-sell credits, receive philanthropic support or take out loans. On the farmer level, options include village banks and revolving loan funds to finance upfront investments in establishing SLM interventions.

Power dynamics within groups

All participating farmers in these projects belong to some form of small group that either engages in carbon contracts directly, or at least plays a central role in extension and monitoring. The dynamics within these groups were critical to ensuring equitable distribution of carbon payments, particularly for women. Projects developed innovative mechanisms, including rotational leadership and targeted trainings, to support efforts to achieve equity within groups, and more needs to be learned about the effectiveness of these systems.

Resource rights and conflict management

Conducive property rights laws and regulations (tenure systems for land and carbon) need to be in place for smallholders in order for agricultural carbon projects to function. In areas where land and carbon rights are not secure, confusion and conflict could arise once project benefits begin to flow. Robust and locally legitimate conflict resolution systems should be in place to handle these issues. The nature of these conflicts and successful mechanisms for dealing with them should be better understood.

Moving to scale

The process for moving from hundreds to tens of thousands of farmers, as some of these projects are attempting, poses significant challenges for project management. Furthermore, as projects grow in size, they will begin to integrate into larger landscape management processes. For both of these transitions, project managers will likely need to change management structures and reach out to other actors. The process of these efforts to scale up and out will be important to track.

Based on the results of the cases analysed in this paper, a 2nd phase of action research commenced in September 2011 to address some of the key issues identified in this report. Projects will also be engaging in a knowledge sharing network so that they can learn from each other's experiences. This research will continue through 2014, allowing projects to track institutional changes over time.

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Appendix 1: Nairobi workshop participants

Name	Organization	Country
Amos Wekesa	Vi Agroforestry	Kenya
Assefa Tofu	Humbo	Ethiopia
Byamukama Biryahwaho	Nature Harness Initiative	Uganda
Charles Iberre	TIST	Kenya
Christine Yankel	TIST	USA
Emmanuel Wachiye	Vi Agroforestry	Kenya
Eunice Anim	Cocoa Carbon Initiative	Ghana
Faith Wambui	ASB Partnership for the Tropical Forest Margins	Kenya
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Appendix 2: Research questions

Topic 1: Organization's capacity to sequester and reduce significant amounts of GHGs and to verify the process

1. What interventions are being implemented and who is responsible?
2. What are the targets?
3. How are they progressing towards it – proportion of targets achieved?
4. What are the roles of various organizations in the sequestering process?
5. What methodology or standard is being used?
6. Roles played by participants in monitoring?

Topic 2: Effective, efficient management capacity that can be sustained over time, and adaptability to local and global changes in C finance policy and practice

1. Project Organization
1a. How is the project organized?
1b. Who are key institutional actors?
1c. What is the role of each institution?
2. Describe project process from start to getting the carbon market
3. Risks and opportunities
3a. What are the project risks?
3b. How are they being managed?
3c. How has the project taken advantage of new opportunities or changes in the project environment?
4. Project management capacity
4a. Describe the project financial, technical, personnel, and administrative management capacity.
4b. What are attributes of the organizations that provide it with stability and/or allow it to adjust to changes?
5. Community structure and governance
5a. What community structures/groups are involved in the project?
5b. Describe the history of the group. Did it exist before project initiation? How has the project changed it?
5c. What is their role generally and in the project?
5d. Describe the governance of these structures.
5e. Are they registered legally?
6. What is the community organization role in the project decision-making process?
7. What are internal or external evaluation processes?
8. National and local law and policy on agricultural carbon
8a. Describe the relevant legal and policy framework that supports the carbon projects in your country.
8b. Describe the relevant sectoral (agriculture, forestry, etc.) legal and policy framework supporting the project.
9. What are the landscape processes with which the project participates and how does the project interact with it?
10. What are the most significant challenges for the project?
11. What are the most significant innovations of the project?

Topic 3: Capacity to generate adequate financial flows, cost-effectively, and to ensure sustainable and equitable benefits to farmers

1. Describe the project's financial lifecycle

1a. Direct project start-up costs.

1b. What are the project's operational costs?

1c. What were the pre-project investments in institutions on which the project is built?

1d. What is the revenue per year? Over time?

1e. What percentage of carbon income goes to farmers as individuals? What percentage goes to the community? What percentage goes to project proponents?

2. Farmer financial analysis

2a. What are start-up costs (or projected costs) each year for the farmer?

2b. Farmer's operational cost per year

2c. Project operational costs

2d. What is the cash revenue to farmers? Yearly and over time?

3. What are strategies for marketability of carbon?

4. Co-benefits and tradeoffs for farmers

4a. What are co-benefits from this project?

4b. What are food production trade-offs for farmers? Opportunity costs/tradeoffs for the community?

5. Payment mechanism to farmers

5a. How do farmers get paid for carbon?

5b. When is carbon payment made in relation to the timing of the farmers' change in practice?

5c. What mechanism is there for the farmer to manage costs of outlay of resources? Timing?

5d. What actions must you take to receive carbon payment?

6. Have you encountered any disagreements/disputes between beneficiaries? How do you manage these disputes?

There is growing interest globally in the development of agricultural carbon projects that can sequester large amounts of carbon dioxide from the atmosphere to mitigate climate change, while contributing to sustainable agriculture and land management for smallholder farmers. This paper summarizes the findings of a research initiative led by international NGO EcoAgriculture Partners with the support of the Climate Change, Agriculture and Food Security (CCAFS) Research Program and in partnership with managers of six African projects. It is designed to generate insights useful to each of these audiences by conducting an in-depth analysis of the structure and institutional innovations of these projects. The objective of this initiative is to better understand mechanisms that can improve projects' viability and impacts on the rural poor, and thereby generate lessons for project developers, managers and policymakers. We review project organization and management, the structure and role of community groups within the projects, costs and benefits for managers and farmers, strategies to manage risks to farmers, and efforts to support women's participation.This analysis indicates that new institutional arrangements are emerging to enable smallholder farmers to benefit from carbon projects.

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